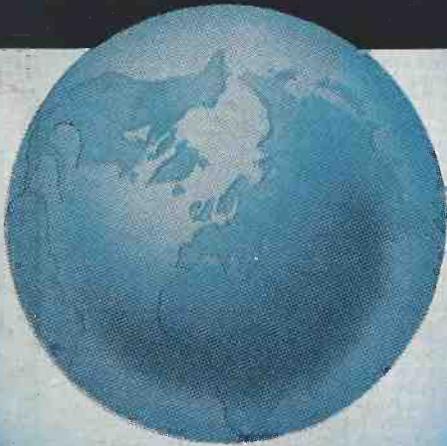


2/-

The
SHORTWAVE

Magazine



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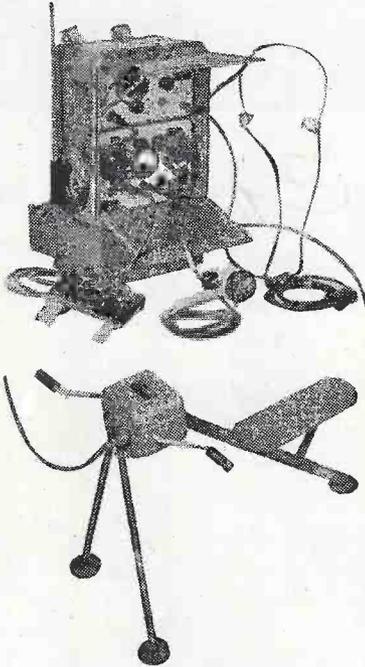
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VOL. VII No. 12 FEBRUARY 1950

CLYDESDALE

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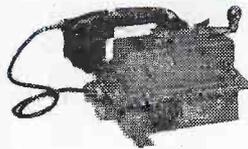
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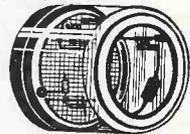
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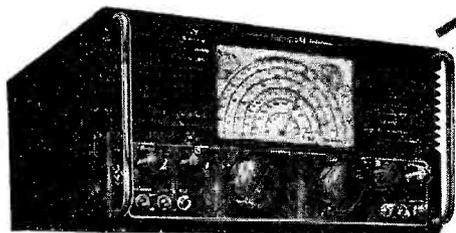
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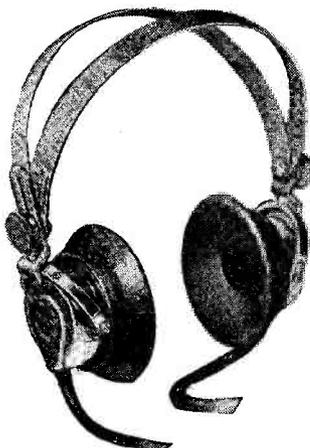
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U.H.F. RECEIVERS R.1481-

To clear space in our warehouse prior to rebuilding, we are offering the remainder of our stock of these well-known receivers at clearance price. Freq. range 65-86 Mc/s, 6" S.M. Dial, 10 6-3v Valves, 3 VR65s, 4 VR53s, 1 VR66, 1 VR54, 1 VR57. I.F. Freq. 12 Mc/s. B.F.O. These receivers are 19" rack mounting brand new in transit cases, with circuit diagram. £4/4/-, carriage paid.

PERSONAL RECEIVERS B.C. 728c

7-Valve receiver with 1-4 valves, R.F. VT173, mixer VT171, osc. VT173, I.F. VT173, det. and audio VT172, output VT174, bias rect. VT174; covers 2-6 Mc/s with 4 push buttons adjustable 2-2.6, 2.6-3.5, 3.5-4.5, 4.5-6.0 Mc/s respectively. Operates from self-contained 2v acc. by 2v vibrator, with 12v vib. for charging 2v acc. from 12v source. Built-in loudspeaker. Carried slung on shoulder. Supplied brand new with valves, vibrators, telescopic aerial, mounting accessories, and instruction book. £8/19/6, carriage paid.

