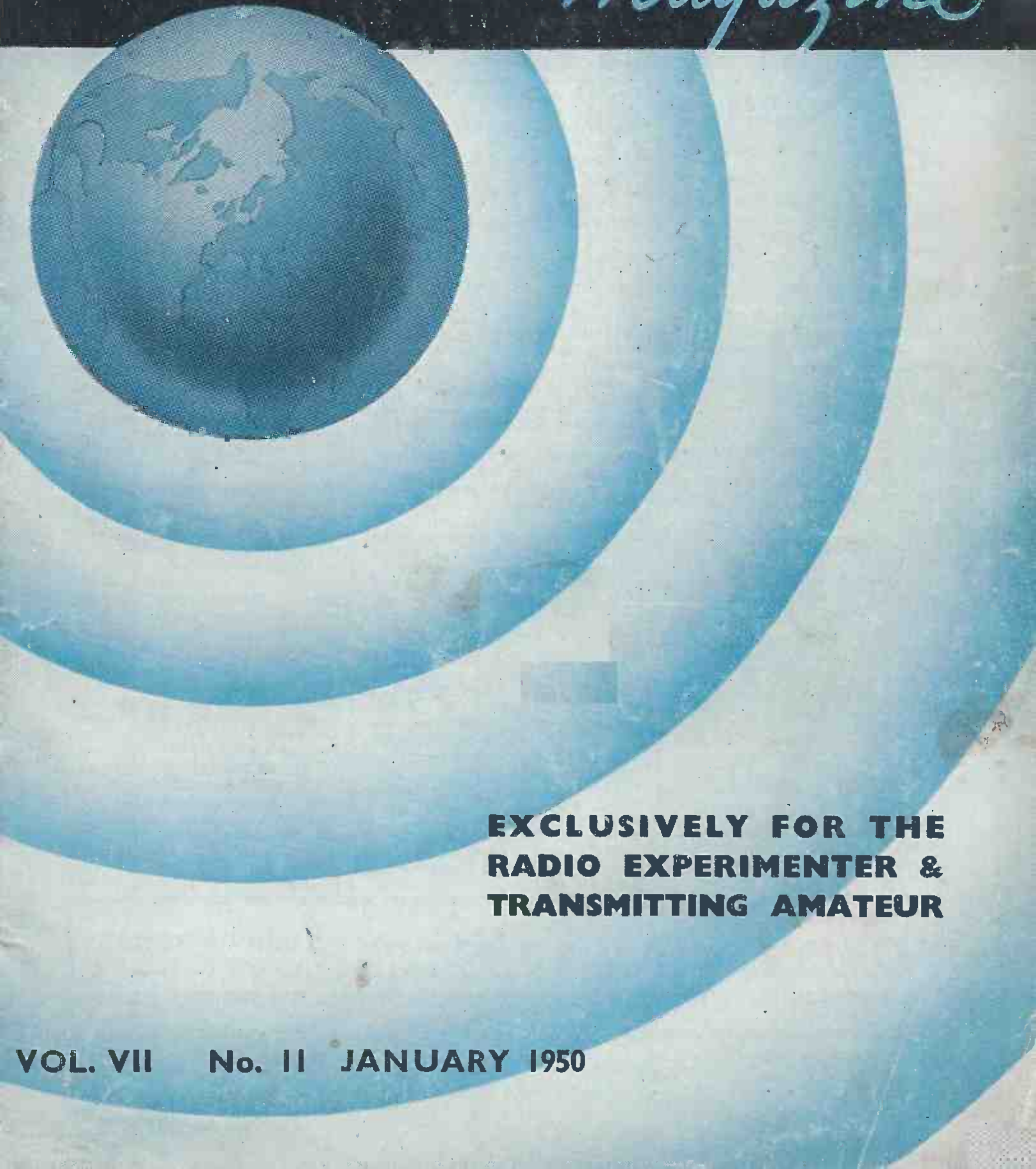
The SHORT WAVE Magazine

2/-



EXCLUSIVELY FOR THE
RADIO EXPERIMENTER &
TRANSMITTING AMATEUR

VOL. VII No. 11 JANUARY 1950

Important ANNOUNCEMENT to users of the AVO VALVE TESTER

REGD. TRADE MARK

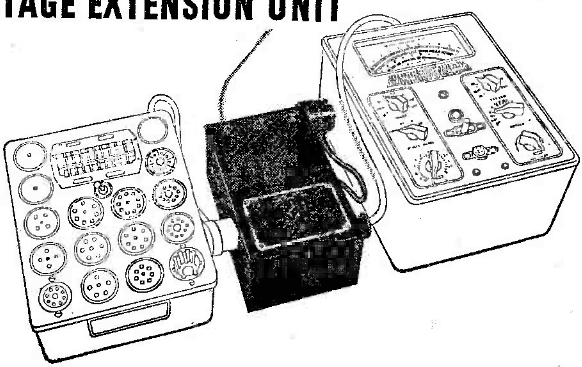
In response to popular request, we are pleased to announce the availability of the following accessories, which provide an inexpensive means of bringing the " Avo " Valve Tester completely up to date. Possession of these accessories will, furthermore, render it a simple matter to maintain the " Avo " Valve Tester in a condition capable of testing any new types of valves that may be produced in the future.

ACCESSORIES for the 'AVO' VALVE TESTER

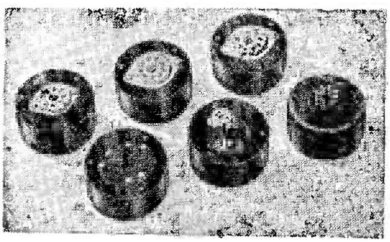
FILAMENT VOLTAGE EXTENSION UNIT

For providing filament voltages of 1·4 to 117 volts for testing valves recently introduced into general use and which are not covered by the original " Avo " Valve Tester.

This unit is plugged in between the Meter panel and the S.S. panel, where it may be left permanently in position regardless of whether the original or the additional heater voltages are being used.



VALVE BASE ADAPTORS



These Adaptors have been specially designed for plugging into the international octal socket of any " Avo " Valve Tester Panel which is fitted with a rotary selector switch. The following types, covering recently introduced valve bases not provided for on the existing Valve Panel, are now available :—

Type No. 1 .... B7G and B8A.
Type No. 2 .... B9G (EF50, etc.).
Type No. 3 .... B8B (American Loctal).
Type No. 4 .... Hivac Midget 4- and 5-pin and Midget Diode.
Type No. 5 .... Blank.

Other types will be made available as required, and Adaptors can also be supplied for any special valve base.

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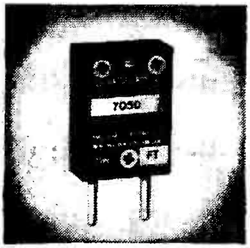
AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.

WINDER HOUSE, DOUGLAS STREET, LONDON, S.W.1. *Telephone : VICtoria 3404-9*

VTE

H.F. QUARTZ CRYSTAL UNITS
(TYPE FO)

These crystals are now available in the fundamental frequency range from 15 Mcs. to 27 Mcs. They are overtone type plates designed for operation at series resonance in low power transmitters, and in v.h.f. receiver oscillators, in which the i.f. section of the receiver is tuned. The Squier circuit is especially recommended, and full circuit details will be found in "Q.S.T." for Oct., 1948, and "Proceedings R.S.G.B.," Summer, 1949. Maximum r.f. volts across the crystal should not exceed 15 volts r.m.s., and the h.t. volts at the anode of the c.o. valve should not exceed 150.



TYPE FO

The crystal is mounted in our type F miniature mount, which is directly interchangeable with the U.S.A. pattern FT243. Two units, back to back, plug in to the standard International octal valve socket.

Prices :—

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Tolerance from nominal frequency	***Price***
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(*Directors : E. A. Dedman, G2NH, N. H. Munday, G5MA, W. J. Thompson, G2MR*)

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G2AK This Month's Bargains G2AK

SCR 522 Receivers, complete with 11 valves, **25/-,** plus 5/- carriage.

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FREE GIFT OFFER. Purchase two 832 valves (new and boxed) at **25/-** each, and we will make you a gift of the above transmitter.

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NEW high efficiency E.H.T. rectifier for Television Tubes

Actual size illustration

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Filament Voltage	1·4 volts
Filament Current	0·14 amp.
Peak Inverse Voltage	15 max. KV*
D.C. Output Current	2 max. mA
Peak Anode Current	12 max. mA
Surge Anode Current	40 max. mA

*For circuits where anode and filament voltages rise at approximately the same rate, e.g. as in fly-back and R.F. oscillator circuits. Where used on power input circuits with full A.C. anode voltage applied on switching, the maximum P.I.V. is 10 kV.

Osram U37

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Osram VALVES

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, W.C.2.

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SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR & AMATEUR RADIO

Vol VII — JANUARY 1950 — No. 78

CONTENTS

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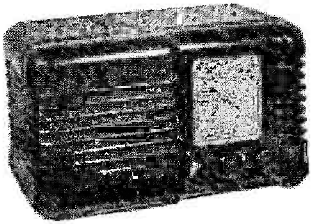
PREMIER MIDGET RADIO KIT. Due to greatly increased production, we are now able to offer this kit at a greatly reduced price. Including an attractive Bakelite case, 12" long × 5" wide × 6" high. The valve line up is 6K7, 6J7, 6V6 and a Selenium rectifier in the A.C. model ; and 6K7, 6J7, 25A6 and Selenium rectifier in the AC/DC model. Both are for use on 200 to 250v mains. The dial is illuminated and the receiver presents a very attractive appearance. Coverage is for the medium and long wavebands. Complete kit of parts with cabinet and diagrams, **£4/19/6**, inc. P.Tax.



PREMIER MIDGET SUPERHET KIT. This powerful Midget Superhet Receiver is designed to cover the shortwave bands between 16 and 50 metres and the medium wavebands between 200 and 557 metres. Two models are produced, one for 200-250v AC mains, and the other for 200-250v AC or DC mains. Both are supplied with the same plastic cabinet as the TRF Receiver. The AC valve line up is 6K8 6K7, 6Q7, 6V6 and a Selenium rectifier. The AC/DC line up is the same, with the exception of the output valve which is a 25A6. The dial is illuminated, making a very attractive receiver. Complete kit of parts with cabinet and diagrams, **£6/19/6**, inc. P.Tax.

VALVES. We have large stocks of new boxed valves at very low prices. All exempt from Purchase Tax. 1LC6, 1LD5, 1LN5, 1S4, 1S5, 1N5, 1T4, 3A4, 3D6, 5U4, 5Y4G, 5Z4, 6AC7, 6AG7, 6C5, 6F8, 6J5, 6J7G, 6K7, 6K8, 6N7, 6Q7, 6SA7, 6SJ7, 6SK7, 6SC7, 6SL7, 6SN7, 6U5, 6V6, 717A, 12A6, 12J5, 12K7, 12K8, 12Q7, 9003, VR55, (EBC33), VT52 (EL32), VR56 (EF36), VR57 (EK32), VR75, VR105, VR116, VR136 (EF54), VR137 (RL37), CV66 (RL37), CV1120 (SU2150A), CV1137 (RL16), CV1068 (AW4), CV189 (U19), CV2941 (EL50), VU39, 807 ceramic base, HYVAC XY & XW, KT61, KTW61, U50, 6F6. All the above at **6/6** each. 6H6, 6SH7, 7193, VR78 (D1), all **2/6** each. VR54 (EB24), VR65 (SP61), VR92, (EA50), VR95 (954), VT121 (955), CV102 (crystal diode), all **3/6** each. 6X5, HL23, RL18, VU111, VU133, VU134, CV6, VR91 (EF50), CV73 (11E3), CV1189 (AC6Pen), CV659 (1625), CV639 (843), all **5/-** each. 2X2, U74, CV1262 (GU1), all **7/6**. 5R4, 5V4, 6B8G, 25Y5, 25Z6, 2050, VT127 (Pen46), CV1075 (KT66), all **8/6** each. Matched pairs, KT66, **18/6**. 3B24, 6L6, P27/500, 705A, 832, CV662 (8012), all **10/-**. 805, **17/6**. 931A, **30/-**. CV186 (magnetrons), **40/-**. CV19 (EHTT), **60/-**. CV160 (KB/S magnetron), **60/-**. CV12 (1191), **60/-**. 861, **£10**.

Cathode Ray Tubes for callers only : VCR140, **50/-** ; VCR516A, **40/-** ; VCR517E, **30/-** ; VCR511B, **60/-** ; VCR522, **15/-**.

EDITORIAL

Equalities

As we have remarked in this space more than once before, amateurs tend to be individualistic and by its very nature Amateur Radio is a highly specialised activity.

It is therefore somewhat to be wondered at that there is emerging a minority with a demand that Amateur Radio be organised on a sort of "fair shares for all" basis. Perhaps this is a reflection of the levelling process supposed to be going on in our national life—but which in fact is not happening at all, and never will.

Broadly, the argument is that in a contest it is "unfair" for A with 25 watts to have to compete with B able to run 150. It is also "unfair" that C, who can only string out a few feet of wire in the backyard, must contend with D, with acres of aerial space.

Certainly, these conditions make it impossible for all operators everywhere to compete on level terms. But they are no more than the conditions of life since the dawn of recorded history, and Nature herself has been unable to evolve a system which makes it "fair for everybody."

The truth is, of course, that in Amateur Radio as in other activities, the best type of amateur is he who makes the *best use of his opportunities*. He may be unable to afford more than a few watts of CW, but that does not mean he is in any degree inferior to the operator who can run a complex high-powered installation. Both are making the most of their opportunities and in their different ways each is making a contribution to the art.

In this sense, therefore, Amateur Radio *is* fair to everybody, for every amateur is given the privilege and the opportunity to contribute the best that within him lies.

Therefore, in Amateur Radio of all things, do not let ourselves be deluded by the false notion that flat equality is a practicable or even a desirable objective.

Austin Forsyth
G6FO

Here is the third in our series of constructional articles based on prototype designs to Magazine *specification. It is a full-power band-switched transmitter unit for the range 3·5 to 28 mc. Requiring only a keyed VFO as driving source for CW operation and adaptable for either screen or plate-and-screen modulation of the PA for telephony working, it uses standard British components throughout. Full constructional and operating details are covered and the model here described is giving excellent results under practical amateur station conditions on Eighty, Forty, Twenty and Ten.—Ed.*

Band-Switch QRO Transmitter

Three-Stage Unit for Full-Power Working—Switched Coil Turrets for Multi-Band Coverage—Detailed Design and Constructional Data

By **J. N. WALKER (G5JU)**

WITH the advent of reliable switched transmitting coil assemblies, it becomes possible to construct a compact transmitter capable of operation on several amateur bands at the maximum power permitted. Unquestionably, it is a great convenience, when changing bands, to have only to rotate two switches, instead of going through the sequence of inserting plug-in coils in the intermediate stages and in the PA tank circuit.

Some amateurs employ a separate transmitter for each band, a procedure to be recommended on the VHF bands (including possibly 28 mc) but quite unnecessary on the lower frequencies. Not only do separate transmitters occupy a good deal of space, but the switching or other arrangements for changing from one transmitter to another become unduly complicated.

The transmitter to be described gives simplicity of operation and takes the full 150 watts on the 80-, 40- and 20-metre bands, with high efficiency. It also functions well on the 15-metre band (not yet released). On the 10-metre band, the amount of drive available is not quite sufficient for running the PA up to 150 watts, but over 100 watts input is possible at reasonable efficiency.

The transmitter is complete on a single chassis and is intended for operation in conjunction with a VFO, which may, of course, incorporate facilities for crystal control. The various DC power supplies are not included since these will normally be already available. The simplicity of the installation as a whole is increased by the fact that the VFO need only give output on 3·5 mc, a point which will be appreciated by those who have experienced the difficulties sometimes encountered when building a VFO to give output on several bands.

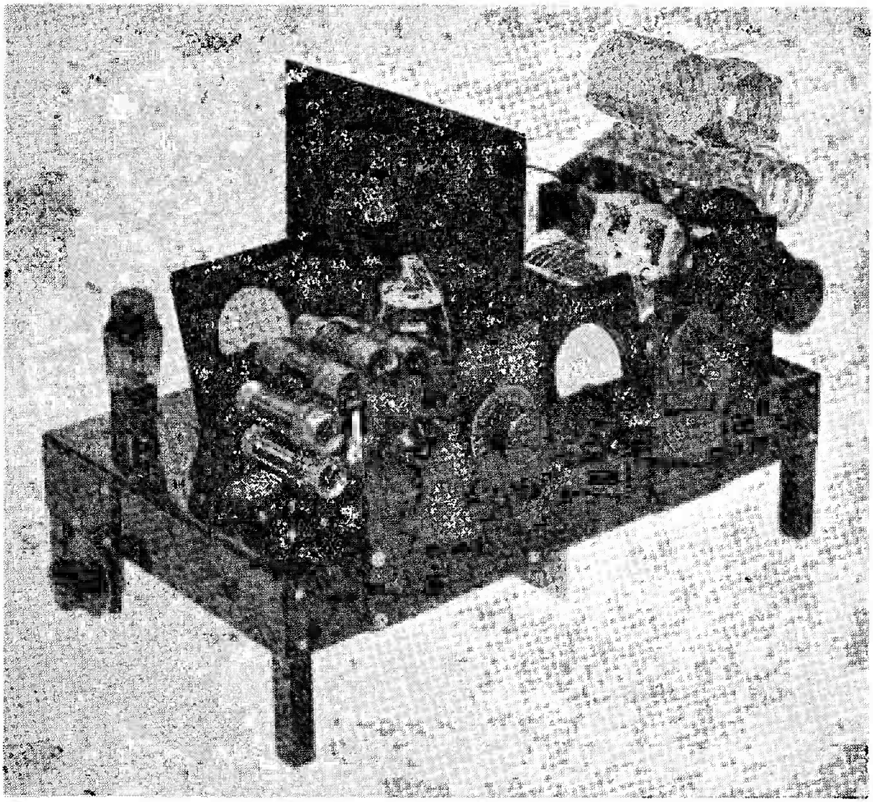
The PA is arranged for screen-grid modulation—a system which has the advantage of requiring only a moderate amount of audio power for full modulation and about which full information is being given in forthcoming issues of the *Magazine.* Screen modulation also obviates the use of a high-wattage voltage dropping resistor in the screen circuit, a method which gives rise to poor screen voltage regulation. At the same time, the circuit can be adapted fairly easily for high level modulation of both anode and screen of the QY2-100 (813) valve used in the PA stage.

In a transmitter employing several tetrode valves, a certain amount of metal work becomes inevitable, but the construction has been simplified as much as possible. For example, few large holes are required and a front panel has been omitted. Panels of Masonite fibreboard hold the few controls and prefabricated mounting brackets take the meters. It will be obvious that the transmitter is designed for "top of the table" operation and not for rack mounting.

Circuit Design

Much consideration has been given to the circuit, given in Fig. 1, to ensure adequate generation of RF drive combined with high stability.

The coil in the grid circuit of the first valve, a 6V6, is self-resonant over a fairly wide band centred about 3·6 mc. It is provided with a low impedance link winding and ordinary coaxial cable is used for connection between this stage and the VFO. Originally a standard type of RF choke was inserted in the anode circuit of the 6V6 but the RF voltage developed across it was insufficient, particularly at the higher harmonic frequencies. It was also found that the output at odd harmonics was greater than at even ones, which is an undesirable state of affairs.



Front view of the Band-Switch QRO Transmitter. The coil change for the 807 driver stage (L3 in Fig. 1) is in the left foreground. The Labgear switched-coil assembly for the PA (the L4 coils) is to the upper right, with the 40-metre inductance on top.

A tuned circuit was therefore substituted, but in a form which calls for the minimum of adjustment. The values of L2/C6 are such that resonance at 7 mc occurs with the tuning condenser near minimum, when the QVO5-25 valve gives ample output at 7 mc as a straight amplifier and at 14 mc as a doubler. On 28 mc, the QVO5-25 acts as a quadrupler giving a fair output, sufficient to drive the final valve to about 120 watts. Tests made on 21 mc indicate that the driver valve, acting as a trebler, will provide full excitation for the PA on that frequency.

On 3·5 mc, the value of C6 is increased and more than sufficient voltage is developed across the circuit to drive the following stage. The tuning of C6 is comparatively flat and adjustment is only required when changing from 3·5 mc to the higher frequency bands.

The valve selected for the driver stage must operate efficiently as a harmonic doubler-*cum*-amplifier and give sufficient output for driving the final valve after making allowance for inherent circuit losses. The Mullard QVO5-25 serves the purpose admirably. On principle, it is run well within its ratings—a better method than using a smaller valve at maximum input, remembering that the efficiency is lower than when used in purely amplifier service.

A Labgear switched coil turret is employed in the anode circuit of the QVO5-25 and it is a matter of a moment to change the operating frequency of this stage to 3·5, 7, 14, 21 or 28 mc. Precautions are taken to prevent parasitic oscillations and a metal screen is fitted around the lower portion of the valve.

The output is fed to the control grid of the PA valve *via* a fixed condenser and a short length of coaxial cable. The use of the latter has definite advantages. It screens the PA grid lead from the grid circuit of the QVO5-25 and also from the circuits associated with the

List of Parts and Values

BAND-SWITCHED QRO TRANSMITTER

1	Standard Chassis, Cat. No. 617	*Eddystone*
1	Filament Transformer 6·3 volt, type PTF15	*Woden*
1	Filament Transformer 10 volt, type PTF22	*Woden*
1	150 watt Switched Coil Turret	*Labgear*
1	Coil, type FCL (10 metres)	*Labgear*
1	Coil, type T20/A (20 metres)	*Labgear*
1	Coil, type T40/DCL/HC (40 metres)	*Labgear*
1	Coil, type T80/ECL/HC (80 metres)	*Labgear*
1	35 watt Coil Turret (L3)	*Labgear*
1	Valve, type 6V6G (V1)	*Brimar*
1	Valve, type QVO5-25 (V2)	*Mullard*
1	Valve, type QY2-100 (V3)	*Mullard*
1	M/c Meter 100 mA (M1), $2\frac{1}{2}$ in. square flush	
1	M/c Meter 25 mA (M2), $2\frac{1}{2}$ in. square flush	
1	M/c Meter 300 mA (M3), $2\frac{1}{2}$ in. square flush	*Measuring Instruments (Pullin)*
1	Trimmer Condenser 3/30 $\mu\mu$F. Concentric (C1)	*Mullard*
1	Transmitting Condenser 50 × 50 $\mu\mu$F. (C19), Cat. No. 612	*Eddystone*
1	Ceramic Microdenser 60 $\mu\mu$F. (C6), Cat. No. 582	*Eddystone*
1	Ceramic Microdenser 54 $\mu\mu$F. (C12) Cat. No. 589	*Eddystone*
1	Ceramic Microdenser 12·5 $\mu\mu$F. (C21) Cat. No. 580	*Eddystone*
1	Former (L1), Cat. No. 646	*Eddystone*
1	Former (L2), Cat. No. 537	*Eddystone*
1	Neutralising Condenser (C14), Cat. No. 481	*Eddystone*
1	Lead through Insulator, Cat. No. 695	*Eddystone*
8	Miniature Insulators, Cat. No. 1019	*Eddystone*
2	RF Chokes (RFC1 & 3), Cat. No. 1022	*Eddystone*
1	RF Choke (RCF2), Cat. No. 737	*Eddystone*
3	Direct Drive Dials, Cat. No. 595	*Eddystone*
1	Skirt Knob (for L3 Switch), Cat. No. 2416P	*Eddystone*
1	Instrument Knob (for L4 Switch), Cat. No. 1076	*Eddystone*
1	Flexible Coupler, Cat. No. 50	*Eddystone*
1	Valve Cap Connector, Cat. No. 562	*Eddystone*
1	Valve Cap Connector, Cat. No. 563	*Eddystone*
1	Octal Valveholder (for V1), List VH85	*Bulgin*
1	American 5-pin Valveholder (for V2), List VH75	*Bulgin*
1	Mains Connector, List P31	*Bulgin*
1	Mains Plug, List P28	*Bulgin*
1	5-way Tag Strip, List T20	*Bulgin*
4	2-way Tag Strips, List T17	*Bulgin*
2	1-way Tag Strips, List T32	*Bulgin*
1	5-way Socket, List L331	*Belling-Lee*
1	5-way Plug, List L1258	*Belling-Lee*
2	Coa ial Sockets, List L373/Skt	*Belling-Lee*
1	HT Plug and Socket, List L353	*Belling-Lee*
1	2-way Plug and Socket, List L348	*Belling-Lee*
1	Large 7-pin Valveholder (for V3)	*Webb's Radio*
1	Valve Screen 807 type	*Philpott*
1	Valve Screen 813 short type	*Philpott*

Varley Power Resistors

R7 = 6,800 ohms, 10 watt
R8 = 10,000 ohms, 10 watt

2 Holders for above

Erie Resistors

R4	= 12 ohms, $\frac{1}{2}$-watt
R1, R10	= 22 ohms, $\frac{1}{2}$-watt
R11	= 220 ohms, 1 watt
R5	= 470 ohms, 1 watt
R12, R14	= 470 ohms, $\frac{1}{2}$-watt
R6	= 1,000 ohms, $\frac{1}{2}$-watt
R3	= 4,700 ohms, 2 watt
R13	= 4,700 ohms, 1 watt
R2, R9	= 47,000 ohms, $\frac{1}{2}$-watt

T.C.C. Condensers (*All Moulded Mica*)

C3, C4, C5, C8, C9, C13, C15, C16, C22, C23, C24	= ·002 μF, type M2N
C2	= ·00025 μF, type M2N
C7, C10	= 100 $\mu\mu$F, type M2U
C11, C17, C18	= ·001 μF, type M3U
C20	= ·001 μF, type M3GO

6V6 valve. It tends to prevent the generation of parasitics, reduces unwanted harmonic frequencies and generally assists in obtaining stability. The short length employed (about 4 in.) admittedly adds to the stray capacities across L3, but these are tuned out, in any case, with C12, the range of which is adequate at all frequencies.