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10-valve receivers covering 20-28 Mc/s. Tunable, or 10 channels available by push buttons. I.F. 2.65 Mc/s. Band width 80 kc/s. Power output 2 watts to built-in 5" loudspeaker. Provision for phones. Line up: R.F. 6AC7, Mod 6AC7, Osc. 6J5, 2 I.F.'s, 12SG7's, Limiter 6AC7, Det 6H6, A.F. and B.F.O. 6SL7, AVC 6SL7, output 6V6. £5/15/-, carriage paid.

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Primary, 200/250v 50 c/s. Secondaries, 460v 200mA, 210v 15mA, 6.3v 5mA. 15/6.
Primary, 200/250v 50 c/s. Secondary, 110v. Rating 60w. Enclosed. 18/6.
Auto. Trans. 230/250v 50 c/s. 100W. Unshrouded, 10/6.

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6H, 200mA, 100 Ω ... 6/- 5H, 120mA, 140 Ω ... 5/- 5H, 250mA, 90 Ω ... 7/6

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Metal cased 2" circular 0/15-600v (500 microA F.S.D.), 6/6; 0-20A, 0-40A, with hunts, 5/-; 2" square bakelite cased, 0-1 mA, 8/6; 0-5 mA, 6/-; 0-50 mA, 7/-; 0-20v, 5/-; 2 1/2" circular bakelite cased, 0-30 mA 4/6; 0-50 mA, 0-100 mA, 0-200 mA, 9/6; 0-500 micro amp., 16/6; 0-1 mA desk type, 15/-; 2 1/2" bakelite cased moving iron, 0-20v, 7/6.

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5", less trans., 9/6, 5", with trans., 11/6; 6 1/2", less trans., 11/-; 10", with trans., 21/-. All brand new boxed, with ali. speech coils. Post extra.

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Covers 100-150 Mc/s. Supplied New with valves (including 4-717A's), 39/6.

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Type 104, 12v D.C. input, outputs 250v 6.5mA, 2.5A. D.C. P.M. Rotary on chassis with cover size 8 1/2" x 4 1/2" x 6 1/2", 6/11 post paid.
Type 87, input 24v. Output as Type 104, 5/11 post paid.

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S.M. DIALS, as used on R.F.26, less Cursor, 3/11

RECEIVERS TYPE 76

150-505 Kc/s in 2 bands. 3 Valves, VR53, ARTH2, VR92. Feeds out on I.F. of 560 Kc/s. Spiral S.M. dial, cal. every Kc. New in transit case, 22/6, carriage paid.

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Every item required for the construction of a famous maker's 20 watt A.C./D.C. amplifier. Employing 8 valves, EF37 high gain stage, into EF37 triode connected, transformer coupled to output stage using 4-CL33's parallel push pull. Rectifiers 2-UR3C. Two inputs, low impedance (moving coil P.U.'s, etc.), via triple shielded trans., to first stage, high impedance (tuner units, xtal P.U.'s, etc.), into second stage. Required inputs for full output, 1 millivolt low imp., 0.5v R.M.S. high imp. Output by large O.P.T. to 10 or 15 Ω . Separate top and bass cut switches. Chassis and case, black crackle and chromium, size overall 15 1/2" x 7 1/2" x 8 1/2" including carrying handles. Chassis isolated from mains. First class components throughout, including Partridge Transformers and Choke. Supplied in kit form, complete with all components, chassis (drilled), case, all valves, and circuit diagram. £13/13/-, carriage paid.

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3 valve medium wave dry battery operated receiver, housed in smart bakelite box, size 7" x 6 1/2" x 5", with plastic carrying handle. T.R.F. circuit, using 3 I.T.4-valves, with reaction. Output to pair of lightweight H.R. phones, self contained. Frame aerial in lid, provision for external aerial, S.M. dial. Powered by self contained dry batteries, 1-WV1435 and 2-U2's. Supplied brand new, with valves and batteries. Open the lid and it plays. Covers whole M.W. band. Purchase Tax paid. £3/19/6. Not ex-Govt. surplus.

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6 valve receivers, covering 195 Kc/s-9050 Kc/s in 4 bands, 195-560, 560-1600 Kc/s, 1.6-4.5 Mc/s, 4.5-9.05 Mc/s, switched. R.F. mixer, 3-I.F.'s, det. and output, using 4-12SF7's, 1-12SA7, 1-12A6 (output). S.M. dial calibrated in Kc. Size 8 1/2" x 7" x 16". Provision for aerial or loop. Powered from 28v self-contained dynamotor. Supplied with valves and dynamotor, used, but O.K. £3/19/6, carriage paid.

MANSBRIDGE CONDENSERS

4MFD, 1,000v WKG. 5" x 4" x 1 1/2", 3/-. 6MFD, 2,000v test, 5 1/2" x 4" x 1 1/2", 4/-. 3MFD, 2,500v test, 7" x 3 1/2" x 2 1/2", 2/6. 2MFD, 2,500v WKG., 6" x 6" x 2 1/2", 3/6. Postage extra please.

G3SJ ★ HAROLD W

We offer this month a really fine range of material mostly by R.C.A. and sub-contracted material on behalf of R.C.A. All is in fine new condition, mostly boxed. Prices are within everyone's pocket, and are based entirely on cost regardless of present-day values. A careful study of all offered will reveal some outstanding bargains. All the condensers and resistors offered are brand new. Electrolytics are in perfect condition from tropicalised cases. The available range is too great to offer in complete detail and we invite enquiries for any component parts, from the entire range of R.C.A. Rx's and Tx's.

VALVE HOLDERS. Ceramic, Octal, 1/; 10/- doz. 807, 1/3; 12/- doz. Johnson lock in 4-pin U.X., 4/-, Brit. 7-pin, 5/- doz. 813, 6/-.

JOHNSON. Continuously Variable Ant. loading or Tank Coil, 8 turns on 3" diameter ceramic former, with 5" x 2" ceramic end plates, standard 1/2" shaft. Adjustable to zero, 300 watts. Suitable for 10 and 20, at 7/6 each.

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R.C.A. OR THORDARSON. L.F. Choke 20hy, 150 mills. Completely screened with flying leads, 6/- each ; 60/- per dozen. Ditto, 10HY, 150 mil s, 5/- ; 50/- doz.

NATIONAL. H.R.O. L.F. Choke ; boxed, 7/6 each.

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R.C.A. HF Chokes. 500 microhenry. Completely screened, 9/- dozen ; unscreened at 6/- dozen.

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VOLUME CONTROLS. R.C.A. Centralab, etc., all U.S.A. One dozen assorted, including wire wound, mostly boxed. 12/-.

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VALVES. TX, 866/866a, 10/6; 805, 25/-; 832, 16/-; 100th, 25/-; 304tl, 39/6; HK257b, 32/6; 807, 5U4, 6/-, or 60/- dozen. 5R4, GY, 4/-, 813, 32/6.