A resistor is included in series with the RF choke in the grid circuit of the QY2-100 mainly to increase the overall stability. A small amount of grid bias voltage is developed across it, but reliance for the major portion of the grid bias is placed on an external source, which is much the better way in a transmitter of this type. The external source may be batteries or a small mains operated power unit, preferably possessing a reasonably low output impedance.

In the anode circuit of the QY2-100 is an Eddystone split-stator condenser and a Labgear 150-watt transmitting coil turret assembly. The latter takes four plug-in coils, each provided with a link winding for transferring the RF power to the separate aerial tuning circuit. Coils for 7, 14, 28 and 3·5 mc are shown (from left to right) in the photograph of the top deck. An additional coil (type BCL) is available for the 15-metre band —for use when the time comes !

Both stator and rotor of the tank condenser are at high DC potential, so that only the RF voltage appears across them. A high voltage blocking condenser (C20) completes the RF path to chassis.

A somewhat unusual feature is the fitment of a small condenser (C21) to balance out the fairly high output capacity of the QY2-100. Without C21, the circuit is not properly balanced, even though a split-stator condenser is used. It will be found that, without C21, RF will be present at the coil centre tap (indicated by a neon lamp) and the RF potential at one end of the coil will be greater than at the other. The full capacity of C21 approximates to the anode to earth capacity of the PA valve, whilst the spacing between

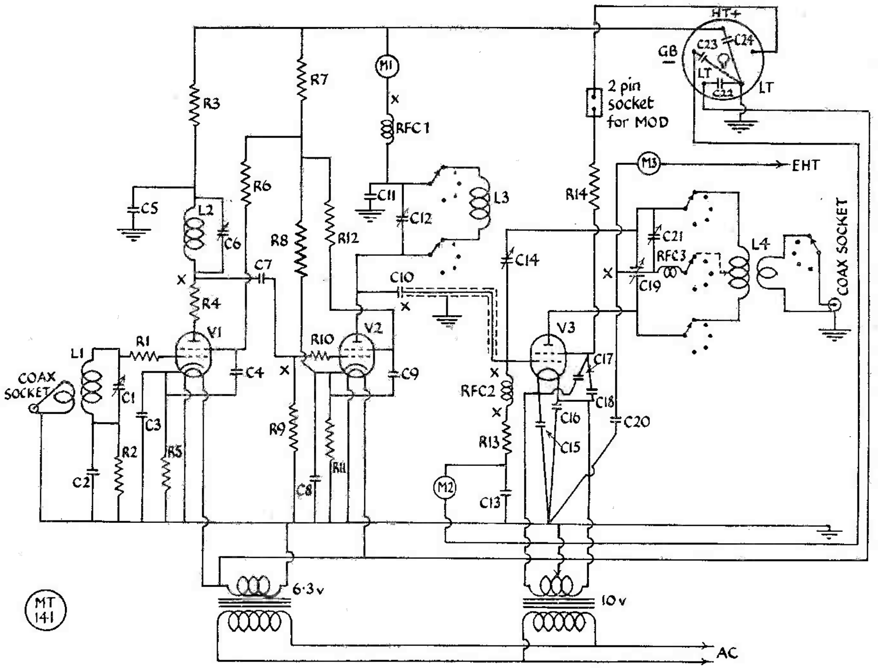


Fig. 1. Circuit of the Band-Switch QRO Transmitter, discussed in detail in the text. For simplicity, one set of coils only is shown across the band-change switches. The switching is integral with the recommended coil assemblies, designed to cover all bands 3·5 to 28 mc inclusive.

the vanes is adequate to withstand the RF potential developed.

The final stage is neutralised—in the writer's opinion, it is unwise to operate a tetrode of the 813 class without neutralisation. This subject was discussed in the October, 1948, issue of the *Short Wave Magazine* and the method of neutralisation then outlined has been adopted. A very effective bypass network is connected between screen grid, filament and chassis, and a small screen is fitted around the base of the valve. As a result of these precautions, there is no trace of instability.

Filament transformers are mounted below the chassis. Grid bias and driver HT voltages are fed in *via* a Belling-Lee 5-pin socket, to which also is brought the 6·3-volt internal supply—the 6·3-volt transformer has something in hand and the VFO heaters are energised from this source. A small Belling-Lee 2-pin socket is provided for connection of the audio voltage in series to the screen grid of the QY2-100. The HT voltage for the PA is fed in through a Belling-Lee high voltage socket.

Meters are fitted for reading the anode currents of V1 and V3 and the grid current of V3. Although the meter reading the anode current of V3 is obscured to some extent by the valve and components in front of it, in practice no difficulty is experienced in observing the meter.

Construction

The chassis has to carry a fair amount of weight and a steel one is therefore used. The number of large holes is comparatively few and considerable manual labour is saved by using Masonite panels for the controls, and ready-made mounts for the meters.

The positions of the major holes are given in Fig. 2—some can be made with punches, others call for the drilling of a number of small holes and filing clean. Two metal (brass or aluminium) screens are required and also some other pieces of metal. The top screen measures 8 in. high by 9 in. long, plus a fixing flange of about ⅜ in. A small 1019 insulator is fitted to this screen, in a position which brings it below C12 (approximately 1 in. from front edge and 1 in. up). The screen itself is set back 1 in from the front of the chassis, to give clearance to the bracket holding the grid current meter. The lower screen is 3½ in. high by 6 in. long. A ¼-in. hole is required for the grid connection to pass through (approximately central 1 in. up) and also a small hole for the bias lead going to the 5-pin socket. The PA coil assembly is mounted with two pieces of metal each 4 in. high and 3 in. wide. Fixing holes are made diagonally to match up with the main bearing rods of the coil switch. As can be seen in the photograph, the PA coil assembly is mounted at an angle to give clearance to the coils. A small bracket (1½ in. × 3 in.) holds the ouput coaxial socket, which is fitted to the side of the chassis, to the rear of the coil turret.

The meters are fitted to metal brackets measuring 4 in. square and provided with clean-cut holes of a size (2⅝ in.) to take the meters. The brackets are made by Philpott, of Loughborough and, being finished glossy black, they add to the appearance, as well as simplifying the work involved.

The Masonite panel holding the smaller coil assembly and C12 measures 6 in. high by 5 in. wide. Two ⅜-in. holes are made 2 in. from the top edge and 2½ in. apart. The Masonite panel holding the dial which controls C19, is 2½ in. by 6 in. and that to which C6 is fitted measures 2 in. wide by 3½ in. long. All these panels (and also the top screen) are painted with black enamel to match the general finish. The coil assembly is of the one-hole fixing type, but it is desirable to provide some support at the rear. A small metal bracket (2¼ in. long, with ½-in. bend up) is therefore made to fit the lower bolt projecting from the switch.

The hole for the neutralising condenser is of unusual shape and should be filed out to conform as closely as possible to Fig. 2. The condenser is mounted with one electrode above and one below the chassis and details of the modification and of the mounting are made clear in the photograph of that component. The brass strip is fitted below the chassis. The setting shown will be found correct in practically every case.

The valveholder for V1 is mounted flush with the chassis. That for V2 is sunk ¼ in. below the chassis and for the QY2-100 1 in. below, to increase the isolation of the grid circuit from the anode side. A metal screen 2½ in. high is fitted around V1 and one 1 in. high around V3. These screens are available from Philpott and are ideal for the purpose—the finish is matt black inside and outside, to assist in the dissipation of heat. A screen 2½ in. high is available for valves of the 813 type mounted flush with the chassis.

When mounting the tank condenser (C19) and the final coil assembly, care should be taken to ensure adequate clearance between the metal rods of the former and the frame of the latter.

The balancing condenser C21 is bolted directly to the unused holes in the end plate of condenser C19, permitting very short connecting leads. Admittedly, C21 cannot be rotated without the rotor fouling a stator section of C19 but this is immaterial, since C21 is set and left at full mesh.

The under-chassis view photograph gives a good idea of the construction beneath the deck and a detailed discussion is hardly necessary. The 6·3-volt filament transformer is on the left and the 10-volt transformer to the right. It should be noted that the V3 valve holder is fitted with the two large sockets facing towards the rear of the chassis. Practically all components are bolted down securely—tag strips or small insulators are provided to hold resistors and RF chokes. To give clearance to the filament transformers, it is necessary to lift the chassis on legs 4½ in. long fitted one at each corner. These legs must be fairly strong and quite rigid and in the writer's case, wooden dowelling (painted black) is used with satisfactory results.

Points in Brief

In a transmitter of this type, there are obviously many small constructional details, some important, some not, which cannot be dealt with fully. The following condensed information will prove useful.

No fuse or switch is fitted in series with the AC supply. In the writer's case, these are provided externally, being bound up with the AC control circuits.

No indicator plates are fitted to the switches. Marks are made on the panel holding the smaller coil assembly and the white line on the 2416 knob indicates which coil is in circuit. A large knob is fitted to the tank coil switch, to move which requires appreciable torque. Engraved dials are provided for variable condensers C6, C12 and C19. The spindle of the latter is insulated by the flexible coupler, and a short length of ¼-in. diameter rod and a suitable bush are needed. The bush is earthed to chassis with a short lead.

Frequentite insulators are used at various points to hold connections which call for high insulation. These points are indicated by small crosses (x) on the circuit diagram Fig. 1.

Two springy brass, phosphor-bronze or beryllium-copper contact strips (1¼ in. long overall and ¼ in. wide) are arranged to bear against the metal base of the QY2-100—*these are essential.* The strips are fixed below the nuts holding the base screen.

The coaxial lead to the grid of V3 passes from C10 (above the chassis), through the

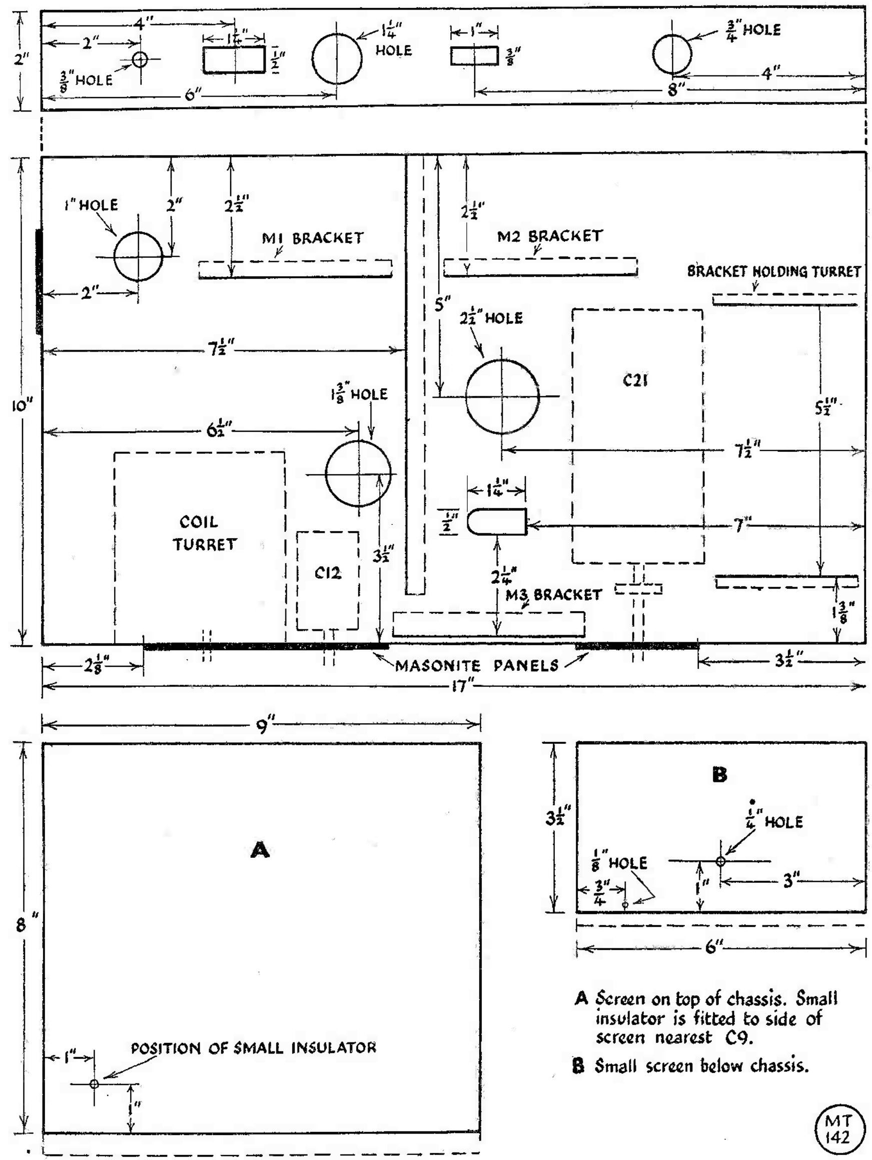
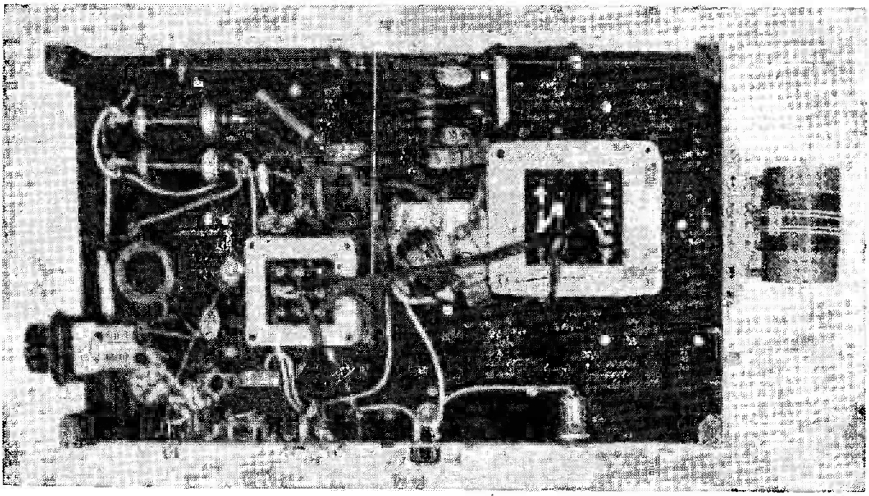


Fig. 2. Chassis and screen constructional detail. Piece "A" is the screen above the chassis, with a small insulator fitted on the side nearest C12. Piece "B" is the under-chassis screen. These details should be compared with the accompanying photographs of the finished job.

chassis and through the lower screen. The outer braid is earthed at both ends.

C11 is bolted to the chassis below and between C12 and the coil switch.

C20 is situated underneath C19 and held off the chassis between the rotor tag of C19 and a tag fitted to an earthing bolt, from the under side of which a copper strip is run to



Underneath the Band-Switch Transmitter, showing the general layout and wiring. The main chassis is raised on short legs to accommodate the depth of the LT supply transformers.

the central earthing point associated with V3.

Connections to M1 and M2 are brought through holes in the chassis. Connections to M3 are made direct from the 1019 insulator supporting RFC3 (using a heavily insulated lead) and from the 695 insulator which carries HT through the chassis.

Condensers C7, C10, C11, C17 and C18 are rated at 750 volts working—it is not advisable to employ condensers of lower ratings at these points. C20 is rated at 1,500 volts working, since it has to withstand the full HT voltage.

Wiring

Little comment need be made on the wiring, except for that associated with the V3 valve holder. No metal parts should be allowed to "float" and assume what potential they will, since they may then act as undesirable coupling elements. So the two unused tags on the valve holder are strapped across with a stout (14 SWG) piece of copper wire (strip would be better, if available) and down to chassis. To this bar, return connections are made from condensers C15, C16, C17, C18 and also, as mentioned earlier, from C20 *via* the bolt earthing one end of the latter. It will be noted that two condensers are used to decouple the screen grid, since it is most important, particularly at the higher frequencies, that the screen grid be quite "cold" to RF. The DC return path from the filament is through the centre tap on the transformer filament winding.

Heavy flexible wire is employed in the PA tank circuit, with 3-mm. Telcothene sleeving over those leads which require insulation (chiefly the one passing beneath the tank condenser). In other places 18 SWG tinned wire, with Telcothene insulation where RF is present and PVC or Telcothene where only DC or AC is passing, is quite suitable.

Coils

Two coils have to be made up specially. The input coil L1, self-resonant to 3·6 mc, consists of 70 turns 30 SWG enamelled wire close wound on a 1 in. diameter former (Eddystone 646). Close to the main winding is a link winding of 10 turns connected to the coaxial socket fitted to the rear chassis wall. As can be seen in the under-chassis view, coil L1 is mounted fairly close to the V1 valve holder and directly across it is soldered, in self-supporting fashion, a small trimmer condenser.

The other coil, L2, is wound with 18 turns of 18 SWG enamelled wire on a 1½ in. former (actually an Eddystone 537 former with the base removed).

Preliminary Adjustment

An HT voltage of about 350 volts, preferably well regulated, is required for V1, V2 and the screen of V3, the total consumption on load being between 90 and 100 mA.

During preliminary tests of the first two stages, it will be well to remove the QY2-100 from its socket or alternatively, apply more than 100 volts bias to its grid—otherwise a high grid current may flow at times.

An output of two or three watts from the

VFO associated with the transmitter will be found ample. In the writer's station, the VFO is situated near the operating position and about 8 ft. of ordinary ¼ in. diameter coaxial cable (Uniradio 39) connects it to the transmitter—this length could be increased with no appreciable loss. As a guide, it can be said that a small neon lamp strikes (but not brilliantly) when held to the "hot" end of L1.

The first operation is to bring the grid circuit L1/C1 into resonance and, to do this, a milliammeter reading to 50 mA should be inserted temporarily between R3 and the HT line. With no drive, the reading will be about 26 mA (dependent on the line voltage) and, on applying the drive, with the VFO set to give output on 3·6 mc, the current will increase. C1 should then be carefully adjusted to bring the anode current to maximum—a reading of the order of 32 to 36 mA should be registered. The meter reading will drop noticeably at a broad dial setting in the region of 30 degrees, indicating resonance at 7 mc. A slight reduction should also be observed when C6 is adjusted to maximum capacity.

From this point, the adjustments are dependent on the operating frequency. With the anode circuit of V2 not in resonance, the anode current of V2, registered on meter M1, will be between 40 and 50 mA, and the dip obtained on adjusting C12 will vary with the frequency. On 3·5 and 7 mc, the anode current will be in the region of 30 mA and about 40 mA on higher frequencies. This is with the PA valve being driven—the dip will be very pronounced when no load is applied to the driver stage.

The approximate locations of the five bands are given in a later paragraph, when discussing the PA stage.

On 3·5 mc, C6 is adjusted to near maximum capacity when, as mentioned earlier, ample output will be delivered by the driver valve on 3·5 mc. C6 is tuned to 7 mc on other bands.

Operation of the PA

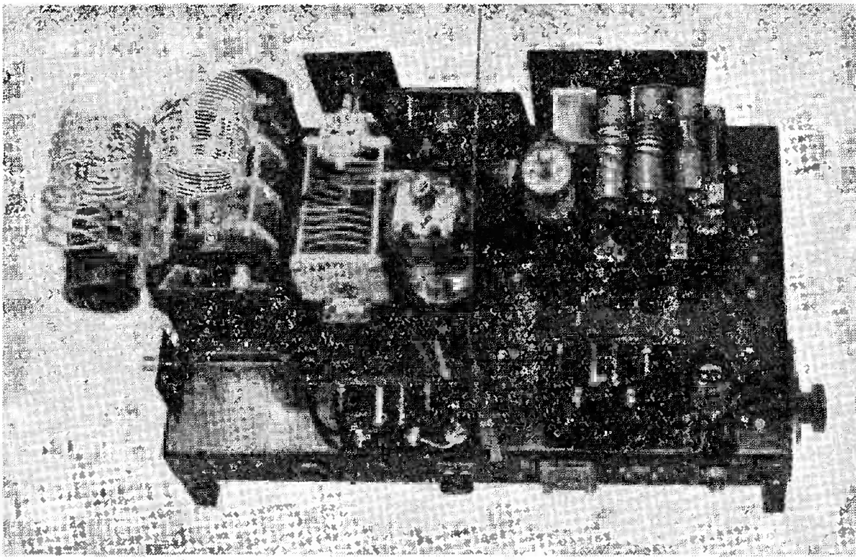
The next thing is to ensure that the PA circuit, centred around the QY2-100 valve, is inherently stable and cannot self-oscillate under any conditions. HT is removed from both anodes *and screens* of the 6V6 and QV05-25 valves and applied to the screen grid of the QY2-100 by inserting a short-circuiting plug in the socket provided for modulation purposes and shorting across the two HT pins on the 5-pin socket. At this stage, it is unnecessary and inadvisable to apply the full HT voltage to the anode of the QY2-100—a reduced value between 600 and 750 volts is suitable. The grid bias voltage should preferably be variable (continuously or in steps) between about 30 and 120 volts, and the source of reasonably low impedance. The bias should be adjusted so that a static anode current flows in the region of 50 mA. Then rotate C12 and C19 with the coil switches set in turn to each of the four bands. Nowhere should there be any sign of grid current nor of fluctuation in the anode current—if there is, the neutralising condenser capacity should be increased slightly. With the neutralising condenser set as shown in the photograph and mounted so that the electrodes can only "see" each other through the hole in the chassis, it is unlikely that self-oscillation will occur and still more unlikely that the neutralising capacity will call for reduction.

When assured that the PA stage can play no tricks, the bias should be increased to about 60 volts (still at reduced anode voltage) and the HT applied again to V1 and V2. A 75- or 100-watt bulb should be connected to the output link *via* a length of coaxial cable.

With the earlier stages tuned to resonance, a substantial grid current will now be observed, except on 28 mc. The valve makers recommend a grid current of 10 mA for normal operation but often less than this will be found satisfactory. In any case, this figure should not be exceeded, since overdriving will tend to increase the screen current and give high harmonic output, both definitely undesirable. Where the grid current is found to be too high, it can be reduced by setting C12 on the low frequency side of resonance. On 28 mc, the grid current is approximately 5 mA.

The anode current will rise to 200 mA or more and no time should be lost in tuning C19 to resonance. The bulb forming the artificial aerial load should glow fairly brightly, accom-

The neutralising condenser



Plan view of the transmitter, with the PA to the left. The tank tuning condenser is between the QY2-100 and the coil assembly, with the PA plate meter front foreground. The small valve to the lower right front is V1 in Fig. 1.

panied by the usual dip in anode current. The full anode voltage (1,000 volts or more) may now be applied and the aerial circuit connected to the output. (The 100-watt bulb will have but a short life when the transmitter is operated at full power !) The bias voltage should be raised to 90 volts or more which, with the increased anode voltage, will cause a reduction in grid current, but this is quite in order.

The accompanying table gives approximate information on the dial settings to be expected for the various bands, and are as obtained on the model.

CONDENSER SETTINGS

Frequency in kc	C6	C12	C19
3500	80/100	82	15
7000	20/30	26	18
14000	20/30	35	14
21000	20/30	40	22
28000	20/30	48	56

CW Operation

No provision is made for keying in the transmitter proper, it being assumed that this will be carried out in the VFO. The full HT voltage applied to the earlier stages (approximately 350 volts) will normally also be applied to the screen grid of V3, by externally shorting the appropriate pins on the Belling-Lee socket. It will be found that the transmitter will follow a change of plus or minus 10 kc at the fundamental frequency of the VFO, representing a total movement of 80 kc at 14 mc. Beyond this, it will be advisable to make slight readjustments to C12, C19 and the aerial tuning.

Assuming an anode potential of 1,000 volts, it is unlikely, on 3·5, 7 and 14 mc, that the PA will be loaded for maximum output into the aerial when the anode current reaches a value of 150 mA. This, however, is all to the good as it means the radiated signal will be sharp and less likely to cause interference to others. On 28 mc, some care will be called for when adjusting the aerial coupling and loading to ensure maximum transfer of energy.

Telephony

As mentioned earlier, it is intended that the transmitter be modulated by the application of the audio voltage to the screen grid only. By this means, a high percentage of modulation can be secured with relatively low audio power. Full information on this system will be published in a future issue of the *Magazine* and only brief operating details are given here.

Screen modulation is an efficiency system and, to enable the carrier to follow positive and negative peaks, the screen voltage must be reduced substantially below the value employed for CW operation, and a figure of about 200 volts is recommended. There are two methods of obtaining this reduced voltage. One is by the insertion of a 7,000 to 10,000 ohm resistor (5 watts rating) in series with the 350-volt supply. It will be convenient to wire this resistor across the appropriate pins of the power socket, at the same time providing a switch (external or internal) to short out the resistor when CW operation is wanted. It is for this reason that the screen connection has been taken to a separate pin on the 5-pin socket.

The second method—and also the better one—is to provide for the screen a separate well-regulated power pack possessing low internal impedance. A pack incorporating a stabiliser would be ideal and, as the output required is low (15 to 25 mA), such a unit would not be expensive or occupy much additional space. If the voltage were variable and capable of being increased up to the value of 300/350 volts called for when using CW, so much the better. Failing this, a change-over switch will be necessary to connect the screen to either the internal or the external HT supply, for CW and telephony operation respectively.

The impedance presented to the modulator approximates to 13,000 ohms and the output transformer taps should be adjusted accordingly. The audio voltage is simply fed in *via* the two-pin plug provided.

It is not desirable to swing the screen volts fully, as this will produce distortion and it will be found that an audio power of 6 to 8 watts is sufficient. To allow for transfer losses and to keep something in hand, the modulator should be capable of delivering about 12 watts with low distortion.

When using telephony, the grid bias voltage should be reduced to 80 or possibly a little less.

Anode-and-Screen Modulation

High level modulation may, of course, be employed with the transmitter if a modulator giving an output in the region of 80 watts is available. There is no necessity to make any modification to the internal wiring, neither is a resistor of high wattage rating required to drop the surplus volts between anode and screen grid.

To the plug provided for screen modulation is connected an audio-frequency choke, rated at approximately 20 henries and capable of carrying up to 30 mA. Modulation is applied in series with the HT supply in the usual way—with the choke in circuit, the screen takes up correct modulating potentials. The grid bias voltage should be set near 120 volts —more if the anode voltage on the QY2-100 is greater than 1,200.

Safety Precautions

It is only common sense to add a final note about safety precautions. The switches should not be moved with power on and at all times care should be taken not to come into contact with parts at high potential. It should also be appreciated that considerable RF energy is generated and equal care is necessary not to touch the aerial lead-in or high potential connections in the aerial tuning unit associated with the transmitter. RF burns are very nasty and take a long time to heal !

DIARY FOR 1950

It may be almost too late to mention the 1950 Edition of the famous *Wireless World* diary, which has been a standard publication for so many years. It is both a diary and a "gen book," for the first 80 pages consist of tables, formulae and much other useful reference material. Pocket size, price 3s. 4½d., and obtainable only of stationers and newsagents.

NEW AMATEUR CATALOGUE

We are glad to draw readers' attention to an excellent 54-page catalogue of branded parts and equipment, which will be of interest to every radio amateur. Well produced and illustrated, this catalogue is in effect a guide to what is readily available in the way of manufactured components and apparatus. Ask for Catalogue No. 7 and send 9d. to Southern Radio & Electrical Supplies, 85 Fisherton Street, Salisbury. Wilts. They specialise in mail order business and have a large clientele.

THANK YOU !

To all those many readers who were kind enough to send us messages of goodwill and encouragement for Christmas and the New Year—our thanks for them all, and may we say how much we appreciated the spirit in which they were sent.

Suppression of TVI

Treatment of the PA—Low-Pass Filter Design—Mains Filtering

PART II

By **F. T. WILSON (G2XX)**

In this concluding instalment, our contributor deals very fully with the PA stage, and factors affecting power supply and mains filtering. He also gives details of suitable low-pass RF filters and shows that by tackling the TVI problem along the lines suggested, a certain cure should be effected.—Ed.

NOW we come to the PA stage. Originally this was of open construction, the various components being mounted on two girders which run from the exciter chassis to the left-hand side of the cabinet. When the first modifications were made the 250TH was removed and a piece of perspex carrying the 35T's and the grid circuit was bolted to the girders. It was fairly obvious that it would be a waste of time attempting to filter this stage as it stood. The whole unit was therefore removed and rebuilt on to a large sheet of dural. The grid circuit was redesigned, the condenser being built into an aluminium screening box on the underside of the dural sheet and the grid coil (in a screening can) mounted on top. The valves, neutralising condensers and plate circuit are mounted above the dural sheet which effectively screens the RF circuits from the audio chassis immediately below. Filter circuits are on the outside of the screening and located at points where pick-up of stray radiation from the tank circuits is impossible. As an additional precaution RF chokes consisting of 20 turns each of 14 SWG enamelled wire were inserted in each filament lead to the 35T's and each side of each filament was by-passed right at the valveholder.

The final result is shown in Fig. 3 (p. 830) and has well repaid the time and care spent in its construction. With the PA working into a dummy load the level of the radiated harmonic does not increase when the final HT is switched on. As a matter of interest the reading obtained on the FS meter when coupled to the aerial link is only 3 μA.

It will be observed that no harmonic traps are employed in the plate circuits. Some illuminating facts about harmonic traps are given in the article by W2VLQ in the February, 1949, *QST* and have been borne out by experience here. It seems doubtful whether their effectiveness justifies the work entailed in their design. When tried in this particular PA they did reduce the 42 mc harmonic slightly, but on changing the frequency to 28 mc the PA went into oscillation and could not be neutralised. Removing the traps cured the trouble. Possibly thorough screening around the traps might have been effective but this was not tried.

In place of harmonic traps low-pass filters incorporating trap circuits are used in the co-axial leads between the 807 and PA grid and between the PA anode and aerial tuning unit. A photograph shows one of these units and the circuit is given in Fig. 4. For calculating the values required the formula given herewith is used.

50-ohm cable	C1	$= \frac{2120}{f}$
	C2	$= \frac{4770}{f}$
	L	$= \frac{12}{f}$
75-ohm cable	C1	$= \frac{1420}{f}$
	C2	$= \frac{3180}{f}$
	L	$= \frac{18}{f}$

Each unit is assembled in a cast aluminium box, 3-in. cube, and the co-axial cable is properly terminated to prevent harmonic currents flowing back along the braiding.

The actual effectiveness of such a filter between the 807 and the PA grid circuit is somewhat indeterminate. It certainly works in that it affords some slight reduction in the har-

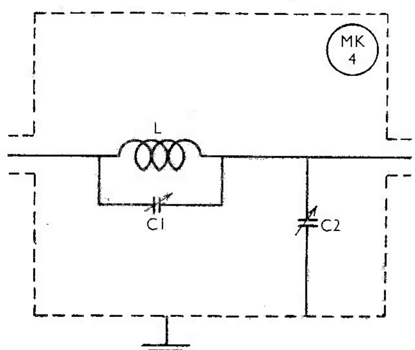
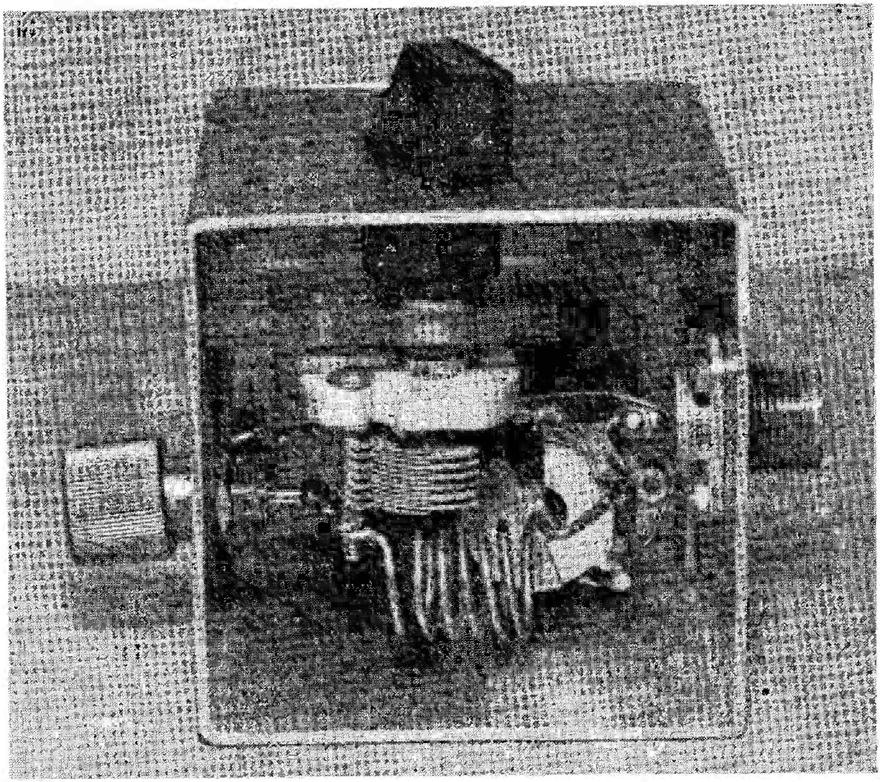


Fig. 4. Circuit of the low-pass filter, values for which are discussed in the text. (*See* photograph).



The low-pass filter for coaxial line circuits, specially designed for the applications discussed in the article.

monic voltage passed to the PA grid, but the tuning is very flat and has no pronounced peak. This is most likely due to the damping of the tuned circuit by the input resistance of the PA valves. On the other hand the filter in the aerial lead tunes very sharply and resonance can be easily determined.

No measurements on the performance of the aerial filter have been made since the amount of harmonic reaching the aerial without the filter in circuit is very small, but there seems no reason to doubt the figures quoted in *QST* which show that an attenuation of 40 or 50 dB is possible.

To sum up the situation, the problem of TVI is not so complicated as it might at first appear. Harmonic radiation from leads can be entirely suppressed and it is surprising how limited the field from a tank circuit is. Generally speaking, low power stages using ordinary receiving valves seem to give relatively little trouble and it is only with the higher powered stages that any action is necessary. Beam tetrodes of the 807 class are the most difficult to deal with as they have a decided tendency to take off at VHF. The filament circuits seem to be the worst offenders as far as harmonic radiation is concerned and adequate filtering is essential both in the filament leads and around the transformer. Fig. 5 shows the filter used with the filament transformer in the HT4E.

Mains Suppression and Screening

A good mains filter is another very necessary item. During some of the tests carried out here in the early stages of harmonic suppression a small amount of radiation was detected from the AC leads to the transmitter. This was so minute that it was assumed there was little prospect of it causing TVI. A check at the TV set showed, however, that the aerial feeder ran parallel to a mains lead for about 3 ft. and spaced 3-4 in. from it. The amount of harmonic picked up through this source was sufficient to block the sound channel completely. Re-routing the feeder cleared the interference, but to eliminate it entirely the mains filter shown in Fig. 6 was installed. It is built into an aluminium screening box mounted on the back of the transmitter. Condensers are not used on the input side of the RF chokes since they were found to make the filter ineffective, probably due to the harmonic flowing *via* the earth return and thus bypassing the chokes.

Where the TV signal is very low, complete and thorough screening of the transmitter is necessary. The ideal is a metal box with no openings whatever. For obvious reasons this is not practicable, but any screening should

Table of Values

Fig. 3. Push-Pull PA Incorporating TVI Filtering

C1	=	100 $\mu\mu$F per section (split stator)
C2, C3	=	·001 μF
C4, C5	=	·0005 μF
C6, C7	=	·05 μF
C8, C9	=	·005 μF
C10	=	·002 μF
C11	=	76 $\mu\mu$F per section (split st. tor)
C12	=	·001 μF
C13	=	·0005 μF
R1	=	220 ohms
R2	=	700 ohms
L1	=	2-turn link
L2	=	12 turns 16 SWG enam., 1-in. diam.
L3	=	2·5mH RF choke.
L4, L5	=	20 turns 14 SWG enam., ½-in. diam.
L6	=	2·5mH RF choke
L7	=	B. & W. tank coil 8-11 mc
L8	=	1-turn link
L9	=	RF choke, ex-TU7B unit
L10	=	30 turns 20 SWG enam., ¼-in. diam. tufnol rod

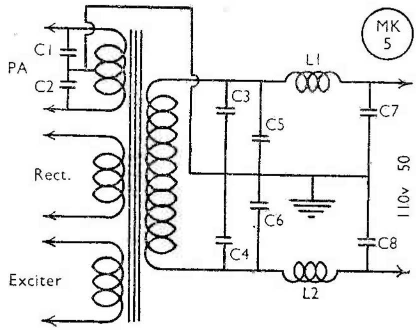


Fig. 5. TVI filter circuit for the transformer supplying LT to RF stages.

Table of Values

Fig. 5. Filter Circuit for LT Supply to RF Stages

C1, C2	=	·002 μF
C3, C4	=	·001 μF
C5, C6	=	·0005 μF
C7, C8	=	·001 μF
L1, L2	=	RF chokes (taken from mains input of old S36C receiver)

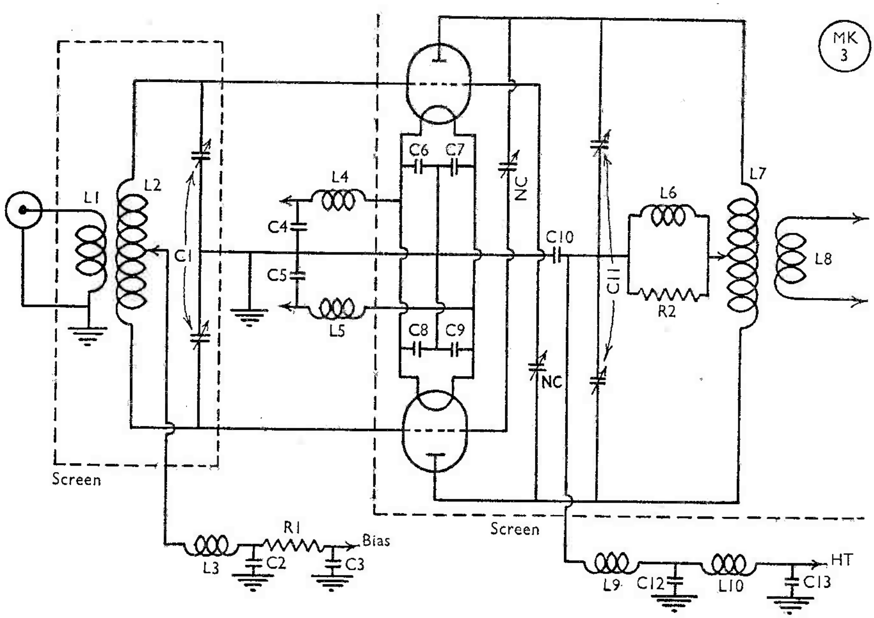


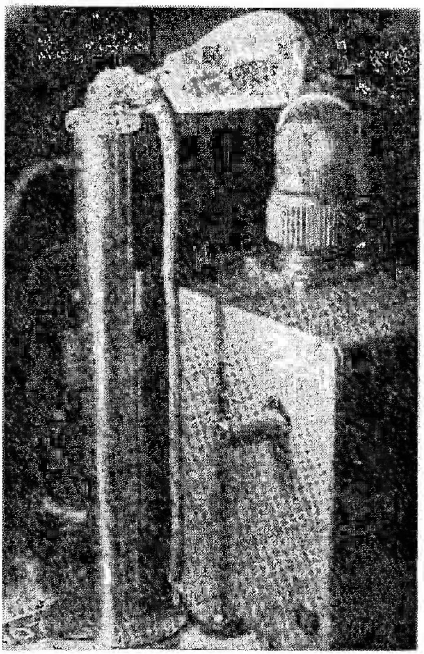
Fig. 3. A push-pull PA circuit with suitable TVI suppression.

contain the minimum possible number of holes. A 3-in. meter opening will radiate quite a lot of harmonic !

Whatever type of aerial system is used an aerial tuner is indispensable since it can contribute greatly in preventing harmonics from reaching the aerial by eliminating capacity coupling. Of course, if the harmonic is transferred by inductive coupling little or no benefit will be obtained from the aerial tuner but experience has shown that most harmonic transfer takes place capacitively. Provided the Q of the aerial tuned circuit is not lower than that of the final tank and that link coupling between the two is employed, attenuation of harmonics up to 40 dB can easily be obtained.

Transmitter Adjustment

Unfortunately, it must be admitted that, even after carrying out the measures described, tuning up the transmitter for minimum harmonic output can be rather a critical procedure. First of all, the circuits are tuned to resonance in the normal manner. Then, observing the harmonic level on a suitable indicator (such as the S-meter of a fairly sensitive receiver) all circuits are retuned for minimum harmonic radiation. When this has been done the grid drive to the PA and the transmitter output should still be normal, because generally it will be found that minimum harmonic output occurs at or very near resonance in any Class-C stage. However, this is not an invariable rule and considerable



The RF by-pass arrangement for tank circuits.

further research into this problem is needed. The operating conditions of the stage, *e.g.* grid bias, LC ratio and electrode voltages, do not appear to have much effect. Any trouble from this source only arises where the drive is limited. In the case of an 807, for example, where 10 mA of grid drive is available, it obviously does not matter if minimum harmonic occurs when the circuit is detuned from resonance until only 4 mA flows, which is enough for the 807. But when the drive is only just sufficient it is essential that minimum harmonic output and resonance at the fundamental should coincide. No difficulty has been experienced with the circuits in the HT4E.

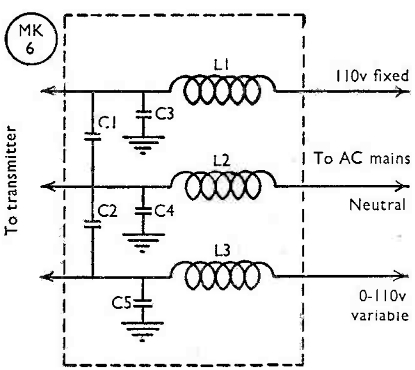


Fig. 6. Suitable mains filter for the HT4E transmitter, but applicable to the supply unit for any other type of transmitter.

Table of Values

Fig. 6. Mains Filter for Transmitter

C1, C2	= ·001 μF
C3, C4, C5	= ·01 μF
L1, L2, L3	= 30 turns 10 SWG SCC, 1-in. diam.

Conclusion

The results achieved here have been very satisfactory and well worth the time and effort spent. Final tests show that the amount of harmonic radiated with 100 watts input on 14 mc will not produce any reading on the S-meter of the SX-28 with the TN16 converter on 42 mc. This test was made with the receiver 2 ft. from the transmitter. The minute amount of harmonic still finding its way out of the transmitter is sufficient to produce a small drop in the level of the audio signal on the TV set, no doubt due to the excessive bandwidth of this receiver. Probably RF by-pass condensers from plate to cathode in the PA stage would clear this small residual interference but has not been thought worth while in view of the imminent opening of the Sutton Coldfield station.

During the period when the programme of work discussed here was being undertaken a receiver was running nearly every evening and most week-ends on 42-43 mc and harmonics of many of the local amateur stations were logged. The strongest signals were received from stations using single-ended final stages with beam tetrodes, whilst it was particularly noted that stations using VFO's had very weak harmonics. The possibilities of a harmonic-free VFO are now being investigated, since this seems to be one solution of stopping harmonics at the source and preventing amplification by subsequent stages. This would make easier the suppression of harmonics developed in the higher powered stages.

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Experiments with Scale Model Aerials

Application of the Theory of Similar Structures

By **F. C. JUDD (G2BCX)**

This is an ingenious approach to the problem of visualising in space the radiation pattern of an aerial. It enables direct comparisons to be made between different types of aerial and it is interesting to observe that the results obtained by the author can be checked against the theoretical patterns given for the systems with which he deals in his article.—Ed.

To carry out certain practical tests and measurements with aerials is not always possible, especially if they are of large physical dimensions, *e.g.*, the vertical radiation patterns for most aerials would prove very difficult, and in some cases almost impossible, to plot and in the normal surroundings of the amateur location even the horizontal patterns would present a problem. Also, of course, the effect of different heights would be difficult to determine with large aerials, especially when the masts are half-a-wavelength high and the performance of the aerial at a height of one wavelength is required to be known.

Theory of Similar Structures

Small scale tests in mechanical engineering are commonplace ; stresses in bridges are investigated by using models, aircraft on a small scale in wind tunnels, and the counterpart of the wave distribution by a big ship moving at a certain speed through water can be seen by towing a scale model at different speeds in a tank. The underlying principle is the "Theory of Similar Structures", the arguments respecting which apply equally well to aerials.

About a year ago it was decided to carry out experiments with all the various types of aerials likely to be used by amateurs, by adapting this theory to models operating on the frequency of 144 mc. This frequency (apart from being an amateur one) enabled aerials to be made and scaled down from the various longer wave bands, bearing in mind also that not only had the physical size of the aerials to be reduced, but also the respective heights—in the case of 160 metres the models are 1/80th of the original size. Another advantage in using this frequency is that feeders of the wide spaced (600-ohm) variety can be scaled down in near relation to the aerial, and impedance matching in various forms made quite accurately. Tuning and loading aerials with normal circuits, measuring standing waves, and so on can all be carried out, whereas at 70 centimetres and above the problem of matching aerials and feeders becomes much more difficult. The most important of all these experiments (and those in which the amateur may be more interested) are some of the horizontal and vertical radiation patterns obtained from some 30 different types of aerials.

Details of the Equipment Used

For these experiments, it was of course necessary to have means of applying RF to the aerials. This took the form of a transmitter using a "grid stabilised long-lines oscillator", with a total input of approximately

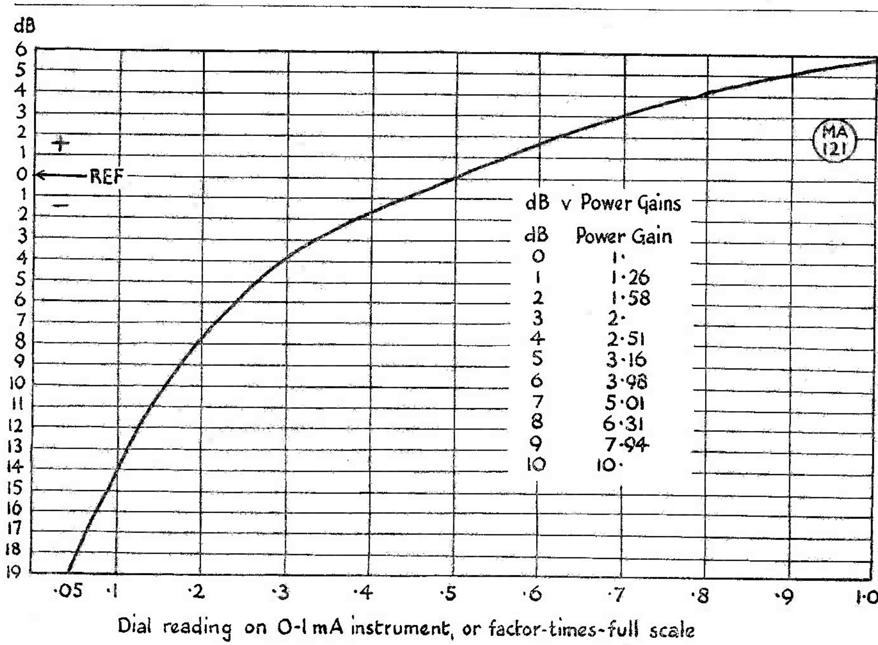


Fig. 1. Curve showing relationship between power and meter readings, as used in the experiments described

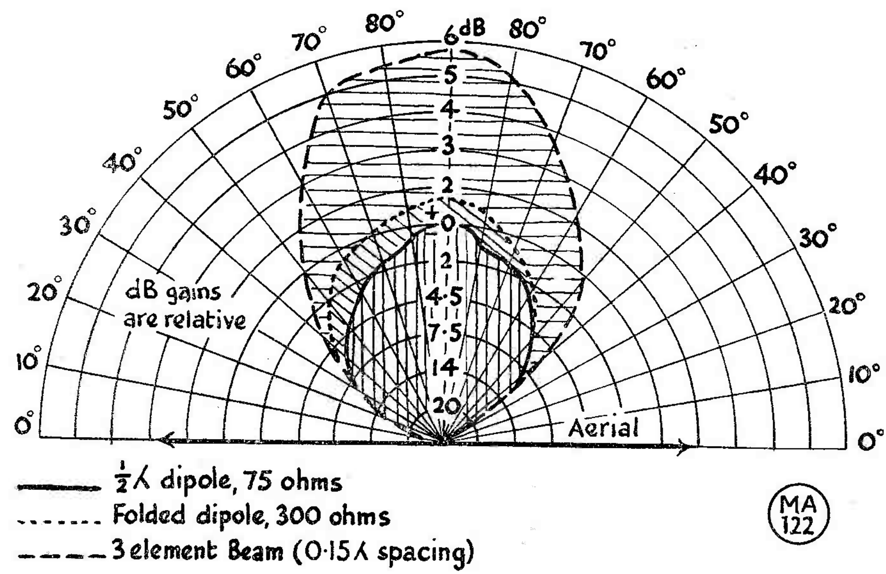


Fig. 2. Some horizontal polar diagrams with aerials at half-wave height. The reference frequency is 144 mc, but the argument is that by the Theory of Similar Structures, the same sort of pattern would be obtained for a similar aerial on the lower communication frequencies.

Data obtained from Model Aerials on Vertical Radiation Angles

AERIAL	EQUIVALENT FREQUENCY	EQUIVALENT HEIGHT FEET	ANGLE OF MAIN VERTICAL LOBE	REMARKS
W8JK—1, 2 or more sections	14 mc	45/50 (¾ wavelength)	25/30°	Over very dry ground
W8JK's at ½-wavelength high	14 mc	30/35	40/50°	Over very dry ground
Dipoles and folded dipoles at ½ wavelength high	All bands	—	30/40° slightly lower for folded dipole	Over high conductivity ground
Long wires and W3EDP on 20m.	14 mc	30/40	40/60°	Over very dry ground Lower for h/c ground
Dipoles, end fed wires, and W3EDP on 40 m.	7 mc	30/40	60/90°	Average ground, high angle off ends of W3EDP
3-Element Beam at ½-wavelength high	28 and 14 mc	—	20/30°	Over dry ground. Lower for h/c earth
Long wires ¼- and ½-wavelength long	1·7 and 3·5 mc	30/40	60/90°	Radiation diminishes as height is lowered
W3EDP with 17·5 ft. counterpoise	3·5 mc	30/40	60/90°	High angle off the ends
Dipoles and long wires at ¾ wavelength high	All bands	—	Very high angles but secondary lobes at 15°	Over average ground
Dipoles and long wires at 1 wavelength high	All bands	—	Lobes of approx. equal amplitude at 15° and 60°	Over average ground, but higher if ground is dry

Notes :—Some of the above are shown in the patterns of Fig. 6, but the theoretical diagrams of most of the others may be found in the "Radio Handbook."