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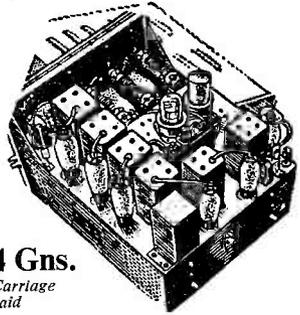
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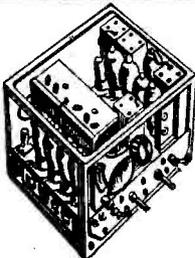
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NEW VALVES. At 35/-: 715B, 805, VCR97. At 27/6: 931A. At 25/-: 2APl, 5FP7. At 15/-: 832, 866A. At 10/-: 6AK5, 6L6, 717A. At 7/6: 5V4G, 6AC7, 6AG5, 6C4, 6F7, 6K7, 6L7GT, 6N7, 6V6M, 12K8, VR150/30, 9D6, PEN46, 72, 73, 2050, VR136, EF39, EF54, CV66. At 6/6: 3Q5GT, 5U4G, 5Z4M, 6C5, 6B8, 6G6G, 6J5, 6K6, 6Q7GT, 6SJ7, 6SK7, 6SN7, 6V6GT, 6V6G, 6X5GT, 6Y6G, 807: 9001, 9002, 9003, EF36, EF50, EC52, AU5, RL37, VS70, VT60A, VU111. At 5/-: 2X2, 2C26A, 6J5GT, 6K7G, 6SL7, 7V7, 12A6, 12C8, 12AH7, 12J5, 12SH7, 12SJ7, 12SK7, 12SL7, 12SG7, 12SR7, 28D7, 713A, 865, 956, 9006, P61, SP61, 8D2. At 4/-: 6SH7, HL2, PN2. At 2/9: 6H6, 7193, EA50, D1, LD210, LP220, SP41. All guaranteed. Two or more valves post free, otherwise add 6d.

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Terms: C.W.O.

All prices include carriage.

Lists available on request.

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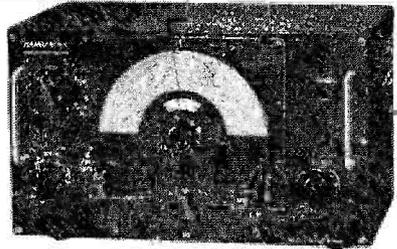
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300-ohm Twin-Ribbon Feeder, per yd., 5d.

13 ft. $\frac{1}{2}$ " dia. Co-Ax fitted Pye Plug each end, 2/6.

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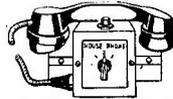
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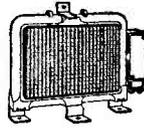
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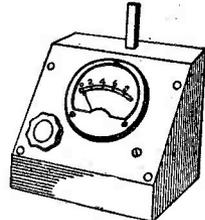


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FOR THE RADIO AMATEUR & AMATEUR RADIO

Vol. VII

FEBRUARY 1950

No. 79

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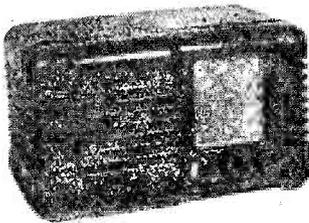
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EDITORIAL

Types

On the theme discussed in this space last month, one might also usefully comment on the wide variety of individuals privileged to call themselves amateurs and to use our bands. Truly a remarkable cross-section of the community.

But they are each individuals, with their own ideas (and in some cases, ideals) as to how they can (or should) conduct themselves when on the air. The factor of personality is always evident, particularly that of the operator of a telephony station. We all subconsciously form a mental picture of the man at the other end of a phone QSO. The remarkable thing is how often one's impression is quite wrong, not only as to what he looks like (which is understandable) but also as to what sort of a chap he is—which is not so satisfactory, as it proves that one must be very careful not to allow impressions so gained to influence one's judgement.

We are moved to these remarks by the increasing tendency for some phone operators to criticise over the air the behaviour (and sometimes even the character) of another operator not in the QSO, apparently on no other ground than the manner in which he conducts his contacts. These opinions are conveyed by an interchange of sniggering remarks calculated to make somebody's ears burn.

Well, behaviour of this sort *over the air* is not in the spirit or the tradition of Amateur Radio, and it is particularly to be deplored that some of the worst offenders are those old enough or sufficiently responsible to know better, even if they have not had much operating experience.

It is a clear obligation on every operator, whether using CW or phone, to avoid anything which could be construed by a listener as an ill-natured reflection on another amateur.

Austin Forsyth
G6FPO

Wide-Range Heterodyne Frequency Meter

Design & Construction

By F. BUTLER, B.Sc., M.I.E.E.,
M.Brit.I.R.E.