The data given will hold good for the various full size aerials and frequencies and were all obtained from models operating on 144 mc.

12 watts to a DET19 twin-triode in push-pull. Sufficient RF was obtained from this to work the field strength meters at several wavelengths distant, even with quite small aerials; *e.g.* those scaled to 1/80th of the original size. The oscillator was also modulated by audio tone, which could be keyed with a built-in auto-sender, having the writer's callsign and "Test 2" on the wheel; the whole transmitter, including power supply, was mounted on a chassis 18 in. × 10 in. In addition to this, three field strength meters of the simple crystal diode type were employed; the first was made complete with a single valve battery amplifier and a dipole cut to the frequency, the indicator being a 0-500 microammeter. This proved a handy unit to carry round and 'phones could be plugged in so that signals could be heard when too weak to operate the meter.

The second F/S measuring unit was constructed as a remote controlled type, with a dipole-plus-reflector spaced a ¼-wave, a tuned circuit and crystal diode as a separate unit, so that the meter (again a 0-500 microamp.) could be fed through co-axial cable to a point near the transmitter. In this way meter readings could be observed whilst moving the aerial under test, *i.e.*, when plotting horizontal radiation patterns and measuring gain.

The third F/S meter was built on to one end of a wand, this being a telescopic dural rod 8 ft. long; on the other end was mounted a jack into which could be plugged either phones or a microammeter—or the output taken to an audio amplifier and speaker when used for live demonstrations.

Other gear made and used included two stands adjustable for height, one for mounting the remote field meter crystal unit and its aerial, and the other, similar, but with a rotating mechanism, remote controlled for mounting and turning self supporting aerials. A scale model aerial mast (dural) with guy wires suitably broken up with insulators and hooks at different heights for hanging the wire aerials, and a standing-wave meter of rather unique design, were also constructed and proved extremely useful. Finally, tuners for Zepp feeding (series or parallel) and end-on wires, a length of 600-ohm twin open-line

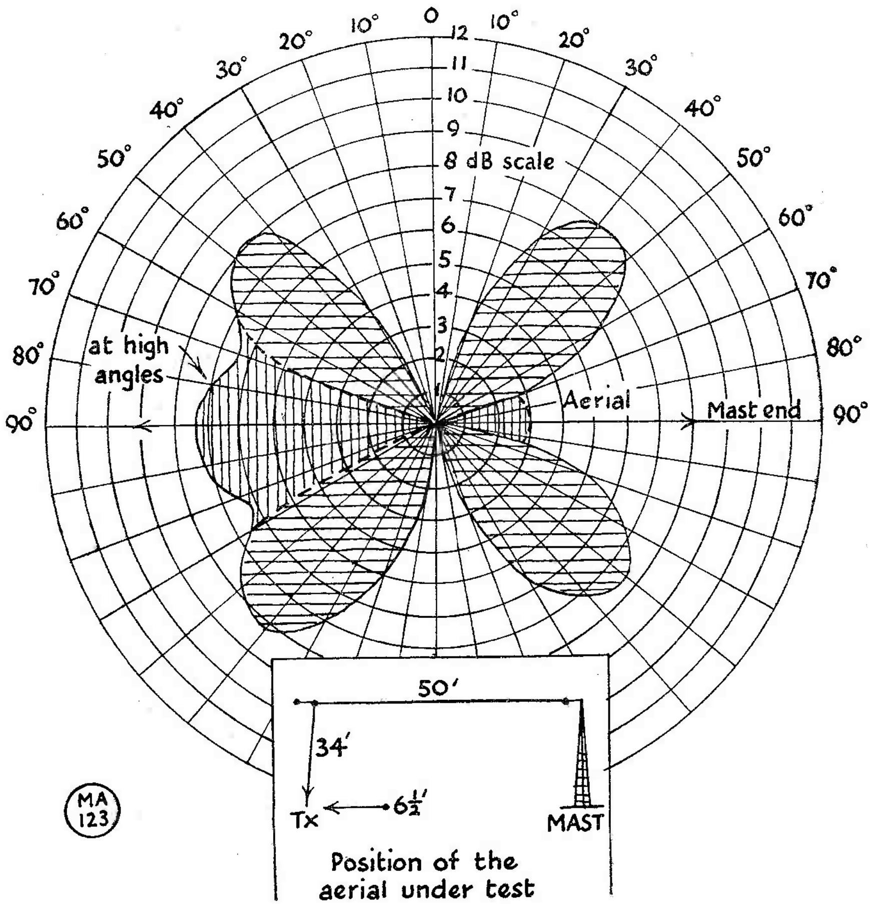


Fig. 3. An analysis of the horizontal radiation pattern of the W3EDP cut for Twenty, and at a height of 40-ft. with the counterpoise at right angles to aerial. (Layout *inset*).

feeder scaled down to 1⅓ in. wide, a Lecher wavemeter, and more than 30 model aerials complete the gear.

How the Equipment was Used

A few words on how the various units were used may prove of interest and at the same time give a better understanding of the results that follow. For example: The measurement of the gain of certain aerials was made possible and a description of the arrangement will show its comparative simplicity. This was done by using the gain of the half wave dipole, half-a-wavelength high, as the reference 0 dB. The standard aerial was set up, RF applied, and with the field strength meter one wavelength high, and five wavelengths distant, the meter was set to read half-scale, this reading being accepted as 0 dB. A conversion chart from the *Radio Handbook* enabled meter readings to be converted to dB, plus or minus the zero reference. Thus, the gain or loss of any particular aerial against the standard could be determined, providing the RF input to the aerial and the height and distance to the remote field meter were maintained constant. Fig. 1 is a reproduction of the conversion chart which will hold reasonably good for most of the better grade moving coil meters.

Horizontal patterns were computed for different aerials and heights and the method used was as follows: The aerial under test was mounted on the rotating gear at the required height and the field meter set to read half scale with its own pick-up one wavelength high and five wavelengths distant. The aerial to be plotted was then rotated through 90 degrees both left and right, readings taken every ten degrees, the resultant figures transferred to suitable circular graph paper, and the lobe duly plotted. This applies of course, to aerials mounted horizontally. Other arrangements put to use during the experiments will be explained in the paragraphs devoted to some of the measurements and data obtained.

Horizontal Radiation Patterns

First, let us take the broadside horizontal radiation patterns of some of the aerials. These were taken on the lawn, the soil underneath being fairly dry, with the aerials reasonably in the clear apart from a few trees and shrubs. Fig. 2 shows the horizontal patterns obtained from three different aerials and also the gains of two with respect to the dipole. The kink in the top right-hand side of each lobe is interesting, and was probably caused by a length of wire running alongside the aerials, a few yards away at about 15 ft. high. (Actually, the station counterpoise for 160 metres !). Each pattern was taken with the aerials a half-wavelength high and it will be seen that the dipole was set for its maximum radiation to produce a gain of 0 dB with the remote field strength meter aerial at one wavelength high and five wavelengths distant—2 metres and 10 metres respectively. The position of the field strength meter pick-up at this height and range is at an angle of approximately 20 degrees to the aerial under test; this may account for the slight gain shown for the folded dipole (2-wire) which means that (*a*) this aerial radiates at a lower angle, or (*b*) that it does have a higher gain, or both. The theory of the operation of this aerial is that the two wires are each making a contribution to the radiation, resulting in an increase in radiated power, and tests have shown a gain of 1·5 dB.

The third pattern is that of the 3-element closed spaced beam, which shows a gain of 6 dB. This figure was probably due to the very careful matching of the feeder to the driven element and the spacing of the parasitic elements, which were 0·1 and 0·15 of a wavelength respectively. A standing-wave ratio of less than 2-to-1 was obtained and its performance does prove the advantage of this type of aerial over the simple dipole. It may also be mentioned here that actual contact was made with the 3-element beam in the shack at one wavelength above ground with S9 at G8TL about three miles away, the signals having to pass through a brick wall, several buildings and over a hill. The dipole and folded dipole gave S4-5 and S6-7 respectively under similar conditions.

Horizontal Patterns—The W3EDP

Horizontal patterns taken from the models of the 84 ft. long multi-band aerial known as the "W3EDP" are interesting and the shape

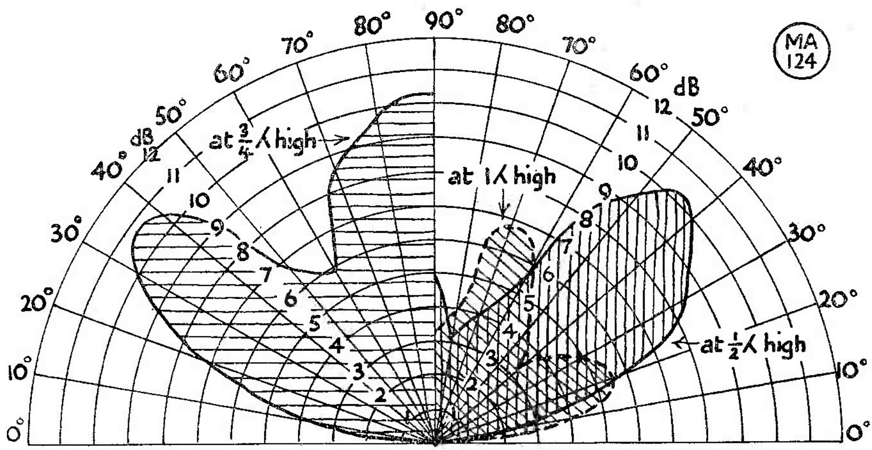


Fig. 4. Some vertical polar diagrams for aerials at half-wave, three-quarter-wave and full-wave in height. The aerials are actually dipoles on 144 mc, and in this diagram the gains are not relative except in the case of those at half-wave and three-quarter-wave in height.

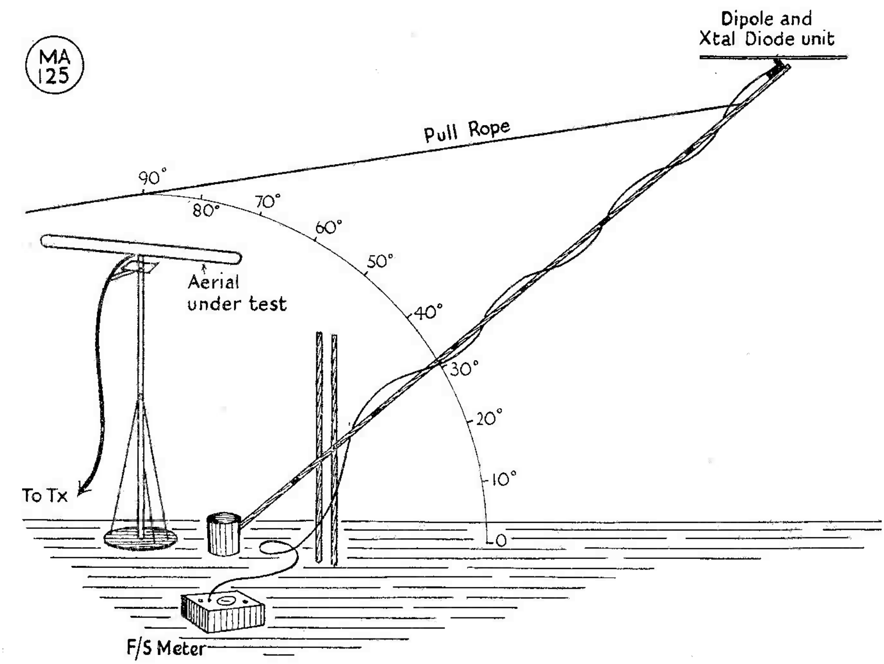


Fig. 5. Arrangement devised by G2BCX to plot vertical patterns. The reference aerial is on the tripod and fed with power from the transmitter on 144 mc. The test aerial connected back to the field-strength meter is swung on the counter-weighted rod. Comparative readings can thus be obtained through all vertical angles.

produced in Fig. 3 shows the approximate broadside pattern of the aerial operating on Twenty. At this wavelength the aerial shows a lobe pattern similar to that of a full-wave aerial, although its length at 14 mc is about one and a half wavelengths. However, the patterns were taken with the equivalent of 50 ft. of top wire and a down lead of 34 ft. this being at an angle of about 60 to 70 degrees to ground and with the counterpoise $6\frac{1}{2}$ ft., long and at *right angles* to the aerial. It should be noted that the down lead also radiates with polarisation in the vertical plane. This produces high angle and radiation which tends to fill in the null between the two side lobes lying towards the down lead end, and the shaded portions of the pattern in Fig. 3 show this.

The lengths of this aerial (referred to 144 mc) to give representation of the 20, 40, and 80 metres bands are as follows; 20 metres $89\frac{1}{11}$ in.; 40 metres, $44\frac{1}{2}$ in.; 80 metres, $22\frac{1}{4}$ in. The radiation efficiency at 20 and 40 metres is approximately equivalent to a single dipole at the same height, *i.e.* about 30 to 35 ft. For maximum radiation the counterpoise should be at right angles to the aerial and any other position will result in some loss of efficiency.

At 40 metres this aerial produces a horizontal pattern similar to a half wave aerial with some vertically polarised radiation from the down lead end which is again mostly at high angles, and will be shown later in the vertical polar diagrams.

Results obtained in practice with the full-sized W3EDP aerial and used on all bands for more than two years show it to be very useful, and the positions of stations worked, and the signals strengths obtained, were carefully plotted into polar diagrams which compare very favourably with the horizontal patterns obtained from the models. Tests on two metres also show that the effects of folding this aerial to fit awkward locations result in some loss of efficiency and distorted radiation patterns, but with the top portion of the wire maintained at a length of 40 to 50 ft., a reasonably good performance can be obtained even if the lead-in portion of the wire is bent a little.

Other Aerials

Diagrams will not be shown for the long

wires of one or more wavelengths for the band used, but tests show them to follow very closely the theoretical patterns given in the various handbooks. The W8JK flat-top beams, of which a two-section model was constructed, show very good patterns both vertically and horizontally, and gain factors closely approaching those laid down by the originator.

Dipoles with various systems of matching such as the stub (open quarter-wave) with 600-ohm feeder, delta match, zepp feed (both current and voltage types) and end-fed wires all gave extremely good results.

Vertical Radiation Patterns

The broadside and off-the-end radiation in the vertical direction is a very important factor, and should be given considerable thought where DX is concerned. But it will be found that there are certain differences between the practical and theoretical results due to the nature of the ground and the general surroundings. These differences are due mainly to the conductivity of the ground underneath and around the aerial, and reference to Fig. 4 shows what can happen to the radiation in the vertical direction. The patterns were taken over very dry soil and it will be seen that they are all approximately 15 degrees higher than those given for a perfectly conducting earth—but at the same time the actual lobe shapes do follow very closely the theoretical diagrams given in the aerial sections of the various handbooks.

For instance, for a dipole three-quarters of a wavelength high, it will be seen that most of the radiation is above the aerial with an additional lobe at a lower angle. Over perfect earth this lower lobe would be about 15 degrees, likewise the two lobes for the aerial at one wavelength high would be at 15 and 50 degrees respectively.

The method of plotting these patterns was as follows : The system under test was placed at the required height and RF applied. A fishing rod some 15 to 18 ft. long was set up with the butt end on the ground at a point directly underneath the aerial, with the rod in line with the horizontal angle of the lobe to be plotted. At the remote end of the rod was mounted a dipole (complete with crystal diode and tuned circuit) parallel to the aerial, with a twin-line carrying the DC output from the diode down to the base of the rod and off to the microamp meter. The rod was then fitted up with a simple guide and pull-rope to lower and raise it through an arc of 90 degrees around the aerial under test, so that meter readings could then be taken for any given angle and the vertical lobe duly plotted. This simple method proved very effective ; the diagram in Fig. 5 will suggest the arrangement used.

Patterns were also taken from the W3EDP, the W8JK beam (2 section), the half-wave end-fed aerial operating at different heights, and the half-wave folded dipole at a half-wavelength high.

The diagrams and chart of Fig. 6 show the results obtained. Perhaps a word or two on what these patterns mean may be of some use to the newly-licensed operator, who has yet to decide on an aerial system for his station. For

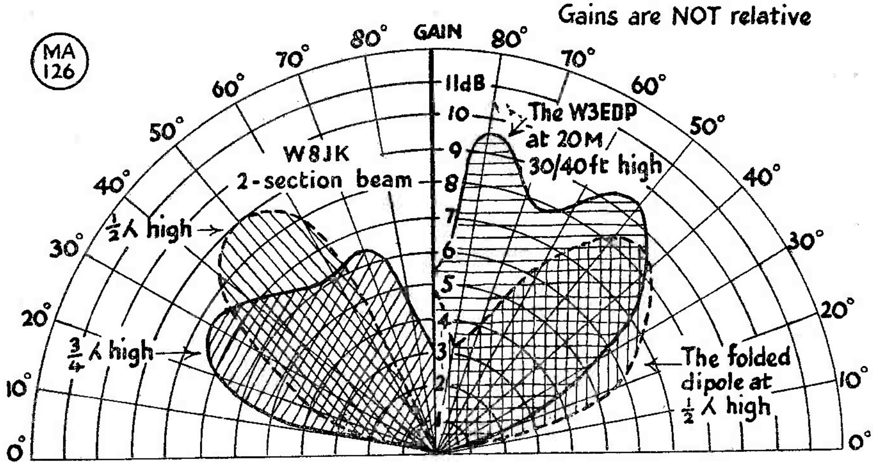


Fig. 6. Vertical radiation patterns given by some other model aerials at different heights.

example, the radiation in the vertical plane from the half-wave aerial for different bands and heights : On 160 metres with a height of 30 to 40 ft., most of the radiation goes up at very high angles and is only suitable for short skip distances, *i.e.*, up to about a 1,000 miles under very good conditions, whereas on 20 metres at the same height the vertical radiation is at a much lower angle (around 30 to 40 degrees) and is more useful for distant communication. But if the height is raised to around 45 to 50 ft. it will be found that most of the radiation is at high angles for 20 metres, with little or no change on the Top Band. So the choice of height is of some importance when putting up an aerial, especially one for multi-band operation, and a study of the theoretical radiation is well worth while. Generally, for DX working on 10 and 20 metres, an aerial which provides low-angle radiation is desirable, but these take the form of beams or arrays which have a rather limited horizontal field.

Recommended types, apart from rotating beams, are the "W8JK" single-section half wave ; the stacked arrays, providing plenty of height is available ; but where space is restricted, both in length and height, then the folded dipole or single-section W8JK beam are both very good aerials. For multi-band operation the W3EDP or the 132 ft. end-fed or zepp-tuned wire is to be recommended.

Conclusion

Many interesting hours of experiment have been enjoyed with the models, and demonstrations have been given from time to time to local groups together with lectures on the theory of transmitting aerials by G2FLG ; to him, thanks are due for his help and co-operation with the writer. It is sincerely hoped that the foregoing paragraphs discussing these experiments will be of some interest and that others may be encouraged to further the work on a most fascinating and useful topic.

Better Clapp Oscillator

Constant Output with Increased Frequency Coverage

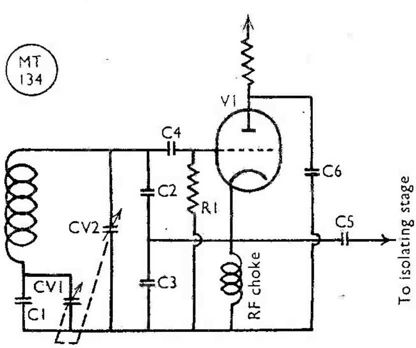
By R. S. J. SMITH (G2DCI)

THE "Clapp" or series-tuned Colpitts oscillator is without doubt excellent for frequency stability, but suffers the disadvantage of giving wide variation in output if made to cover any appreciable range. The isolation which produces the stability is also made poorer with increased series capacity—but can be restored with a proportional increase in parallel capacity.

To maintain constant output and isolation the circuit herewith was devised, giving these desirable features. The only essential is that the series and parallel variable capacities be made to increase in the same ratio as originally given by the series and parallel fixed capacities.

With a suitable inductance value the circuit shown will cover the Top Band fully and with multipliers all bands up to and including 420-460 mc.

This latter requires three tripler and three doubler stages. If reasonable care is taken with the mechanical construction the signal can be made T9x on 70 cm.



The circuit suggested by G2DCI to improve the performance of the Clapp over a wider band of output frequencies. CV1, CV2, are ganged to give constant capacity variation, and values are shown in the table.

Table of Values

Clapp Oscillator with Constant Capacity Variation

C1	=	95 $\mu\mu$F, silvered mica
C2, C3	=	·001 μF, silvered mica
C4, C5	=	100 $\mu\mu$F, silvered mica
C6	=	·002 μF, silvered mica
CV1	=	5-65 $\mu\mu$F, variable } *ganged to give constant*
CV2	=	25-350 $\mu\mu$F, variable } *capacity change ratio*
R1	=	100,000 ohms
V1	=	6J5 (or half 6SN7)

POINT ON DX WORKING

We would refer those readers who want a clear understanding of amateur procedure (in the DX operating sense) to our *DX Operating Manual*. It covers in detail the technique of DX working and operation on the amateur bands generally. The price is but 2s. 8d. post free—order on the Circulation Manager, Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1.

DX COMMENTARY

CALLS HEARD, WORKED & QSL'd

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

FIRST of all, thanks to those many readers who have been so kind as to send Christmas and New Year greetings, both over the air, in their letters, or on cards. We have already said "Same to You!" individually, but, collectively, your DX Commentator would like to wish you *all* the very best of Health, Happiness and DX in 1950. And let's refrain from the too-obvious crack about New Year Resolutions, shall we?

Contests and All That

Further views on the proposed new type of DX Contest have still been coming in, and, in general, the scheme is popular and everyone is anxious to have a try at it. The one modification we have decided on is this—instead of the originally-suggested two-hour period we shall have to make it six hours. And instead of the five best QSO's counting, we will have the twelve best.

This will still make a contest that won't deprive anyone of sleep; that won't turn the bands into a Bedlam; that won't necessitate frantically working thousands of stations for a mere contact; and that will give everyone a chance of raising some DX that they might not otherwise find. And what more can you ask?

Elsewhere in this piece appears an up-to-date list of countries in order of prefixes. This conforms in detail with the other published and internationally agreed lists. Our arbitrary figure for the "Points Value" of each country is appended—and please don't write and tell us that it is all wrong because *you* can work a KM6 any time of day or night but have never heard a CR4—and so on, and so forth. It is only an attempt at justice and is sure to contain anomalies. It is intended as a scoring comparison for United Kingdom stations only, and, as such, it should be equally fair for all. Perhaps you would like to do a bit of arithmetic and work out the total points value of all the countries you have worked, and append it to your DX scores next month? It would be interesting to see what sort of totals we get.

Of the first of the contests, more later. January and February are too full of contests as it is, but in March we shall certainly sneak six hours of a Saturday or Sunday evening and see what we can find.

The DX Tables

Congratulations to G5MR (Hythe), who enters the 40 Class in the Zones Worked Listing. 'MR has been searching for Zone 6 for a long time, and was overjoyed to find XE1PJ, 28080 CW at 1415 GMT on December 5. 'MR has recently moved and has only a "bit of wire" in the roof space as yet, but he finds it gets out fine on 28 mc. The Four-Band Table appears in 3:5 mc Order of Precedence this month with, of course, the uncatchable G8VB 'way out front. Note that G3EIZ (Liverpool), the runner-up, is a 25-watter. Nice work, 'EIZ.

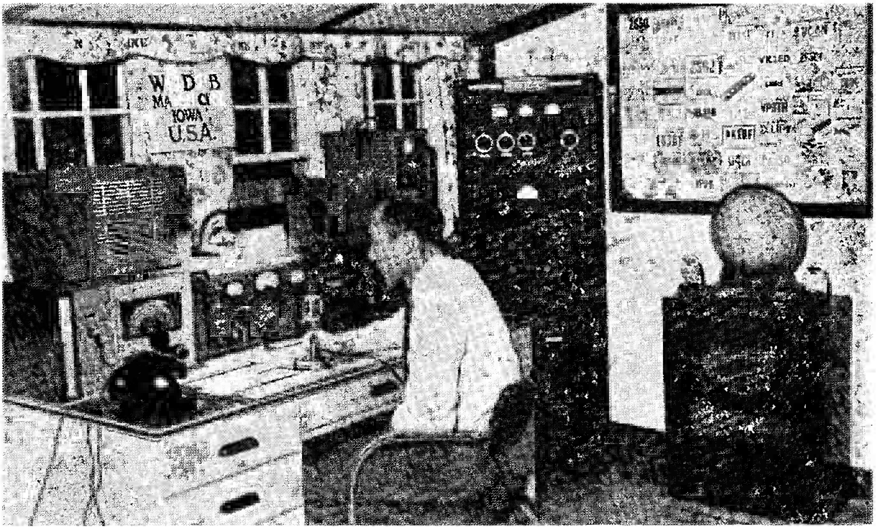
Certificates

As another move for the New Year, it has been decided that we issue certificates as some kind of encouragement to stations that can show proof of having Worked 100 ZL's, or 100 ZS's, or 200 VK's or 200 VE's. This scheme could, of course, be extended to other countries. If the idea finds favour and support, we are prepared to start it right away. Will you state your views, please?

And we have in mind the issue of the Toughest One Yet—a Four-Band Proficiency Certificate. This would be no joke and would involve proof of contacts on the following lines: 40 countries on 3·5, 100 on 7 mc, 180 on 14 mc and 150 on 28 mc, with a total of not ess than 200. We very much doubt whether anyone in the world could qualify for it at present, but at least it would be something worth going for. The size, we suggest, would

TOP BAND TRIUMPH

G3PU (Weymouth) reports that on the morning of December 18, 0730-0805, he was in QSO with W4NNN (Church Falls, Va.) on 1810 kc. G3PU was RST-339 and gave 459. This is believed to be the first G/W4 contact on the Top Band, and both operators are to be congratulated on a fine effort.



WØDPB, Mason City, Iowa, who has been at it since 1925, runs a pair of 812H's in the 400-watt final, with an SX-28 receiver.

be about twelve feet by six (big enough for a shroud). Are those figures ridiculously high, or do they represent a real "target"?

DX of the Month

December has not been what one would call a howling success, but 14 and 28 mc have been very good indeed for short periods and pretty good most of the time. A few "nice ones" made brief appearances which have brought out all that is worst in human nature for a little while—but we think that behaviour on the whole, has improved. Examples of these plums were FY8AC, FN8AD, ZS9D, ZD8B, ZD9AA and FK8AC (all 14 mc CW). The FY8, in particular, was submerged on practically every appearance. KL7's are getting particularly prominent again, both mornings and evenings, and KH6's are frequently about.

Ten Metres

GM3DZB (Morayshire) has been very active on 28 mc 'phone and reports hearing KH6's and KL7's two or three hours on either side of midnight. He worked KH6IJ and KH6LG at 0150 and 0159, other good ones being ET3AF, CR5UP, PK3WH, VP6SD, OX3GG, ZP5BL, HP2RO, HC2JR, YS2AG, MP4BAE, TI2HP. There's no doubt that ten-metre 'phone piles up the countries these days.

G2BJY (West Bromwich) reports CR5UP, UN1AB, EK1AD and a horde of PK's. G2HIF (Wantage) got PZ1QM, YS2AG, XZ2FK, CR6AI, HH2X, YV1BE and others—all 'phone. He calls that sort of thing Grade I DX; Grade II includes PK's, KG6's, KR6's, CX, ZL, ZE, JA and the like; Grade III is "What you get back when you call CQ on an open band." The DX that doesn't come back to you is described as "Plums that didn't ripen!" GM3CSM (Glasgow) worked ZS6OS/ZS8, who said he would be in ZS7 a couple of days later

G2WW (Penzance) found EQ3SAM, ZD1FB, KR6BB and KR6CO; G3FGT (Birmingham) thought 28 better than 14, and collected OQ, CR7, 3V, VU, KZ and XZ on CW; G5FA (London, N.11) added several new ones to his score but nothing very startling. G3DCU (London, N.W.11) got ZEIPJ (CW) for his 39th Zone and is now flat out for Zone 23. Working in the *CQ* DX Contest on 28 mc only, 'DCU worked 44 countries in 26 Zones, with a score of 52,570—which seems pretty hot to us for one band.

The 14 mc DX

Quickies on this band: G5FA has heard VQ8AX (who would have given him his 40th Zone) but remarks "too many flies round the jam-pot!" This suggests that a new name for Spivs might be "wasps". G6BS (Cambridge) weighs in with UJ8AF, MI3AB, AP5B, CR7BN, ZS3B, MS4FM and UI8KAA. G3FGT says "good old Twenty" and adds VQ8AY, FE8AB, MP4BAM, MD7DC, ST2TC, TI2PZ, VQ3SS and others. G3FXB

COUNTRY LIST BY PREFIXES

With Scoring Values

This List has been brought up to date as at December 31, 1949. It is in agreement with the American lists and all amendments. The "points value" given to each prefix in the List below is, however, a purely domestic allocation made by the *Short Wave Magazine*. It is for use by United Kingdom stations only for the purpose of calculating their scores in the DX Contests to be organised by the *Magazine* during the coming year.

Prefix	Country	Points Value
AC3	Sikkim	10
AC4	Tibet	10
AP	Pakistan	2
AR	Lebanon	2
C	China	2
C3	Formosa	5
C9	Manchuria	5
CE	Chile	2
CM/CO	Cuba	2
CN	French Morocco	1
CP	Bolivia	5
CR4	Cape Verde Is.	5
CR5	Port. Guinea	5
CR5	Sao Thome & Principe	5
CR6	Angola	2
CR7	Mozambique	2
CR8	Goa	5
CR9	Macao	5
CR10	Timor	10
CT1	Portugal	0
CT2	Azores	1
CT3	Madeira	1
CX	Uruguay	2
CZ	Monaco	2
DL	Germany	0
DU	Philippines	5
EA	Spain	0
EA6	Balearics	2
EA7	Rio de Oro	5
EA8	Canary Islands	2
EA8	Span. Guinea	5
EA9	Span. Morocco	5
EI	Eire	0
EK	Tangier	1
EL	Liberia	2
EP	Persia	2
ET	Ethiopia	2
F	France	0
F	Corsica	2
FA	Algeria	1
FB	Madagascar	10
FC	Clipperton Is.	10
FD	Togoland	5
FE	Cameroons	2
FF	Fr. West Africa	2
FG	Guadeloupe	10
FI	Fr. Indo-China	5
FK	New Caledonia	5
FL	Fr. Somaliland	10
FM	Martinique	5
FN	French India	5
FO	Fr. Oceania	5
FP	St. Pierre & Miquelon	10
FQ	Fr. Equatorial Africa	2
FR	Reunion	10
FU (YJ)	New Hebrides	10
FY	Fr. Guiana	5
G	England	0
GC	Channel Is.	0
GD	Isle of Man	0
GI	N. Ireland	0
GM	Scotland	0
GW	Wales	0
HA	Hungary	0
HB	Switzerland	0
HC	Ecuador	5
HE	Liechtenstein	2
HH	Haiti	5
HI	Dominican Republic	5
HK	Colombia	2
HL	Korea	5
HP	Panama	5
HR	Honduras	5
HS	Siam	5
HV	Vatican City	2
HZ	Saudi Arabia	2
I	Italy	0
IS	Sardinia	2
JA	Japan	2
KB6	Baker, Howland & Phoenix Is.	5
KC4	Antarctica	10
KC6	Palau Is.	10
KC6	Carolines	10
KG4	Guantanamo Bay	5
KG6	Marianas	2
KG6 I	Bonin Is. (Iwojima)	5
KH6	Hawaii	2
KJ6	Johnston Is.	10
KL7	Alaska	2
KM6	Midway Is.	5
KP4	Puerto Rico	2
KP6	Jarvis & Palmyra	5
KR6	Ryukyu Is. (Okinawa)	2
KS4	Swan Is.	5
KS6	American Samoa	10
KV4	Virgin Is.	5
KW6	Wake Is.	5
KX6	Marshall Is.	10
KZ5	Canal Zone	2
LA	Norway	0
LU	Argentina	1
LX	Luxembourg	0
LZ	Bulgaria	0
MB9/OE	Austria	0
MC1/MD1 MD2/MT2	Cyrenaica, Tripolitania	1
MD3/MI3	Eritrea	1
MD4	Somalia	2
MD5	Suez Canal Zone	1
MD7	Cyprus	2
MF2/AG	Trieste	2
MP4	Oman	5
M1	San Marino	2
OA	Peru	2
OH	Finland	0
OK	Czecho-Slovakia	0
ON	Belgium	0
OQ	Belgian Congo	2
OX	Greenland	2
OY	Faroes	5
OZ	Denmark	0

Prefix	Country	Points Value
PA	Netherlands	0
PJ	Dutch W. Indies	5
PK1, 2, 3	Java	2
PK4	Sumatra	2
PK5	Dutch Borneo	5
PK6	Celebes & Moluccas	5
PK7	Dutch New Guinea	5
PX	Andorra	0
PY	Brazil	1
PZ	Dutch Guiana	2
SM	Sweden	0
SP	Poland	0
ST	Sudan, Anglo-Egyptian	2
SV	Greece	1
SV5	Dodecanese	5
SV	Crete	5
TA	Turkey	1
TF	Iceland	1
TG	Guatemala	5
TI	Costa Rica	5
TI	Cocos Islands	10
TT	Tannu Tuva	10
UA (LA)	Spitzbergen	5
UA	Franz Josef Land	5
UA1, 3, 4, 6	USSR, Europe	0
UA9, Ø	USSR, Asia	2
UB5	Ukraine	0
UC2	White Russia	0
UD6	Azerbaijan	2
UF6	Georgia	2
UG6	Armenia	2
UH8	Turkoman	2
UI8	Uzbek	2
UJ8	Tadzhik	2
UL7	Kazakh	2
UM8	Kirghiz	2
UN1	Karelia	2
UO5	Moldavia	0
UP	Lithuania	1
UQ	Latvia	0
UR	Estonia	0
VE	Canada	1
VK	Australia	1
VK1	Heard Island	10
VK1	Macquarie Island	10
VK9	New Guinea Territory	5
VK9	Papua Territory	5
VK9	Norfolk Island	10
VP1	British Honduras	5
VP2	Leeward Is.	5
VP2	Windward Is.	5
VP3	British Guiana	5
VP4	Trinidad	2
VP5	Jamaica	2
VP5	Cayman Is.	10
VP5	Turks & Caicos Is.	10
VP6	Barbados	2
VP7	Bahamas	5
VP8	Falkland Is.	5
VP8	South Georgia	5
VP8	South Orkney Is.	5
VP8	South Sandwich Is.	5
VP8	South Shetland Is.	5
VP9	Bermuda	2
VQ1	Zanzibar	10
VQ2	N. Rhodesia	2
VQ3	Tanganyika	2
VQ4	Kenya	1
VQ5	Uganda	2
VQ6	Brit. Somaliland	5
VQ8	Mauritius	5
VQ8	Chagos Is.	10
VQ9	Seychelles	10
VR1	Gilbert & Ellice Is.	10

Prefix	Country	Points Value
VR1	British Phoenix Is.	10
VR2	Fiji	5
VR3	Fanning Is.	10
VR4	Solomon Is.	10
VR5	Tonga	5
VR6	Pitcairn	10
VS1, 2	Malaya	2
VS4	Brit. North Borneo	5
VS5	Brunei	5
VS5	Sarawak	5
VS6	Hong Kong	2
VS7	Ceylon	1
VS9	Aden	1
VS9	Maldive Is.	10
VU	India	1
VU4	Andaman Is.	10
VU4	Laccadive Is.	10
VU7 (MP4)	Bahrein	5
W (K)	United States	1
XE	Mexico	5
XZ	Burma	2
YA	Afghanistan	10
YI	Iraq	5
YK	Syria	2
YN	Nicaragua	5
YO	Roumania	0
YS	Salvador	5
YU	Yugo-Slavia	0
YV	Venezuela	2
ZA	Albania	0
ZB1	Malta	0
ZB2	Gibraltar	1
ZC1	Transjordan	2
ZC2	Cocos Is.	10
ZC3	Christmas Is.	10
ZC6	Palestine	1
ZD1	Sierra Leone	2
ZD2	Nigeria	2
ZD3	Gambia	5
ZD4	Gold Coast	2
ZD6	Nyasaland	5
ZD7	St. Helena	10
ZD8	Ascension Is.	5
ZD9	Tristan da Cunha	5
ZE	Southern Rhodesia	2
ZK1	Cook Is.	5
ZK2	Niue	10
ZL	New Zealand	1
ZM	Western Samoa	5
ZP	Paraguay	5
ZS	Union of South Africa	1
ZS	Marion Is.	10
ZS3	South West Africa	5
ZS7	Swaziland	10
ZS8	Basutoland	10
ZS9	Bechuanaland	5
3V	Tunis	2
4X	Israel	1
	Aldabra Is.	10
	Bhutan	10
	Comoro Is.	10
	Easter Is.	10
	Galapagos Is. (HC)	10
	Ifni	10
	Jan Mayen Is.	10
	Kerguelen Is.	10
	Kuwait	5
	Nepal	10
	Outer Mongolia	10
	Tokelau Is.	10
	Wrangel Is.	10
	Yemen	10

(Hove) found a few new ones on 14, including SP1CM, ZB2G and 3V8AG.

G2WW acquired MD4TH for a new one on CW, and heard CR4AE, FY8AA and ZD9AA on CW and OY3IGO on 'phone. G3BDQ (St. Leonards) hooked YV5BX, MS4FM, VS1BX, FE8AB and VQ8AX. He will by now be GW3BDQ/A with a flea-power rig on 7 mc.

GM3CSM is so fed up with the absence of Zone 23 that he suggests a "Worked 39 Zones" Certificate "for good triers."! 14 mc CW rewarded him with TI2PZ, XZ2FK, ZD9AA, CE2DY, MI3UU, KZ5KS and a batch of KL7's.

DX on Forty

Whenever we look at 7 mc it seems to be jam-packed with Europeans and commercials, but that must be because we look at the wrong times—trouble is that we sleep at nights ! G6BB (London, S.W.2) managed to find UA9KSB (2000), CO8FH (0740), FA8JO (2000)and YO5LC (2020). G3AKU collected an EA6 and an EA8 ; G2WW says he finds 7 mc almost the best band of the lot, and proves it with a WAC including TF5TP, UL7KAB, CO8FH, PY2AIA, ZS5YF and two ZL's—2MM and 2NQ. He has also heard a few VK's and some W5's, 6's and Ø's, and says that EA9AB has appeared on the band. G3FXB worked F9JD/*Corsica* up there, and G3FGT brought in VK6RU, TF5TP, KV4AA, UA9KCC, FA3WW and F9QV/Corsica.

G6BS—the top-scorer for the band—added

FOUR BAND DX

Station	Countries Worked					Power
	3·5 mc	7 mc	14 mc	28 mc	Total	
G8VB	52	49	124	61	144	120
G3EIZ	36	23	39	15	54	25
G6QB	35	72	172	129	195	150
G3AKU	29	52	131	47	144	70
ZB1AR	29	41	94	43	106	100
G6BS	28	106	173	4	178	150
G2VD	28	60	161	98	168	150
G3ATU	26	61	170	95	178	10/150
G3FGT	23	33	79	35	97	25
G3DO	21	37	158	103	188	150
G8VG	21	54	107	26	122	60/75
G6BB	21	41	105	35	118	10/70
G3FNJ	21	40	113	63	133	150
G2WW	21	40	166	96	175	150
G2YS	21	26	111	25	122	150
G3ACC	20	13	103	5	112	150
G5FA	19	89	125	66	143	35/150
G2DHV	18	21	81	4	85	25/60
GW3CBY	17	27	43	8	58	15/30
G8IP	13	38	114	65	130	3/150
G3FXB	13	24	34	6	47	25
G8QX	12	18	111	73	131	150(P)
G6TC	11	38	78	13	90	20/65
G8KU	9	26	131	57	142	120
G2HIF	6	9	42	91	105	150(P)
GM6IZ	5	2	102	25	104	150
G2BJY	4	24	75	99	130	25
G2VJ	4	13	79	55	99	? (P)
G5WC	1	50	119	12	121	45
G2HKU	1	35	92	8	100	4/25

TOP BAND LISTING

Starting August 1, 1949

Station	Counties	Countries
G2YS	50	9
G4LX	45	9
G6AB	44	9
G2LC	44	9
G6ZN	40	8
G2HDT	40	8
G5XF	39	6
GM2HIK	38	7
G2ABT	34	6
G3BEX	32	6
G2AJU	31	7
G3ALE/A	28	4
GW3CBY	27	6
G3EJF	26	6
G3NT	24	4
G3FZW	23	5
G3FGT	10	5

At the First Class Operators' Club Dinner on November 25 last, G2NM presented the Marathon Cup to the winner, G8VG. Behind is G5PS, Asst. Honorary Secretary of the FOC.

EK1AO, MD7DC, KL7AAA and KH6QH. G5FA, another high scorer, worked W's as early as 1920 GMT and added MP4BAD, KP4HU, UA9CQ and VK, ZL and FA. He and others worked "CZ2AC", who *now* says "QSL via R.E.F." The eyebrows twitch slightly.

The 3·5 mc Band

As usual, most of the 80-metre gen comes from G8VB (London, W.5), who set up a new one by working TA3GVU on 'phone. After a 100 per cent. two-hour contact he put him through to VO2BL, and TA3GVU told him he was hearing many W's calling CQ but apparently not listening for DX. Then there was a round-table "do" with TA3GVU, HB9S, GM2AZN, VO2BL, G3DSW and G8VB. 'VB makes a plea for more African and Asiatic stations to come up on 80-metre 'phone during the early hours of the morning, as DX up to 3,000 miles seems to be easily practicable.

G5FA worked his first DX on the band with VE1BV, and G3FGT worked the same station plus VO4AJ and some FA's. 'FGT heard KV4AA and MP4BAD. G6ZN (Horbury) worked VO and W between 2200 and 2300 *with* 3 *watts*—his "QRO" ! He also heard G5LH, nearby, working EK1AO. G3DCU rolled in VE1BV, W1BOR, EK1AO and VK5AL. The latter, if genuine, was very interesting, because he is in Darwin ; he was first heard at 0100 and worked at 0214.

(Copies of photographs taken at the FOC Dinner can be obtained, price 4s. each, from F. Wise, 5 Victoria Street, London, S.W.1.)

Anomaly Department

G3AFL (Berwick-on-Tweed) writes to state firmly that he is in *Northumberland* and *not* in the Scottish county of Berwickshire, as so many people seem to think. He says the only station in the latter county is GM2CGY in Ayton, 8 miles North of Berwick-on-Tweed. GW3CDH (Newport, Mon.) points out that amateurs in that town are free to use G or CQ as they please, but they do *not* count as proper GW contacts for "outsiders."

Incidentally, GW3CDH recently worked W2HX, who told him that his call in the Old Days was 3CDH, and immediately afterwards he heard the present W3CDH who, unfortunately, went off the air because the XYL wanted him to put the car away ! 'CDH strongly recommends an aerial using a 67-ft. top with provision for current-feeding it at the appropriate points for 28 or 14 mc by a plug-and-socket arrangement.

Miscellany

G2VD (Watford), who did so well in the *CQ* Contest, now tells us that he scored 34,681 points in the CW part of the All-European Contest. Nice going, once more . . . .G3GFF, recently licensed in Pinner, Middx., has visited some forty countries in the last two years and made lots of personal contacts, acting as second operator at some stations.

He says "from Palestine to Panama and Costa Rica the same friendship, kindness and hospitality was shown me everywhere." Good to know that the old spirit still prevails over most of the world. . . .

G3DYY (near Skegness) is ex-VS9ET, and has worked 103 countries during his first year back in G. He is shortly leaving for MD5, where he will listen on 1·7 and 3·5 mc for G signals. Needless to say he hopes that MD5 operation will be permitted again by the time he arrives. G3AKU (St. Ives) wants us to dissociate the remarks in the first column of last month's Commentary from himself. Sorry, but Error Crep' In and they should have been to G3AGQ (Benson). He has received cards from AC3SS, AC4RF and EA8BC, but wants to know if *anyone* has ever had an LX card ?

G3AGZ (London, N.22) is ex-ZE2JI, and will send his ZE card to anyone who is still short. Heart-cry from him : "Everyone listens to a ZE CQ, but it's certainly a waste of time CQ-ing as a G3."

G3EFY (Exeter) and others clear up the 4X4CV query (*see* last month) by telling us that the station on 7 mc was 4X4CV/Airborne. 'EFY worked him when he was over the English Channel. The operator is W4OHT/W5IQH. Thanks also to G2AYQ and GM3DXJ for information on this subject.

G6YQ (Woolton, Liverpool) is in trouble ! He has had a card from a C8 in Zone 23 (*not* C8YR)—but with a sob in his voice, G6YQ admits that he has never worked, called or even heard this gold brick, though he has been looking for Zone 23 for months. The C8 card is certainly genuine, and obviously for some G who has had the QSO, and presumably is expecting the QSL. It therefore awaits a taker who can give to G6YQ the details—callsign, date, time and RST—to establish the claim.

Piracy

This goes on—it is now G3DEK (Cinderford, Glos.), who is not at present active, but is getting reports for alleged operation on 7 mc and the Top Band.

Cards from Poland

G2FSR (Chingford) has received his card from SP5AC, and G5PQ (Hull) has worked SP1CM, who is definitely genuine and the pre-war 1CM. ('PQ quoted a pre-war QSO to him and the SP came back with time, date and reports, which is just about as conclusive as anything could be.) It seems that the SP5's are newly-licensed stations and that the others will be using their pre-war calls. So SP will no longer be a rarity, either for QSO or QSL. G2FSR also received a card from KA1AI which was a pleasant surprise.

News From Overseas

ZD4AM (Tafo) has not much longer to live. (No, he's not ill, but returning home shortly and sounding the last QRT.) Nice DX for Harold recently has been VP1AA, VP5AR, VP7NU, VP9TT, PZ1QM and some KS4's, all "encouraged" to look for ZD4 by a W4 ! SP5AC is definitely good, his Air Mail card having arrived out there in Tafo. 'AM says that ZD2P (Cameroons) mentioned in the October issue is very doubtful ; he is now ZD2DCP and still in Port Harcourt. Anyway, British Cameroons does not count separately from Nigeria.

VS2CR (Perak) is ex-G3CTG and should be on 14 and 28 mc by now, looking for G's after 1230 GMT. See panel for QTH. VQ3AA (Dodoma) has found 14 mc very good in spite of 40 watts and two crystals. Look for him on 'phone, 14256 or 14350 kc.

ZD3D in Gambia has at last succeeded in working a few G's, but says he still answers lots of CQ's and they don't come back. (On the other hand, it is fair to add that many G's say they have called ZD3D and *he* hasn't come back.) He was on during the *CQ* Contest but didn't make a single contact, which looks like a straight lack of watts (RF) ! By now he has returned to U.K., so if you weren't on the short list, you've had it.

ZS2AT (East London) passes the welcome news that there is another active ZD6-ZD6HJ

ZONES WORKED LISTING
POST WAR

Station	Z	C	Station	Z	C
Phone and CW			Phone and CW		
G2FSR	40	200	G2YS	36	122
G6QB	40	195	ZB1AR	36	106
G3DO	40	188			
G3ATU	40	178	ZD4AM	35	109
G2WW	40	175			
G2VD	40	168	G2AKR	34	116
G3AKU	40	144	G3ACC	34	112
G3FNJ	40	133			
G8IP	40	130	G3FGT	33	97
G5MR	40	119			
			G6TC	32	90
G5FA	39	143			
G8KU	39	142	G2SO	31	93
GM3CSM	39	139	G2DHV	31	85
ZS2AT	39	138			
G3DCU	39	138			
G3CNW	39	130			
			Phone only		
G8VB	38	144			
G6WI	38	128	G3DO	37	151
G3CVG	38	122			
G6BB	38	118	G2WW	36	125
G3BNE	38	112			
GM6IZ	38	104	G8QX	35	131
G2BJY	37	130	G2VJ	34	99
G5WC	37	121			
G3BDQ	37	116	G2HIF	31	105

at Dowa, Nyasaland. He also tells us that a French expedition is bound for the Antarctic in the *Commandant Charcot* with the call FB8AX (ship's call FNFM). After agreeing with all our usual moans and groans and adding a few of his own, ZS2AT signs off "Cheerio for now OT es mni tnx fer fb OSO sure hpe cuagn so vy 73 es bcnu tnx fer QSO fb so 73 es all the best wl be looking fer u es hpe fer another QSO so cheerio es all the best 73 es gud luck VA VA . ... . VA . . what's that—working another station already? Well, I'm hanged, he might have come back to me!"

B. A. M. Herbert of G2WI, who hopes to be G2WI again in 1952, is schoolmastering at RAF Ismailia, M.E.A.F. He says crowds of "the boys" are potential DX and only waiting for the ban to be lifted, but he gets a lot of fun from listening to G's. He says 14 mc has been the best band, with 28 mc quite unpredictable. During October and November the TV Sound from A.P. roared in at S9 plus.

MD7XP (QTH in panel) is just licensed and, to quote his own words, "now an active lid patiently calling CQ G and piling up a huge score of EA's, HA's and YO's." He suggests that a "Worked All Counties" Certificate would help the G's to pull in the DX, and adds that although he has received All States he has only heard 14 British counties in 12 months' listening. 'XP is the only civilian yet licensed in Cyprus.

ZB1BB (see panel) is ex-ZC6JU and works with 150 watts on 14 and 28, mainly 'phone. He writes from MD5 and laments the fact that it is a "closed shop" and he can't give a shout from there, but will soon be back in ZB1.

Another MS4 reports from Somalia; MS4FM, who is on 14 and 28 mc using two crystals—7027 and 7073, and work 'em out for yourselves. He has 25 watts to an 807 and an HRO, and has only just burst in on Amateur Radio although he has been a professional operator for 22 years.

Capt. A. M. R. Mallock writes from Accra, Gold Coast, to say that he is licensed and active on 14 mc 'phone, but as he forgot to tell us the call-sign we can't publish his QTH!

Ken Ellis of HZ1KE (Taif, Saudi Arabia) told us, in a QSO, quite a lot about his problems out there. He is going to continue using the Top Band at weekends throughout the winter, but as the only time that he has both good conditions *and* freedom from static is about 0630 local time (0230 GMT), that is the only time he will be around. He works near the HF edge of the band and will continue to look for G's on Saturday and Sunday mornings at that time. He is also active on 3·5, on which band we recently worked him at 2000 GMT. HZ1KE's second-in-command is HZ1PC. Ken hopes to be taking the famous portable in search of some of the rarer prefixes again—more of this later.

Top Band News

And quite a lot of it this month, we are glad to note. G2ABT (Bolton) enters the table with 34 counties, worked with 6 watts and a 50-ft. aerial in a poor location. G3BEX (Southwick) works on only two bands—420 mc and 1·7 mc! He appreciates the Top Band for the possibility of "long chats without QRM," but also does a bit of DX with OK1ZB and the like.

Those who have been bewailing the absence of a GD on the band will be glad to know that GD3UB appeared there on December 8 and is likely to stay for a while. G3EJF (Bury) worked him on 'phone, using 2·8 watts. This, for 94 miles in daylight, does credit to them both. G2HDT (Burton-on-Trent) appreciates the increasing activity on the band and the interest shown in this feature. His total is up

DX QTH's

EA8AE	Lucas Fernandez St. 17, Puerto de la Luz, Canary Is.
EK1AO	34 Goya Street, Tangier.
EK1DL	Box 57, RCA Communications, Tangier.
KG6SF	Navy 3245, c/o PM, San Francisco, Calif.
MD7XP	L. Parks, c/o Met. Office R/S, RAF Nicosia, Cyprus, M.E.F.3.
MI3DX	c/o Cable and Wireless, Asmara, Eritrea.
MI3SI	Radio Marina, Asmara.
MS4FM	M. K. Hare, c/o British Administrator, Mogadishu, Somalia.
PK2JB PK3HR PK3LC	Box 222, Soerabaya, Java.
VE8MC	c/o Weather Bureau, Washington, D.C. (*Stn. on Prince Patrick Island*).
VP4CO	APO 869, c/o PM, New York.
VQ4AI	RAF Nairobi, Kenya Colony.
VS1BJ	GHQ Signal Regt., c/o GPO, Singapore.
VS2CR	J. Hemphill (*ex-G3CTG*), c/o Perak River Hydro-Electric, Ltd., Malim Nawar, Perak, Malaya.
VS6BI VS6BO	Box 541, Hong Kong.
YJ1AA	F. H. Palmer, Vila, New Hebrides, Oceania.
YO3RI	Box 95, Bucharest.
ZB1BB	A. L. Langford (*ex-ZC6JU*), HQ Forces Broadcasting Service, Malta.
ZD1FB	Lungi Airport, Freetown, Sierra Leone.

to 40. G3FGT (Birmingham) has widened his activity to five bands and has collected OK1AW up here.

G3FZW (Lichfield) using the "Top Band Cabinet Tx" as described in the *Magazine*, has worked 23 counties and 5 countries since being licensed late in October. GC2CNC (Jersey) is on most nights from 2345 to 0030—he can't get on earlier because of mysterious noises which don't shut down till 2345. G2YS (Chester) seems to be "King of the Table" at present, with 50 up—nice going.

This Month's Aversion

Only one pet grouse this month, and that a purely personal one about the 'phone fellers who *will* say "Thanks for a fine business QSO." We've already been tackled by one casual listener who said "I thought 'business QSO's' were forbidden by the terms of the licence." Just another case of the misuse of CW abbreviations on 'phone. Is a "fine business QSO" so different from a "fine QSO"? Does it sound clever, or is it just a matter of habit?

GM3CSM comes up with the usual plaint about (*a*) Europeans who call CQ DX at zero-beat with a nice DX station; (*b*) G's who work a rare one and proceed to make skeds "for the contest next week" although there's a queue of 50 waiting; (*c*) all the well-known types who call the DX station right through a QSO, even when *he* is transmitting (showing a lack of receivers!) But these are too well-known to need expansion. . . . C. R. Davies (Bournemouth) mentions hearing ST2KR on 28 mc 'phone; he is not one of the active ST's mentioned last month, but appears to be the real thing. . . . G5TV (Harrow Weald) gives news of the Brisbane DX Club. There are twelve members, and anyone working five of them is promised a nice certificate. If you collect this kind of wall-paper, look out for these VK4's, mostly on 28 mc 'phone. (We are thinking of awarding a really astounding certificate to every rare DX station that works G6QB and QSL's . . . would that help, do you think?)

Talking of QSL's, can anyone invent an electronic device to burn the ears off all those stations who say "Sure will QSL" when they haven't the least intention of doing so? It's not the absence of the card that we deplore so much as the dishonest habit of saying that they will send one. Each time we have worked FM8AD he has, without prompting, suggested that he should QSL; but we don't think he *ever* does, and has anyone ever seen a card from Haiti? Other "black-sheep countries" seem to be VP7, YN, ZP, FO8, HP, and KM6.

So now it's time to sign off for 1949 and to welcome Radio's second Half-Century. Who knows what the 1950's may hold for the likes of us? Shall we yearn for the "good old Forties"? Maybe not. At all events, all the very best to you for the New Year and may all your DX dreams come true. Deadline for next issue is January 11, which makes it a close thing, so sit down and write that letter *now*. 73 and BCNU.

★

XTAL XCHANGE

Below are the offers for this month; any received after December 21 are being held over for the February issue. All negotiations should be conducted direct.

GI2ARS, Ballyveamore, Ballymartin, Co. Down, N. Ireland.
Has QCC 7159 kc crystal, mounted, with certificate. Wants any type 1750-1800 kc crystal, with certificate.

G3DRN, 65A Melbury Gardens, Wimbledon, London, S.W.20.
Has Standard 7275 kc crystal, ½-in. pin spacing. Wants frequency 7005-7020 kc.

G3KH, Woodlands, Station Road, Cropston, Leics.
Has 1792 kc crystal, holdered, and 7025 kc, unmounted, both QCC. Wants frequencies 3500-3562 kc.

SMALL ADVERTISING

Readers having offers or requirements to advertise, likely to be of SWL interest, will find our *Short Wave Listener* Small Advertisement columns worth exploring. Rates are low—2d. a word, minimum 3s., box numbers 1s. 6d. extra—and a good coverage is assured. Insertions for the next issue of the *Short Wave Listener* should reach us by February 2, for appearance in the March issue, published on February 16.

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ITEM FOR CONTRIBUTORS

Intending contributors to the *Short Wave Magazine* or *Short Wave Listener* should ask for a copy of our "Notes on the Preparation of Articles"—it will save an awful lot of time and labour in the end! We are always glad to see material from new writers, and every year we publish much work from contributors who have never previously appeared in print. Our rate of payment is the highest in the world in the Amateur Radio field—*see* p. 541, September, 1949, issue.

Amateur's Heaven

or, Was it a Dream?

By Brasspounder

We all have our ideas about the design, layout and operation of that perfect station hoped for some day. This short article on the subject is simply full of ideas !—Ed.

THERE is little fun in Amateur Radio when one lives in a large block of flats seemingly crammed with every electrical noise-producing machine and located on a busy road, so that streams of passing cars ensure that no gaps remain in the local noise level. When one's pocket is shallow, however, these circumstances must be accepted.

The unexpected windfall of a really handsome legacy suggested that I could be rid of these irritations and could go ahead and indulge my hobby to the full in a location of my own choice.

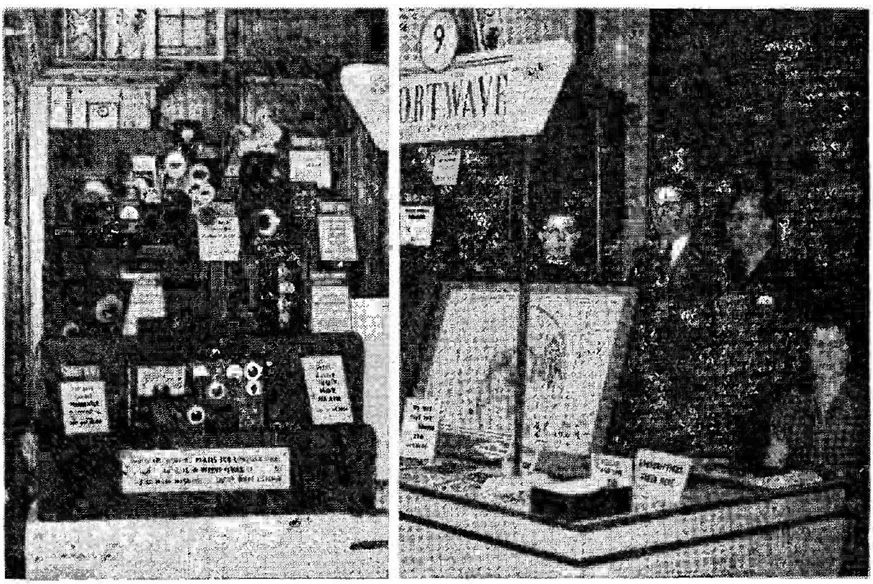
Finance being no longer a worry, my location problems were solved when, after careful search, I found the ideal QTH some 30 miles from London. A pleasant house in its own acre of ground, connected to both supply mains and telephone, half-a-mile from main roads and other habitations—and, best of all, adjoining a *ten-acre field* apparently unsuitable for either grazing or cultivation, but a perfect site for an extensive aerial farm.

After a few weeks of domestic upheaval and the successful renting of the ten-acre field, construction commenced and now after two years the station is completed and working—at least as far as any amateur station ever is.

General Layout

Briefly, the plan allowed for the operating position in the house adjacent to domestic comforts, with a transmitter position in a specially built shack on the edge of my own ground from which RF lines would lead to the aerial systems in the ten-acre field.

The transmitter shack (a small 18 ft. by 20 ft. brick single floor building), partitioned to allow a portion as workshop, was completed and five transmitters installed. I have never favoured excessively high power so for simplicity the transmitters are identical and use push-pull 813's in the final stages (with a shade over 2,000 volts on the plates) modulated when



An impression of the Stand of the Short Wave Magazine, Ltd., at the Radio Society of Great Britain's Third Amateur Radio Exhibition, London, November 23-26, 1949. Right, some members of the *Magazine* staff. Left, our equipment display ; these were all prototype working models designed to our specification for recent constructional articles in the *Short Wave Magazine* and our *Short Wave Listener*.

necessary by a pair of 805's in push-pull.

One transmitter is earmarked for use on each of the four main amateur communication bands and tuned accordingly, thus avoiding troublesome band changing problems. One transmitter is spare and all have low power (150 watt) facilities incorporated.

Frequency control is by VFO or crystal. Both the VFO and the switch for the selection of any one of the 70 crystals housed in the temperature controlled oven are at the operating position. Crystals are arranged in 2 kc steps from 7000 through 7060 kc and in 6 kc steps from 7060 through 7200 kc, as well as suitable points in the 3·5 mc band.

All remote controls for the transmitters are terminated on a compact panel 2 ft. by 10 in., located directly above the receivers. Also incorporated in this panel are the aerial selector switches and a set of miniature meters to duplicate those in the major circuits of the five transmitters.

The Aerial Farm

Aerial design was tackled boldly at the beginning and the ten-acre field is now fairly full ! Rotary beam systems currently in use are :

3·5 mc close spaced three element.
7 mc four element.
14 mc eight element (four-over-four).
28 mc eight element (four-over-four).

A fifth experimental rotary beam for 28 mc has been completed and erected and initial tests augur well. This is a multi-wire dipole with 11 reflectors arranged parabolically, each one-tenth wavelength spacing from each other and one-third wavelength from the radiator, with three directors ahead. This beam is tiltable (remotely from the operating position) 10 deg. above and below the horizontal. Four three-wire folded dipoles of conventional type complete the aerial systems.

To prevent excessive disfigurement of the countryside the pylon masts carrying the beam were restricted in height and none exceed 72 ft.

All aerials are fed with 600-ohm open lines carried on breast routes from the transmitter shack to the aerial matching units. For aerial tuning a pair of field cable wires connect a field strength meter at the extreme end of the ground either to the operating position or to alternative positions near the aerials.

Directivity of each system is displayed on 12-in. × 12-in. azimuthal projection maps, each set in its own case above the operating desk. Selsyn motors control this indication and the aerial selector switch additionally selects the appropriate map and selsyns, each with its associated illuminated pointer.

Some Operating Conveniences

The operating position is built into an oak desk of special design which blends with the room without impairing its functional role. Extreme simplicity of appearance was made possible by the effort put into it, with resulting efficiency of the remote control arrangements and the control panel and its associated relays. It has been possible to reduce visible equipment to the two double superhet receivers, the VFO and the aerial maps except when on the air, when the control panel is additionally exposed.

Electronic, semi-automatic, manual and Wheatstone tape keys (the latter for stereotyped calls) are available. An automatic CW DX analyser and recorder which I have designed gives great pleasure and saves much lengthy hunting for those rare calls. Adjustable to any preset dash-and-dot combination it can be tuned to sweep continuously over any 100 kc required. Thus, if set to the combination of say, KM6, the sweep ceases on reaching the frequency on which the KM6 call is being transmitted and an alarm bell is actuated—a strident alarm bell—a most persistent alarm, loud enough to wake the dead—confound it, it is that wretched alarm clock once more, what a detestable invention it is.

Well, here's another day. I *must* remember to buy a spare for that final 807 stage.

DIRECT SUBSCRIPTIONS

The *Short Wave Magazine* can be obtained by direct subscription to us, for delivery by post on the day of publication—the Friday after the first Wednesday in each month. A home subscription costs 20s. for a year of twelve issues, and we can also accept gift-subscriptions at the same rate taken out on behalf of contacts overseas.

New overseas subscription rates are : America, $3·08 ; Canada, $3·40 ; France, Fr. 1,078 ; Belgium, Fr. 154 ; Sweden, Kr. 16; Switzerland, Fr. 14 ; Holland, Gdr. 11·70, and Portugal, Esc. 88·50.

MULLARD ULTRASONICS

Further to some notes on ultrasonics in previous issues, we are now informed that Mullard Electronic Products, Ltd. are marketing a Magneto-striction Transducer and LF Ultrasonic Generator, having a maximum output of 1 kW in the frequency range 10-25 kc. This equipment will widen the application of ultrasonics in industry very considerably, the greatest advance being in the design of the transducer. It is this that converts the low-frequency RF energy into ultrasonic power ; where previously a crystal was used, involving certain obvious limitations, the new transducer is an electro-mechanical assembly resonated at its natural frequency and capable of being operated at high peak loadings.

The Versatile BC-357

Surplus Unit with Unusual Applications

By V. J. COPLEY-MAY (G3AAG)

This is the marker beacon receiver carried on aircraft fitted for SBA landings. It is unique of its kind in that the output stage operates a relay, and such a unit obviously has considerable practical applications in the field of Amateur Radio. Our contributor suggests a few of them.—Ed.

SPENDING some time in "Surplus Avenue" in search of equipment containing sensitive DC relays the writer came across the BC-357 marker beacon receiver, which in addition to providing the necessary relay also led to an interesting series of experiments. As it stands the receiver is of little use to the amateur but with a few simple modifications it can be made to perform a variety of useful functions.

Theoretical Explanation

In the unmodified form the receiver consists essentially of an RF amplifier followed by a detector and two-stage audio amplifier and a further detector. These functions are obtained using only two valves—a 12C8, double-diode pentode and a 12SQ7 double-diode triode.

Referring now to Fig. 1, a modulated carrier (it is essential that the carrier be either pulse or amplitude modulated) is coupled to the input tuned circuit from the aerial terminal. This signal, being applied to the grid of the first valve *via* the condenser C2, appears across the anode load L2 in amplified form. From the anode it is passed *via* C9 to the detector tuned circuit C11/L6 and thence *via* C10 to one of the diodes of V1 ; R4 is the diode load across which the detected audio will appear. The network L5, C4 and C3 serves to prevent RF from returning to V1 grid. The audio signal now appears across R2. (It is probable that R1 is incorporated to prevent oscillation in the first valve.)

The audio signal is thus applied to the grid of V1 and after amplification appears across L3. V1 is operated as a reflex amplifier. Further amplification of the audio signal occurs in the triode section of V2. The signal developed across L7 is applied to the diodes of the second valve ; the relay itself forms the diode load. The small value of C2 is accounted for by the fact that the unit was used for the reception of "pulsy" signals.

In its present form the receiver is tunable with C1 and C11 in the range 60 mc to 75 mc.

The Relay

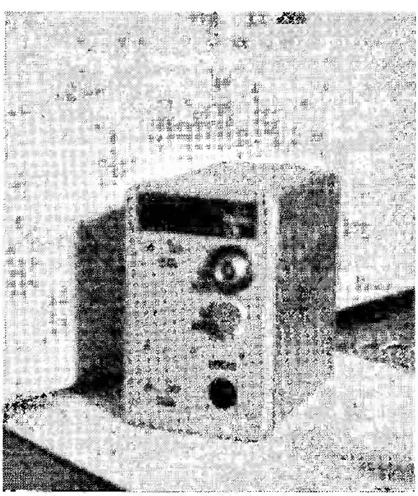
The relay forming the heart of the receiver has a DC resistance of 12,000 ohms. It gives a positive "make" on 400 microamperes and then breaks when the current is reduced to 150 microamperes. This sensitivity varies with different receivers but a tension spring adjustment is incorporated enabling a critical setting to be obtained. Single-pole change-over contacts are operated by the armature and these are suitable for controlling a low voltage current of up to 500 mA.

With a 30 per cent. sine wave modulated carrier on 65 mc the relay was made to function with an input of ·04 volts applied to the aerial terminal.

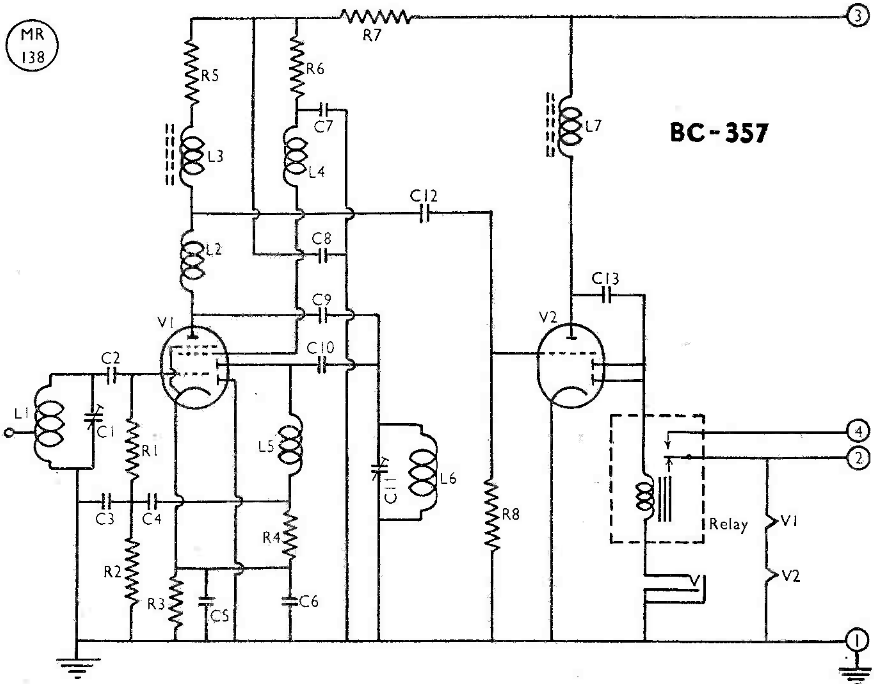
Modifications

The reader will have doubtless thought of a number of practical applications for the unit. Two modifications successfully carried out by the writer may, however, prove of interest.

Converting the unit to accept signals at the intermediate frequency of the station receiver was easily accomplished by dividing the sections of an old IF transformer and incorporating these in place of the existing tuned circuits L1/C1 and L6/C11. The value of C2 was increased to 150 $\mu\mu$F. The new tuned circuits were resonated to 455 kc (IF of the HRO). A pick-up wire connected to the aerial terminal



General view of the BC-357 Marker Beacon Receiver on which G3AAG's experiments were carried out.



Circuit of the BC-357 before modification. All controls and connections are brought out to the front panel, and the whole unit measures 5¼-in. × 5¼-in. × 3¼-in. only

of the BC-357 was loosely coupled to the last IF stage of the HRO.

CW signals of the order S7 to S9 were found to operate the relay satisfactorily and it was possible, by connecting the BC-357 relay contacts in series with the keying relay of the transmitter, to re-radiate transmissions being received. (It was of course necessary to use separate aerials and operate on widely different frequencies.) The BC-357 could also be used for actuating a Morse inker, but possibly one of its most amusing functions was in converting a T6 note into a T9x by keying an audio oscillator from the relay !

The signal being received must be reasonably free from QRM in any of these applications. It should also be remembered that for correct operation the BFO of the main receiver must be switched on. The fact that the BC-357 will respond without the BFO is because keying transients give the "impression" of modulation. Critical adjustment of the main receiver RF gain control is necessary and it should be set to just beyond the point where the relay begins to function. The speed at which the relay will operate is mainly governed by the time constant of the circuit and was found satisfactory for speeds up to 16 w.p.m.

Table of Values

Circuit of the BC-357 Marker Beacon Receiver

C1, C11	=	18 $\mu\mu$F
C2	=	25 $\mu\mu$F
C3, C9, C10	=	50 $\mu\mu$F
C4	=	·004 μF
C5, C6, C12	=	750 $\mu\mu$F
C7	=	·01 μF
C8	=	0·5 μF
C13	=	0·34 μF
R1, R2	=	1 megohm
R3	=	200 ohms
R4	=	0·5 megohm
R5	=	10,000 ohms
R6	=	150,000 ohms
R7	=	20,000 ohms
R8	=	2 megohms
L1	=	Aerial coil
L2	=	Detector Coil
V1	=	12C8
V2	=	12SQ7

Other Functions

A further adaptation was in the conversion of the BC-357 to a "negative audio squelch control."

Many operators will have experienced that most irritating phenomenon which occurs when a local QRO station suddenly comes up on the same frequency as a weak DX station. Having a fast reflex action the writer has frequently grazed his knuckles in an attempt to turn down the gain of the receiver in the shortest possible time and before losing aural sense !

Modified exactly as before, the relay was arranged to introduce additional cathode resistance in the first RF stage of the main receiver. With full RF gain the holding action of the relay was sufficient to mute the receiver partially during periods of strong signal reception. The delay, on the other hand, was short enough for the DX station to be heard at full gain during interruptions of the strong carrier's transmission.

In this application the coupling to the BC-357 must be fairly tight, ensuring that a strong signal will hold the relay over for the full period of the QRO station's CW characters.

Conclusion

No elaborate details are given of the modifications required as it is felt that with the assistance of the theoretical explanation these will be self-evident.

The chassis of the BC-357 is ideal in itself for the construction of a wide variety of small test units, head amplifiers, phone monitors, wavemeters and so on. Whilst there are a number of possibilities it may in conclusion be interesting to suggest the suitability of the BC-357 after modification for remote control by radio, for voice operation, positive squelch control, actuating alarm circuits, meter protection and even automatic aerial change-over when changing bands.

But no success has yet attended attempts to make the BC-357 write out QSL cards during transmission !

Modulating the Screen

A Practical Arrangement for 50-Watt Stations

By H. J. BEACH (GM8BO)

This is a very useful discussion on the practice of screen modulation, which has not yet achieved nearly the popularity it deserves in amateur circles. Excellent results are possible with reasonable efficiency and a very considerable saving in modulator power compared with AM systems. Valves such as the 6L6, 807, KT8 and 813 are quite suitable for SAM working, and show considerable economies at higher power inputs. In a practical case, an 813 run at 140 watts DC input is being screen modulated to a depth of 70 per cent. with good quality using less than 6 watts of audio.—Ed

WHILST adhesion to convention and accepted techniques may be sound policy, usually based upon wide experience and findings gained over a number of years, the adoption of "unorthodox" methods for practical usage, as distinct from experiment, can be extremely advantageous.

Some excellent articles have been published, many in the *Short Wave Magazine*, dealing with the various methods of applying modulation to the carrier, and it is hoped that these notes will prove of interest to those wishing to construct a simple but effective modulator.

When deciding upon a modulation system other than anode or anode-and-screen, it is advisable in the first instance to aim for a method which will give as high an efficiency as possible, together with a minimum of audio equipment and power expenditure.

It will be of interest, before examining in detail any one particular method of modulation, to compare the relative merits of the more conventional anode modulation with one of the lesser used systems.

The average medium power 'phone station probably uses a VFO or CO-PA arrangement, the PA usually being a single-ended stage employing an 807 or similar RF tetrode.

The audio equipment required fully to modulate, say, a 40-watt carrier, using anode and screen system, will need to develop 20 watts, necessitating the use of (*a*) a reasonably high gain pre-amplifier (dependent on the type of microphone used) ; (*b*) a phase inverter ; and (*c*), two output valves of the 6L6 class, resulting in a total current drain of the order of 100 mA, assuming 400 volts HT.

Before proceeding farther it will be obvious that for optimum results two power packs are required, one for the RF and one for the audio equipment. The total valve complement of the transmitter will be at least six or seven, plus rectifiers, so making for heavy demands on heater supplies, apart from HT drain.

Assuming that the transmitter is efficient from the point of view of low loss power transfer to the aerial, also that the aerial has a good radiation characteristic, the writer has proved that, for one additional valve in the PA, minus three in the modulator, telephony operation equal to any anode modulated transmitter can be achieved with screen modulation. The PA efficiency using this system can be as high as 60 per cent.; further-

Table of Values

Circuit of GM8BO's Screen Modulating System

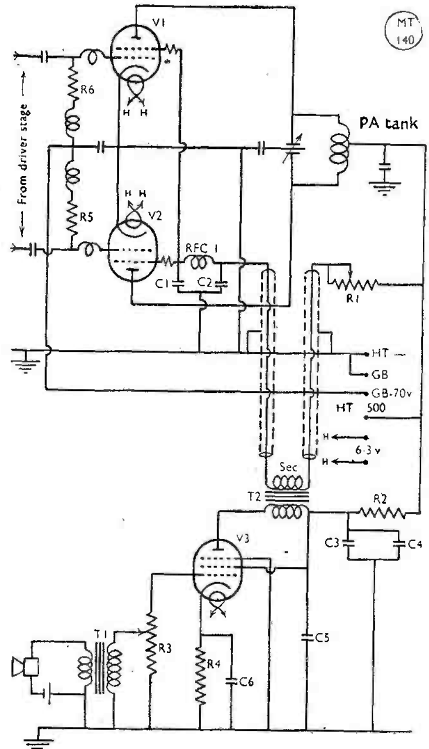
C1 = ·002 μF mica, 1,000 volt working
C2 = ·002 μF mica, 1,000 volt working
C3 = 8 μF electrolytic, 600 volt working
C4 = ·01 μF mica, 600 volt working
C5 = ·01 μF, 600 volt working
C6 = 50 μF, 12 volt working electrolytic

R1 = 50,000 ohms wire-wound potentiometer, 5 watts
R2 = 20,000 ohms vitreous wire-wound 20 watts
R3 = 1 megohm potentiometer, 1 watt
R4 = 150 ohms, non-inductive, 3 watts
R5, R6 = 25,000 ohms, 1 watt

RFC1 = 2·5 mH RF choke

T1 = Microphone Transmitter, 50 : 1
T2 = Ferranti AF.5 (*see text*)

V1, V2 = 807
V3 = EF50.



Circuit of the screen-modulated PA complete. The values given above are those affecting only the modulating system discussed by GMB8O—otherwise, the circuit follows normal practice.

more, the modulator may be an RF pentode of the receiving type, operating in Class-A, and having a total HT consumption of the order of 10mA, thereby enabling it to be fed *via* a series dropping resistor from the PA power pack.

Requirements for Screen Modulation

It is believed by some that screen modulation of a PA stage is difficult to achieve. This is not the case, and in the ensuing notes the writer will endeavour to show how simple to install and adjust is this very effective modulator.

The reader's reaction at this juncture will undoubtedly be one of disapproval of the relatively low PA efficiency obtained, but a little thought will dispel any misgivings when it is realised that the *overall* efficiency of the transmitter is actually increased, and the standard of the emitted signal maintained.

The arrangement at present in use at the writer's station is shown at Fig. 1, and is complete for telephony operation.

In order that reasonable RF power may be obtained with the reduced screen voltage necessary for symmetrical modulation, two 807's are used in push-pull, with 500 volts on the anodes. A variable resistor (R1) is in series with the screen HT feed, to provide a means of varying the screen potential when adjusting the transmitter for optimum conditions.

Using the valves shown in Fig. 1, a matching transformer (T2) having a ratio of 5 : 1 is suitable, but a little time spent on experimenting with various modulator valves (provided they are rated for at least 3 watts), and different transformer ratios, will be well worth while.

The screen impedance for practical purposes can be calculated from Es/Is, and having determined the optimum load for the modulator V3, the turns ratio of T2 can be derived from $\sqrt{\frac{Rl}{Zs}}$ where Rl = optimum load of V3, and Zs the screen impedance of the PA. It is desirable to carry out the initial adjustments using a dummy aerial and an oscilloscope for checking the modulation.

The highest possible PA efficiency together with a modulation factor of unity should be aimed for, and these conditions are achieved by commencing with a low screen voltage of the order of 100 volts, then increasing this figure gradually until the screen potential is at such a value as to permit symmetrical full modulation.

The limiting factor can be regarded as the ratio Va/Vg2, which should be made as small as possible, but in any case the recommended screen voltage of the particular PA valves in use should never be exceeded.

It will be seen that if the screen voltage is made too high, the positive excursions on peaks of modulation will be limited by the anode potential, yet the negative modulation half-cycle will be comparatively unrestricted, thereby causing asymmetrical and consequent downward modulation.

A particularly useful feature of this method as opposed to control grid modulation lies in its independence of critical grid current adjustment, and provided that this latter is sufficient to drive the PA to maximum rated output with normal screen and anode potentials for Class-C operation, then it will certainly suffice for this system. An important point which may conveniently be made at this juncture is that it is essential to ensure that the modulator valve (an EF50 in the writer's set-up) is operating in true Class-A.

Results.

When carrying out the initial tests with a dummy aerial load and oscilloscope, the writer found that the PA—two 807's in push-pull, with 500 volts on the anodes—could be driven up to 40 watts, whilst maintaining symmetrical modulation to a depth of 90 per cent. Increasing the 807 screen potential, and hence the RF output, resulted in the positive modulation peaks becoming flattened, causing downward modulation and attendant distortion.

It will be seen from the foregoing that by the simple expedient of using a push-pull final for a 25- to 40-watt transmitter, instead of the more usual single-ended arrangement, full modulation of good audio quality can be obtained with a single EF50 as modulator. It will be appreciated, of course, that in order to make full use of the linear portion of the EF50 Ia/Vg characteristic, the output from the microphone and associated transformer will have to be of the order of $\pm$ 2 volts. In the case of a relatively insensitive microphone being used, a small pentode voltage amplifier, *e.g.* an EF37, preceding the modulator, will be necessary.

At GM8BO 25 watts is invariably used, and during the first few days of testing the modulator, 12 countries were worked on 14 mc, including OX3 and W2, and 90 per cent. of these reported S7-9 signals, with excellent speech quality. Recently the transmitter has been tested on 28 mc, good reports being obtained from several W's, VE2, and VK.

QUITE A LIST

Ruminating on the scope of our activities, and the developments of the last few years, we listed the specialist organizations within the general framework of Amateur Radio for which we are now directly or indirectly responsible, in that they are sponsored or supported exclusively by us. These are : The First-Class Operators' Club, The Fiveband Club, The VHF Century Club, The VHF Listeners' Club, The British Old Timers' Club and now the British Short Wave League. No single operator is yet a member of all of these, nor by *honoris causa* ever will be.

★

D/F FIELD DAY

On September 25 last, the Radio Section of the Ernest Turner Social Club (High Wycombe, Bucks), organised a D/F Contest with the transmitter on 1854 kc. Using call G8VZ, and concealed in a punt on the Thames near Cookham, signals were radiated every 10-15 minutes from 2.0 p.m. The start point was at Beaconsfield, where over 50 operators and "followers" had gathered. First to unearth G8VZ was J. Walley of Slade Radio Society, Birmingham, who arrived at 3·24 p.m. K. Finch of the local group was next, 18 minutes later, followed by G3BJQ of the B.T.H. Radio Society, Rugby, only one minute after him. G6JK (High Wycombe) was fourth, and at 4.25 p.m. G3BSI of Southend Radio Society got home fifth on a solo motor-cycle. Ten other parties also competed, and some were very near G8VZ at the stop-time of 4.30 p.m. This highly successful affair, due entirely to the initiative of the High Wycombe group (of which the moving spirit is G4NT), terminated with tea and a get-together at a riverside hotel, and has certainly whetted appetites for further events along the same lines.

QTH, PSE !

Cards are held for the under-mentioned stations ; a large S.A.E., with name and callsign, sent to BCM/QSL, London, W.C.1, will produce them on the next G clearance. The address can also be entered in "New QTH's" if a request is made to that effect.

G2CBS, 3BCC, 3CPQ, 3ERT, 3FED, 3FRY, 3FTF, 3GBF, 5PI, 5WL, 8PT, GM5BH.

VHF BANDS

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

November Contest Story—
Individual Station Reports—
Detailed Analysis of Results

IN summing up the results of the November 1948 VHF Contest, your conductor remarked that had conditions been bad the London area would have been favoured. The November 1949 Contest has proved how right those words were. The first three positions all go to stations within 25 miles of the centre of London. It was no runaway victory, however, and a strong challenge was made by the Reading and Oxford district competitors. while GW2ADZ and G5BY achieved good scores from locations distant from the main centres of activity. Anything in the nature of a DX contact required not only efficient apparatus and a reasonable location but also good operating. The only contact over more than 200 miles was that between G2CIW (Romford) and G5BY (Bolt Tail). This was made at midday on the Sunday, G2CIW's signal being RST339 in Devon, and G5BY RST 459 in Essex. DX conditions seemed to improve towards the end of the Contest period, but they were never good, and any contact over 100 miles was well worthy of all the points it received.

The Top of the List

Congratulations go to G2AJ, the winner. Details of some of the equipment in use at Biggin Hill is given in the table of results. The receiving line-up was a crystal-controlled type converter, with two 6AK5 RF stages and 6AK5 mixer, feeding into a AR88 main receiver. His best contacts were with G2BMZ, G2IQ, G5BY and GW2ADZ, all over 150 miles. G2AJ would have preferred a serial number to a reference number, in order to make contestants listen more carefully, and would have liked some form of county bonus. Runner-up G5WP, at one time, looked like being top of the list, but a closer check on the logs showed that two DX stations worked from Woking failed to agree on the RST's exchanged and these contacts had, therefore. to be expunged from G5WP's entry ! G5WP comments on the Contest, "Conditions were much below average. This was not altogether a misfortune and made for a more interesting state of affairs—providing a continuous challenge to gear and operator." The Rx at G5WP used 6J6 RF and 6J6 mixer, with crystal oscillator. into an HRO.

G3BLP, in third position, found the Contest hard work, but enjoyable. His DX included G2BMZ, G2OI, G5BY and GW2ADZ. He was glad that there were no bonus points for counties, which, taken in conjunction with G2AJ's comments above, goes to show how difficult it is for your conductor to arrange rules to suit everyone ! For a receiver a modified ZB3 with a cascode pre-amplifier was used, fed into a BC348.

Bottom of the List

From third position it is worth while making a big jump down to the bottom of the list, for here are to be found a number of very keen operators who sent in entries knowing full well what their position was likely to be. All of these are to be highly commended and at the same time it must be placed on record that their lowly positions are often due to bad location. This is not to imply, of course, that the Contest Results are just a measure of QTH suitability. A glance at the aerial column in the Table of Results shows that the leaders are, in general, those using multi-element systems, but it is true to say that stations in the extreme north of G and in GM were very unfavourably placed, and the same is true of our PA friends who sent in such an encouraging number of entries.

Other Contest Comments

G2BMZ was pleased conditions were as they were as it provided a real test for gear. He was also very encouraged to find he could work all that G5BY worked, and that, as he says, takes some doing. G2DCI found his Rx good, but not good enough ! The band plan, he thought, worked well where it was used. G2CIW had 6J6 RF and mixer stages in his CC converter. G2KG was operating from his new QTH, 3 miles NE of Chelmsford ; he worked PAØPN. G2MV, using a BC639A receiver, raised about half the stations he heard ; he remarked that he found operating and manners very good indeed. G2NH was only on for a limited time, but added that the DX was there if one dug deep enough; G3ABH and G5BY were always audible at workable strength. G2NM heard many stations that he could not work, and commented that some of them were complaining that the band was dead ! However, he does not believe in one-way traffic. G2OI found conditions peaked up on Sunday evening, and after 2300 he could work southerners with ease. The most con-

The Fiveband Club Dinner, held in London on November 25, at which some 80 VHF operators were present. Standing (extreme left to right along the wall) are G2AJ, G2NH, G3BLP, G6LX, G5RP, G2XC (Chairman), G6VX, G5ML, G6OT and G5JU. Once again, it was an extremely successful evening.

(Copies of photographs taken at the VHF Dinner can be obtained, price 4s. each, of F. Wise, 5 Victoria Street, London, S.W.1.)

sistent station at G2OI was G3BHE (Malvern). For future contests he suggests a later start, say, 1800 on Saturday. G2UJ felt that many stations did not search for weak signals, nor search the whole width of the band. G2XS thought things very disappointing, with the usual London signals being weak and few and far between, while G2XV considered that no points should be allowed for contacts under 10 miles. G2WS found much of interest as a result of the sustained activity which existed in spite of the poor conditions. His Rx is a home-made 8-valve superhet with 6AK5 RF and 6J6 mixer.

G3ABA remarks that the prevailing conditions showed up the stations with poor equipment. In general, he received more consistent signals from the North than the South, and the only DX heard was G5BY. Like many others he has 6J6's in RF and mixer stages of the Rx. G3ABH experienced trouble from staticly charged rain and hail, and also from severe fading on signals from 40 miles and over. He asks for more frequent but shorter contests. G3BOB used a CV66 as first RF stage and heard G2IQ and GW2ADZ. G3CAZ had a CC converter with two 9003 RF stages. He heard little of the Surrey stations, and found G2KG his most consistent signal. G3CGQ heard PAØPN amongst other DX, with his 6J6 type converter. He comments that if it did nothing else, the Contest put some life into the band. G3CWW regretted the clash of dates with the Club Contest on the Top Band. The main lesson he learnt from it all was that his aerial must go up higher. G3CYY thought conditions might be good as he was receiving Alexandra Palace at S6 in the Saturday afternoon, but was disappointed, and only worked two local stations in spite of many hours on the band. He is using a G2IQ type converter. G3CZV heard no London stations at all, in spite of using a 6J6 type of converter. His best contact was with G3BHE. G3DCC says, "Please do not hold a contest on the 13th again." Well, that's a point, but November 13, **1948**, did not do so badly for us! However, it certainly was a little unfortunate for G3DCC, as not only did the rope which rotates the beam come adrift, but a feeder came off the beam, three fuses blew and three by-pass condensers shorted!

G3EJL used 100 watts for two hours until the 829 succumbed and then had to return to 32 watts to the old 832A. London stations were heard for short spells of about 20 minutes every few hours. G3ENS received many London stations which he could not work; G2OI and G3BLP provided the most consistent signals for him. G3FAN asks, "Is there a booby prize?" Although why anyone who scored as many as 25 points should be interested in that subject is hard to tell. He also comments that he only received two reports of T8, all the other reports being T9, which, as he says, was certainly not true. His

THE SHORT WAVE MAGAZINE

TWO-METRE CONTEST

NOVEMBER 12-13, 1949

(See p. 611 October, 1949, issue for Rules)

Position	Call	Location	Points	Contacts over 100 mls	Power watts	Aerial System	N.G.R.
1	G2AJ	Biggin Hill, Kent	221	10	110	16-ele. 50 ft. high	—
2	G5WP	Woking, Surrey	204	9	80	16-ele. 25 ft. high	41/999560
3	G3BLP	Selsdon, Surrey	197	8	25	16-ele. 35 ft. high	51/349626
4	G5TP	Stoke Row, Oxon	180	4	80	16-ele. stack	—
5	G5DF	Tilehurst, Berks	170	4	50	Three 4-ele. Yagis	—
6	GW2ADZ	Llanymynech, Mont.	167	10	—	Three 4-ele. Yagis	—
7	G5RP	Abingdon, Berks	163	3	100	5-ele. Yagi 60 ft.	—
	G6NB	Chertsey, Surrey	163	6	30	16-ele.	—
9	G2KG	Chelmsford, Essex	150	3	—	16-ele.	—
	G5BY	Bolt Tail, Devon	150	11	150	Four 4-ele. Yagis	20/688388
11	G2XC	Portsmouth, Hants	140	4	25	Two 4-ele. Yagis	41/670076
	G2BMZ	Torquay, Devon	140	12	50/90	Five 7-ele. Yagis	—
13	G2CIW	Romford, Essex	124	3	40	16-ele. 40 ft. high	51/555915
14	G4DC	New Cross, London	118	3	18	Three 4-ele. Yagis	51/358766
15	G8SM	East Molesey, Surrey	117	4	50	8-ele. stacked	—
16	G5MA	Ashtead, Surrey	116	5	—	Two 4-ele. Yagis	—
17	G3ABH	Sandbanks, Dorset	109	—	18	4-ele. Yagi 50 ft.	—
18	G2OI	Eccles, Lancs	105	6	50	Two 5-ele. Yagis	—
19	G8WV	Bletchley, Bucks	103	3	36	6-ele. Yagi	—
20	G3FXG	Clapham, London	88	2	25	4-ele. Yagi	—
21	G3ABA	Coventry, Warw.	84	1	24	16-ele. 34 ft. top	42/353822
22	G2NH	New Malden, Surrey	81	2	50/100	Two 4-ele. Yagis	51/204694
23	G3ENS	Loughborough, Leics.	81	5	90	5-ele. Yagi	43/535153

24	G4HT	Ealing, Middlesex	80	—	25	Various	—
25	G2MV	Kenley, Surrey	73	—	25	Bisquare	—
26	G8IP	Hampton, Middlesex	72	—	16	4-ele. Yagi	—
27	G6UH	Hayes, Middlesex	66	—	—	—	—
28	G3CGQ	Luton, Beds.	65	—	25	4-ele. Yagi (Roof)	50/852232
29	G6VC	Northfleet, Kent	63	—	18	6-ele.	—
30	G2WS	Shortlands, Kent	61	—	20/40	5-ele. Yagi 40 ft.	—
	G3DCC	Harringay, Middlesex	61	—	15	4-ele. Yagi	—
	G3EJL	Southampton, Hants	61	2	32/100	4-ele. Yagi	41/415154
33	G3WS	Gidea Park, Essex	57	—	50	4-ele. Yagi	—
34	G3CWW	Hendon, Middlesex	55	—	82	8-ele. stack	—
	G8SB	Horwich, Lancs	55	2	—	—	—
36	G5ML	Coventry, Warwick	54	2	70	16-ele. stack	—
37	G5BM	Cheltenham, Glos.	48	—	55	6-ele. Yagi	—
	G3FD	Southgate, Herts	48	—	40	Two 4-ele.	—
39	G3BWS	Gillingham, Kent	43	—	72	3 sets of 4 stacked	—
40	G6CB	Wimbledon, Surrey	39	—	12	Various	—
41	G2XV	Cambridge	37	—	65	Corner reflector	52/474568
42	G5HN	Reading, Berks	35	—	20	4 over 4	—
43	G3BOB	Hayes, Kent	32	—	25	4-ele. Yagi	—
44	G5UM	Knebworth, Herts	31	—	22	3-ele. Yagi	—
45	G2NM	Bosham, Sussex	30	—	—	—	—
46	G2XS	King's Lynn, Norfolk	25	1	70	8-ele. stack	—
	G3FAN	Ryde, I.o.W.	25	—	—	5-ele. Yagi 24 ft.	—
48	G5MR	Hythe, Kent	23	—	30	6-ele. stack	61/153352
	G3CZV	Nottingham	23	—	13½	Two 5-ele. Yagis	50/373636
50	G2UJ	Tunbridge Wells, Kent	19	—	20	6-ele. stack	51/577399
	G3CAZ	Gillingham, Kent	19	—	50/100	4-ele. Yagi	—
52	G2DCI	Liverpool, Lancs	17	—	18	4-ele. Indoor	33/431832
53	G3FOD	Rochester, Kent	15	—	20	3-ele. indoor	—
54	GM3EGW	Dunfermline	11	—	50/60	Quad and 4-ele. Yagi	—
55	G3VM	Norwich, Norfolk	8	—	18	5-ele. Yagi 35 ft.	—
56	G3ANB	Brightlingsea, Essex	6	—	30	4-ele. 35 ft.	—
57	GM4QV	Bonnybridge, Stirling	3	—	—	4-ele.	—
58	G3CYY	Newcastle-on-Tyne	2	—	20	4-ele.	—

note has since been vastly improved. G3FD only experienced QRM on five signals and did not lose a contact through it. His best DX heard was G3ABH whom he called in vain. G3FOD remarked that he needs an outdoor beam to overcome the poor conditions. G3FXG, using CV66 and 6AG5 RF stages, heard some DX but found it unworkable. G3VM described conditions as tragic. He did not even hear his usual "sked" stations. G3WS, using EF91 RF stages, was glad to find so much activity, and considers the band plan helped to find what DX there was.

G4DC thought the method of scoring would favour stations outside populated areas, especially those about 50 miles away. Another point he makes is that other things being equal scores will be a function of power in use. G4HT thinks all contacts up to 75 miles should score only one point, then two points up to 150 and three points for greater DX. That would certainly put G4HT higher up the list than G2XC !

The only London signal to reach G5BM was G3BLP, but he heard G8SB from Lancashire ; the Rx included a 6AK5 RF and 6J6 mixer-osc. G5BY used his acorn converter preceded by a 6J6 amplifier. He had ten contacts over 150 miles. G5DF thinks the use of 'phone spoils a contest, but he says he really enjoyed the struggle for the DX. His best contact was with G5BY. G5HN used 9003 RF and mixer stages. G5ML heard no signals from over 150 miles ; he was using a G2IQ converter and his Tx has two 8012's in the final. G5MR frequently found the band completely empty. His peak period was between 1100 and 1115 on Sunday when all signals seemed to increase in strength. G5RP uses a 6J6 type converter, but with a 9002 tunable oscillator. G5TP describes the contest as excellent in spite of conditions. His best DX was G2OI and G5BY. G5UD heard G2AJ, G5MA and G5WP constantly, but in general found the contest monotonous mainly due to the poor conditions. G5UM finds that these contests are very useful for confirming that the gear still works and as an interlude to gardening and other domestic commitments !

G6CB, trying out a new 2-metre beam, found that he obtained 4 dB better signals by using his ten-metre aerial. He suggests that many receivers are not sufficiently selective and at times of high activity show up badly. G6NB worked 22 counties during the contest. G6UH used a modified RF 27 unit with a 6J6 neutralised amplifier.

G8SB heard no southern DX. His Rx has 6J6 RF and mixer stages, with a CV53 pre-amplifier ; best DX was GM3OL. G8IP felt the Contest was held under ideal conditions as the emphasis was placed on technical ability and operating skill, which would not have been the case had conditions of the DX type prevailed. On the Sunday afternoon G8IP took down his 12-element beam (two directors and nine reflectors) and erected a simple four-element Yagi in its place. with much improved results. G8SM used a cascode RF stage. G8WV noticed bad frequency drift on many stations.

GM3EGW used an R28/ARC-5 modified receiver and for aerials, a cubic quad on the Tx and a four-element Yagi on the Rx. GM4QV had a Type P104 Rx and an SCR522 Tx.

GW2ADZ heard DX right from the start, but had much difficulty in raising it, and describes the Contest as exhausting, tiring and disheartening.

Check logs were received from G3BUN, G3BY, G3CNF, G3EHY, G3FFU, G3FMO, G3GBO, G4CG, G4MR, G5KX, G5LQ, G5MB, G8VR, GM3OL and these were found most helpful in compiling the Table of Results.

Conclusion

With the press of Contest material, it has not been possible this month to include the Achievement Tables or to cover the station reports received for December. The Christmas holiday (which we hope you all enjoyed !) also necessitated bringing the copy date forward so as to get this issue of the *Magazine* ready for press some days before the usual time.

So we shall be picking up the threads again next month, and it now only remains for your conductor to offer all those who follow "VHF Bands" his good wishes for their happiness and prosperity in 1950—and let us look forward to another season of VHF achievement and success in the new year.

With you again on February 3, which makes it January 11 for news, reports and claims for that issue. Send it all to E. J. Williams, G2XC, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1.

TELECOMMUNCIATIONS MERGER

It is announced that Ericsson Telephones, Ltd., and Pye, Ltd., have reached a working agreement for a world-wide linking of the activities for which they are famous—Ericsson's in what might loosely be termed as the landline and telephone sphere, and Pye's for their extensive developments in the field of radio communication, television and VHF engineering. Together, these two firms will set out to compete in the markets of the world through their existing global organisations.

Here and There

The Call Book

We are glad to be able to draw readers' attention to an advertisement appearing elsewhere in this issue, by which amateurs in this country (and indeed anywhere in the sterling area where free currency exchange is possible) can order the *Radio Amateur Call Book*, for delivery direct from Chicago.

On this topic, it can also be announced that we are now the official forwarding agency for *all* British callsign-addresses, and in future no responsibility can be accepted for errors or omissions in the G listings in the *Call Book* unless they have been passed through us. It may be as well to mention, too, that any operator who for any reason does *not* want his address to be published should likewise inform our QTH Section.

Earth on Our Head

For the guidance and information of those several of our readers who go through each issue with a pin—our apologies to G8BQ and G8QB (p. 776, December); to G3BNE (p. 758); to G3ESP (p. 768); and in that caption on p. 765 (still December) the word should be "contacts," and not as printed.

Well, these things happen—but what is so exasperating is that somebody always finds them just when it is too late to put through a correction. And we are not offering a shilling to anyone who can find any more lil' errors that have crep' in.

SSB Working

G2NX (Oswestry), exponent of the art of single-sideband suppressed-carrier operation and author of the series of excellent papers on it in the *Magazine*, has found kindred spirits in OZ7T, SM5QV and SM7HZ. On December 13, what was probably the first inter-European amateur SSB QSO took place between G2NX and OZ7T, a comfortable 100 per cent. contact being held for some 45 minutes, on 3·7 mc. In the course of this QSO, OZ7T said that he had previously worked a VO, both ends operating in the SSB mode.

Several G's will already have had contact with G2NX (and many will have heard him on about 3·7 mc) with SSB in operation at the Oswestry end. What sounds on a receiver adjusted for AM to be a distinctly "harsh and distorted" 'phone transmission can be resolved into clean, strong speech by turning down the RF gain, switching out AVC, bringing in the BFO, and with the receiver tuned as closely as possible to the SSB transmission, carefully setting the BFO pitch control until clear speech results. It is true that tunes can be played on the pitch control, but once you have done it, and got it right, you will always be able to resolve an SSB signal—and will appreciate its advantages.

Just at present, from G2NX's own point of view, the disadvantage is that so few operators understand how to do this—and to get the utmost out of SSB a receiver modified to take it is necessary.

Unusual !

In Readers' Small Advertisements in this issue, a quantity of equipment is being offered in exchange for a piano. Another reader has for sale an astronomical telescope "for sunspot observations."

Hints on Soldering

Most of us think we know all about how to solder. Nevertheless, an interesting and well-written six-page leaflet called *Hints on Soldering* is available for the price of a S.A.E. to Multicore Solders, Ltd., Mellier House, Albemarle Street, London, W.1, and is worth having as a reference by those who would wish to be certain they know all about it. Ask at the same time for Reference Card RPE 849.

More Trumpet

With the opening of the BBC's Sutton Coldfield station, we now possess by far the most powerful TV transmitter in the world, producing a picture of high technical quality over a very wide area. Though it is difficult to draw comparisons, competent and unbiased opinion is that we do lead the world in this field in the strictly engineering sense.

Coverage Note

On the point mentioned in this space last month, we now hear from a reader in the MD5 area that the *Short Wave Magazine* is regularly on sale in a native bookshop in Ismailia. Incidentally, there is still an embargo on amateur operation in the Suez Canal Zone.

NEW QTH's

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

G2BKD J. D. Budd, 105 Grange Avenue, Reading, Berks.
GM2FNF A. McNeill, Woodside, Kildonan, Arran, (*Tel. : Kildonan* 235)
G2HHJ T. Chambers, 13 Evelyn Crescent, Southampton, Hants.
G3AWA A. J. Woiwood, Flat 2, Raleigh House, 26 Foxgrove Road, Beckenham, Kent.
G3BIT G. S. Ellery, 16 King Street, Lostwithiel, Cornwall.
G3BUA J. E. Monks, 2 Maple Grove, Latchford, Warrington, Lancs.
G3DTA G. F. Nottingham, 51 Carr Lane, Acomb, York.
GW3DWR K. Morgan, 30 Woodville Road, Mumbles, Swansea, S. Wales.
GW3DZL I. C. Elias, Lower Ship Inn, Pentreguinea Road, St. Thomas, Swansea, S. Wales.
GM3EDQ/A J. Woods, c/o Callanan, 50 Greenloan Avenue, Glasgow, S.W.1. (*Tel. : Govan* 1916.)
G3EGL W. J. Green, 3 Forfar Road, Liverpool, 13.
G3EGM M. E. G. MacLeod, c/o Mrs. E. Stevenson, 37 Fairfield Avenue, Edgware, Middlesex.
GM3EYR F. C. Boettcher, c/o Howe, 400 Easter Road, Edinburgh, 6.
G3FIX J. R. Tinning, 108 York Road, West Hartlepool, Co. Durham.
G3FJK D. Gordon, 123 Stanton Street, Newcastle-upon-Tyne, 4.
G3FJK/A D. Gordon, 25 Earls Drive, Newcastle-upon-Tyne, 5.
G3FJS F. A. Elder, 74 Stockton Road, Middlesbrough, Yorks.
G3FMJ G. H. W. Power, 42 Glenthorne Road, Hammersmith, London, W.6. (*Tel. : Riverside* 1318.)
G3FMO G. Elliott, 61 High Street, Chard, Somerset.
G3FNI J. Bletcher, 10 Lime Road, Stretford, Manchester.
G3FQL S. E. Pinington, 74 Wolverton Road, Haversham, Near Wolverton, Bucks.
G3FRV R. G. B. Vaughan, 1 Alma Road, Carshalton, Surrey.
G3FRX J. A. Wilkes, 6 Salcombe Road, Shirley, Southampton, Hants. (*Tel. :* 73744.)
GM3FRZ G. B. Esslemont, 3 Kingshill Avenue, Aberdeen, Scotland.
G3FSI R. W. Robbins, 36 Sunnyside Gardens, Upminster, Essex. (*Tel. : Upminster* 4857.)
G3FTP E. Davis, 158 Marlborough Street, Ashton-under-Lyne, Lancs.
G3FTS A. Horner, 54 Plantation Drive, York.
G3FUI C. A. Sargent, 102 Renton Road, Oxley, Wolverhampton.
G3FVA South Manchester Radio Club, Hon. Sec.: 57 Longley Lane, Northenden, Manchester.
G3FVK A. E. Heath, 155 Kirkway, Alkrington, Middleton, near Manchester.
G3FVY J. W. Courtenay, 28 Lindale Gardens, South Shore, Blackpool, Lancs.
G3FWA J. Bennett, 18 Lime Tree Avenue, Peterborough, Northants.
G3FWN A. Hall, 14 Abbott Street, Long Eaton, near Nottingham.
G3FXE O. C. Wells, 7 Buckland Crescent, London, N.W.3. (*Tel. : PRImrose* 4201.)
GD3FXN A. D. Radcliffe, 6 Hildesley Road, Douglas, Isle of Man.
G3FXR L. J. David, 191 Merritts Brook Lane, Northfield, Birmingham, 31.
G3FYP P. G. Robson, 9 Galtres Grove, Clifton, York.
G3FZM H. Aitchison, 46 Whirlow Grove, Sheffield, 11.
GI3FZQ A. Forsythe, 4 Somerdale Gardens, Belfast, Northern Ireland.
G3FZR M. W. Capewell, 20 Stainburn Road, Leeds, 7, Yorks.
G3FZS J. H. Brent, 26 Redhill Drive, Fishponds, Bristol.
G3GAA W. P. Jeans, 58 Coningsby Road, High Wycombe, Bucks.
G3GAC E. J. Leech, 20 Darwin Street, Northwich, Cheshire.
G3GAH A. W. Foster, 53 East Bawtry Road, Rotherham, Yorks.
G3GAT Dr. T. Turnbull Graham, 15 Banklands, Workington, Cumberland.
G3GAV W. B. Nicoll, 166 Stanmore Lane, Winchester, Hants.
G3GAW D. J. Redshaw, 5 North Street, Driffield, Yorks.
GM3GAY M. McLeay, Seaview, Deveronside, Banff, Banffshire, Scotland.
GD3GBG A. Moore, The Cot, Spring Valley, Braddan, Isle of Man.
G3GBH J. H. Jones, 32 Willow Garth, Newby, Scarborough, Yorks.
G3GBK P. W. Crouch, 141 West Town Lane, Bristol, 4.
G3GBN S. H. Feldman, Mullion, Oak Way, Southgate, London, N.14. (*Tel. : ENTerprise* 3852.)
G3GBV C. A. Dugdale, 17 Low Road, Lower Hellesdon, Norwich, Norfolk.
G3GCK W. Miles, 4 Westwood Street, Peterborough, Northants.
GW3GIN C. J. M. Wozencroft, 50 Romilly Road, Canton, Cardiff, S. Wales.
G3GJY J. O. Yarker, 14 Bewlay Street, York.
G5HX K. T. Cleaver, 171 Farren Road, Wyken, Coventry, Warks.

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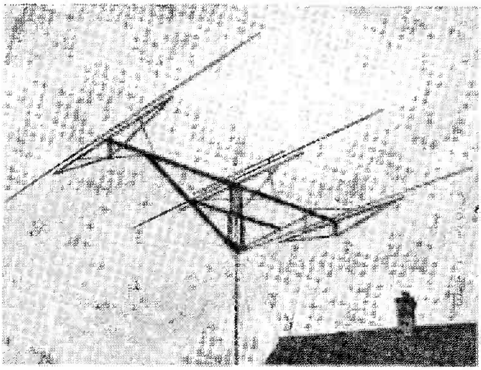
G2DRP R. J. Harvie, 66 Larkfield Way, Patcham, Brighton, 6, Sussex.
G2FBA J. A. Hayward, 44 Degema Road, Chislehurst, Kent.
GI2FHN E. R. Sandys, 26 Bryansburn Lane, Bangor, Co. Down, Northern Ireland.
G2FLC L. A. Yaxley, 16 Park Road, Cheveley, Newmarket, Suffolk.
G2WY H. J. Swift, 58 St. James Avenue, Beckenham, Kent.
G3CEM N. F. J. Schembri, 43 Laygate Lane, South Shields, Co. Durham. (*Tel. : South Shields* 1266.)
GI3CGO A. Whyte, 7 Dublin Road, Riversdale, Strabane, Co. Tyrone, Northern Ireland.
G3ECA A. H. Koster, 195 Woodford Avenue, Ilford, Essex.
G5KX R. Moffitt, 47 Highfield Road, Churchtown, Southport, Lancs.
G6FU J. H. Cant, 36 Hawley Lane, Farnborough, Hants.

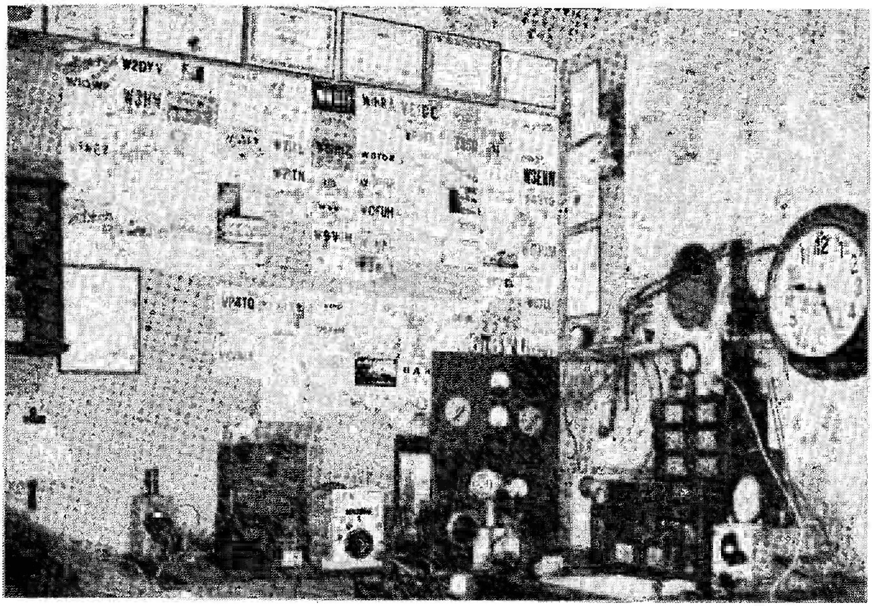
CORRECTION

G3GKW J. G. Kenyon (*ex-G3FOK*), 2a Derwent Street, West Hartlepool, Co. Durham.



The other man's station

GI6VU



Operated by H. Carmichael at 56 Ashley Drive, Belfast, Northern Ireland, GI6VU suffers from the extreme disadvantage of being on DC mains. The supply is 220v. nominal, but as he is at the end of the feeder, the actual pressure is anything from 200 to 235 volts.

The VFO, actually a converted BC-458A, is 1626-1629-2/1625, with VR-150 stabiliser, link coupled to the transmitter. A 6V6 CO-tritet-doubler-buffer drives a 1625 doubler, into a pair of P/P 1625's in the final, run at 35 watts. The speech amplifier-modulator is 6J7-6J5 into a pair of KT33c's in Class-AB1, plate and screen modulating the 1625's in the PA. Either crystal or moving-coil microphone is available, and gives full control of the carrier.

For receiver, GI6VU runs an HRO modified for DC, with the *Short Wave Magazine* noise limiter circuit designed for this particular type ; the HRO is operated with a Q5'er.

Aerials are a 66-ft. end-fed wire and the three-element wide-spaced beam (in the photograph) for 10-metre working. This beam is controlled from the operating position, is fed with 300-ohm line, and the elements are wide-spaced (0·2 wavelength), the whole assembly being about 22-ft. above ground.

Though there are occasional appearances on 7 and 14 mc, main activity at GI6VU is DX 'phone on Ten, with which he has been conspicuously successful, in spite of his disadvantages. He is WAC and WAS, and as at the end of October last, had 70 countries confirmed ; a daily schedule is maintained with W3MAC, which has produced over 200 QSO's up to this third season of running it.

As readers will agree—a nice station, a good record, and a job being done well.

THE FOURTH MCC

THE MAGAZINE TOP-BAND CLUB CONTEST

NOVEMBER 12-20, 1949

ONCE more the Clubs have done battle for the annual week, and, again, those participating seem to have considered this *the* event of the year for the Clubs. We received a total of 25 entries (compared with 28 last year), so that activity was on roughly the same level as in 1948; scores, however, were somewhat higher.

The many prophecies that Wales would score a double this year were justified; GW stations were first and second. Here are the first three:

1st: Rhigos and District Radio Club, GW3FFE (3,452)
2nd: Neath, Port Talbot and District Radio Society, GW3EOP (3,096).
3rd: Coventry Amateur Radio Society, G3FAB (2,152).

Hearty congratulations to Rhigos on scoring their second win (they were, of course, first last year), and to the runners-up, Neath and Port Talbot, who were fourth in 1948.

Deserving of a special mention are Coventry, G3FAB, for their remarkably consistent performance in appearing in the first three for every one of the four Contests in this series. We must also bring in G2YS (Chester). Operating for the Chester club this year, he came fourth; during the previous three contests he was batting for Coventry and therefore appeared among the winners each time. Table I shows, as a matter of interest, the first four in each of the four MCC events.

Table II is the complete analysis of this year's event, giving number of contacts, number of points, multipliers and totals. It really tells the whole story, but we pass on to sundry comments made, as requested, by the participating Clubs.

The Scoring System

There is no doubt that the scoring system happened to favour the GW stations. The idea of giving two points for a contact in another prefix zone was originated chiefly for the benefit of GM and GI stations, who really are remote from the main cêntres of activity. But the interesting fact is this: That GW3FFE and GW3EOP may really be said to have come out on top on their own merits, because, even if their scores are reduced by giving them the *one* point for each contact with a G station, the only G station to beat them is G3FAB (Coventry). The numbers of contacts made (*see* Table II) also show this. Had the GW's been treated as G's, and given only one point for working G's, the order would have been Coventry, Rhigos, Neath, Chester.

Really, then, the scoring system was hard on Coventry but did not affect the position of anyone else! So no one can say that our Welsh friends had a huge advantage; they just happened to be very successful and well-operated stations. All the same, we can say now that the scoring system will be different next year.

Useful check logs were received from G3NT (Northallerton), G3FZW (Lichfield), G2AOL

Table I

	1946	1947	1948	1949
1st	Coventry G2YS	W. Cornwall G2JL	Rhigos GW3FFE	Rhigos GW3FFE
2nd	Cheltenham G3LP	Warrington G3CKR/A	Coventry G3FAB	Neath & P.T. GW3EOP
3rd	Grafton G3AFT	Coventry G2YS	Wirral G2AMV	Coventry G3FAB
4th	Salisbury G5DZ	Beaumanor G3BMR	Neath & P.T. GW3EOP	Chester G2YS

Operators on GW3FFE, winners of the Fourth MCC for the Rhigos & District Radio Club. In the picture are GW8BW (glasses), GW3ZV and GW3CDP, ready with the axe for the phonies signing "W7" and "UB5." A fourth operator not in this photograph was GW3FZV, and we are told that the two 'ZV's did most of the work, with 'CDP as relief and 'BW as station manager. Rhigos put up a very fine show, and are to be congratulated on winning for the second time in succession.

(Otford) and GC8NO (Jersey)—all of whom we would like to thank for their trouble.

Zone Multipliers

The top three all worked their eight prefix zones this year, the eight being G, GC, GI, GM, GW, DL, OK and OZ. Wirral, G2AMV, who also scored an "eight," missed out on the DL, but collected a GD, as they did last year. Geography again !

OK1XB and 1ZB were both active ; the Danish station was once again our old friend OZ1W, who has been on the band for twenty years ! Quite a few DL's were about, most popular of them being DL1IX in Husum.

GW3EOP worked "W7CSY," and both the Welsh stations worked "UB5BP," but we probably need say no more about these ! "W7CSY" produced S8 signals and key-clicks at GW3FFE when he was working GW3EOP. Maybe the "little green van" has been seen in the neighbourhood since then.

General Comment

Conditions were variously described as Fair, Good, Fairly Good, Not too Good, Poor, Noisy and Very Good. Take your choice ! (We thought they were Good.)

Complaints were received about too much 'Phone QRM, too much Fish-'Phone and so on ; but obviously nothing could be done about such things. 'Phone stations were also heard complaining about the terrific amount of CW activity !

Operating

Our own chief criticism of the operating standard is that stations quite needlessly crowded into the band between 1820 and 1900 kc, with the thickest concentration about 1860. There is no sense whatever in this—why make things difficult when the band is 285 kc wide ? Comments from individual Clubs mention "poor notes," "long CQ's," "quick contacts and good co-operation," "absence of BK operation." One Club disliked some stations who didn't know what "MCC" meant and wasted a lot of time. And one particular Club operator who held a GC station for 15 minutes at 8 w.p.m., just before midnight, comes in for murderous comment from practically all the others—and justifiably so.

The Rules

We have already mentioned that the scoring system favoured GW somewhat. Practically everyone (except the GW's !) makes a point of saying so. Other suggestions received were as follows : That listening time should, in a future event, be unlimited and not counted in the 30 hours of operation. . . . Evenings should be limited to Monday, Wednesday and Friday. . . . Midnight is too late a closing time for those who have to contend with travelling difficulties. . . . A week is too long, as at the end of the time everyone is waiting for fresh stations to appear. . . .

Edgware remarks that "even a large Club with several operators finds itself faced with

TABLE II

ANALYSIS TABLE

CLUB	CALL-SIGN	CONTACTS	POINTS	MULTIPLIER	TOTAL
1. Rhigos	GW3FFE	203	419	8	3,452
2. Neath and Port Talbot	GW3EOP	190	387	8	3,096
3. Coventry	G3FAB	210	269	8	2,152
4. Chester..	G2YS	193	255	7	1,785
5. Wirral	G2AMV	148	207	8	1,656
6. Grafton	G3AFT	169	229	7	1,603
7. Edgware	G3ASR	165	220	7	1,540
8. West Middlesex ..	G3EDH/A	116	170	7	1,190
9. Edinburgh	GM8FM	129	278	4	1,112
10. Forfar	GM3GBZ	107	223	4	892
11. Rugby	G3BXF	92	144	6	864
12. Warrington	G3CKR	94	142	6	852
13. Derby	G3ERD/P	127	168	5	840
14. Gravesend	G3GRS/A	113	166	5	830
15. Medway	G2FJA/A	110	152	5	760
16. Harrow	G3EFX/P	102	150	5	750
17. Southend	G3AXN	100	142	5	710
18. Baldock	G3EAJ	68	118	6	708
19. West Kent	G4IB	118	163	4	652
20. Birmingham	G2BON	66	109	4	436
21. Lincoln	G3EBH	64	107	4	428
22. Carlisle	G3ART	45	89	4	356
23. Spen Valley	G2CSJ	66	111	3	333
24. Wanstead and Woodford	G3BRX	53	83	3	249
25. South Manchester ..	G3EON	37	63	3	189

the disapproval of XYL's"; and Grafton makes the very sound comment that there is something wrong about allowing private (home) stations to bat for their Clubs, because it is so much easier for an already established station, even with only one operator, to cope than for the Club station to get itself organised and running smoothly for such an event.

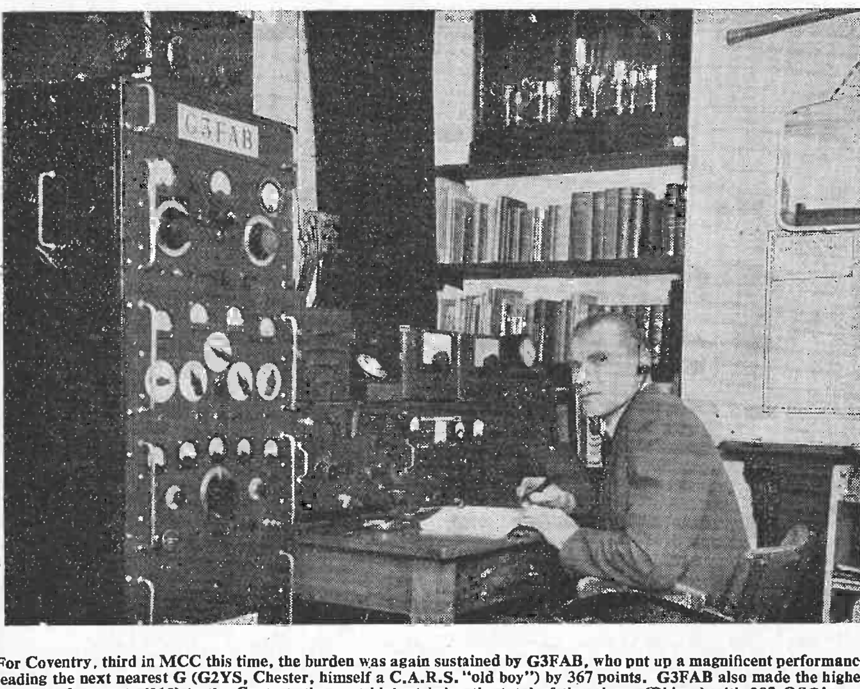
To those who consider midnight too late, we would say that there is no need to wait until that time each night. Nine "working days" were available, and the 30 hours could have been filled by working, for instance, from 7 p.m. until 10 p.m. on eight of them, and 7 p.m. till 11 p.m. on the final Saturday or Sunday ! To those who considered 30 hours too long, we would say that it was none too long to make over 200 contacts, as the high scorers succeeded in doing.

G2YS (Chester) says the event, in addition to fostering healthy inter-Club rivalry, constitutes useful training in contest work for those who are new to it. G3FAB (Coventry) remarks that it increases enthusiasm for CW. Most of the other Clubs say "Jolly Good Show—we can't wait until next year," although a few say that activity was so much less than before that they didn't enjoy it as much. But the scores and logs belie this completely.

On the whole, we are satisfied that the competitors enjoyed the Contest and that it has stimulated some interest and activity among them. Don't dismantle those transmitters until next year's event—keep them on the Top Band for inter-Club working. Thanks for the splendid support, once more, and Here's to the Next Time !

Date for next "Month with the Clubs" Report : January 11.

The happy chaps at GW3EOP—Neath, Port Talbot and District Amateur Radio Club—second in the Fourth MCC. In the case of both GW stations, a readjustment of the scoring system to put them on the same basis as other G stations would still have brought them out in the first three. Aerial at GW3EOP was a West-East Vee, 45 ft. high, with 266 ft. in each leg and an angle of 150° between them.



For Coventry, third in MCC this time, the burden was again sustained by G3FAB, who put up a magnificent performance, leading the next nearest G (G2YS, Chester, himself a C.A.R.S. "old boy") by 367 points. G3FAB also made the highest number of contacts (210) in the Contest, the next highest being the total of the winner (Rhigos) with 203 QSO's.

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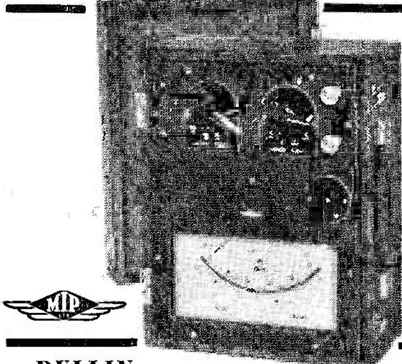

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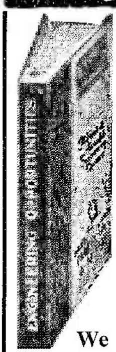

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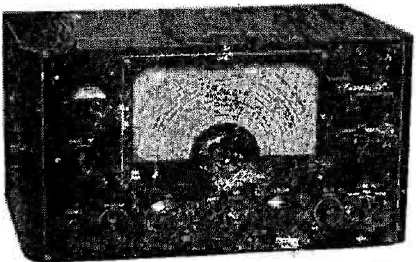

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H.S.2X.	Input 200/250v. Output 250/0/250v. 100 m/a	19/6
H.S.30X.	Input 200/250v. Output 300/0/300v. 100 m/a	19/6
H.S.3X.	Input 200/250v. Output 350/0/350v. 100 m/a	19/6

Fully Shrouded—

F.S.2.	Input 200/250v. Output 250/0/250v. 80 m/a	19/6
F.S.30.	Input 200/250v. Output 300/0/300v. 80 m/a	19/6
F.S.3.	Input 200/250v. Output 350/0/350v. 80 m/a	19/6
F.S.2.X.	Input 200/250v. Output 250/0/250v. 100 m/a	21/6
F.S.30X.	Input 200/250v. Output 300/0/300v. 100 m/a	21/6
F.S.3X.	Input 200/250v. Output 350/0/350v. 100 m/a	21/6

All above have 6·3·4·0v at 4 amps, 5·4·0v at 2 amps.

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FOR Sale. Hallicrafter SX24 and 50-watt transmitter. VFO, microphone, key, etc., in black crackle rack. Excellent condition, £50.—Payne, Hillcrest Cottage, Welton, Daventry, Northants.

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RCA AR88LF, 75-550 kc, 1·5-30 mc. S-Meter, excellent condition. Bargain, £24.—P. Love, Spring Grove, London Road, Cheltenham.

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SMALL ADVERTISEMENTS
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