ANYONE who has looked inside the case of a high grade heterodyne frequency meter will realise that the home construction of a satisfactory instrument of this kind is a formidable undertaking. The difficulties are both electrical and mechanical, and concern mostly the variable frequency oscillator part of the circuit. The requirements to be met in the design of this section of the instrument are:

- (i) Temperature control or temperature compensation of the frequency-controlling elements of the VFO tuned circuit.
- (ii) Reduction to a minimum of all undesired electrical couplings which vary the load on the VFO.
- (iii) Rigid mechanical construction to avoid frequency instability due to vibration.
- (iv) Provision of an accurate drive mechanism for the VFO tuning condenser.
 - v) Elimination of all switching operations which affect the VFO.
- (v) Voltage regulation of all power supplies.

The instrument to be described violates many of these design requirements and, in consequence, its performance falls a long way short of the ideal. To compensate for these shortcomings, it is small, cheap and compact, is operated from the AC mains, and is versatile in its applications. It covers the range of frequencies between 50 kc and 30 mc and gives facilities not normally available from an instrument of this class.

Functional Description

The two photographs show respectively the panel layout and the internal wiring and construction. The various facilities, provided by panel switching, include the following:

- (i) RF output available from a 50 kc quartz crystal oscillator, the harmonics of which are detectable on an AR88 receiver up to 3 mc.
- (ii) RF output from a 1 mc crystal oscillator (harmonics available up to 30 mc).
- (iii) RF output from a VFO, the fundamental frequency of which covers 1000-1050 kc.
- (iv) Simultaneous output from the VFO and 50 kc crystal oscillators, the VFO output being modulated by the 50 kc signal.

Provision is made for the injection of RF from an external source so as to obtain heterodyne beats against any of the internally-generated signals, or their harmonics.

A separate switch cuts out the VFO and

Though the author modestly deprecates any suggestion that this is a really adequate instrument when judged by the highest standards, it is nevertheless an extremely useful design from the amateur point of view. Several interesting circuit features are incorporated and constructors keen on frequency measurement will find this article of considerable value.—Ed.

the 1 mc crystal oscillator, and in this condition, external RF can be applied to a special pair of terminals and made to beat with the fundamental or any harmonic of the 50 kc quartz oscillator.

Additional switching cuts out all RF signal generation and enables the meter to be employed as a 2-valve audio frequency amplifier for use in connection with AC bridge measurements.

Fig. 1 shows in schematic form the method by which all these facilities are provided.

Theoretical Circuit

The complete circuit diagram is shown in Fig. 2. The valve V1 and its associated components form a 50 kc oscillator, the fundamental and harmonic outputs of which are applied through C11 to the suppressor grid of the RF pentode V2, used as a mixer. The switch Sw.1 permits the 50 kc oscillator to be disabled by short-circuiting its crystal. The RF output from this oscillator is available at the terminals A, B, which alternatively serve to apply an RF input to be heterodyned against the 50 kc harmonic series.

The valve V2 also acts as an amplifier and in its anode circuit is an RF load consisting of a 500-ohm resistor in series with two RF chokes which serve to accentuate the output of the

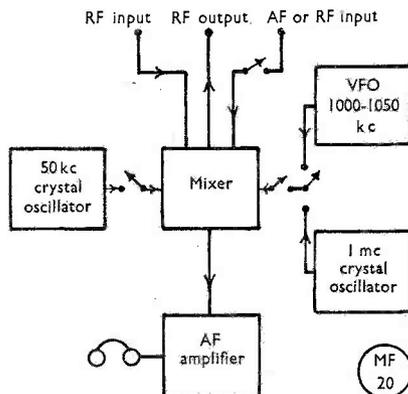


Fig. 1. Block schematic showing the electrical interconnection of the units in the instrument, and the functions it can perform.



Panel view of the Wide Range Heterodyne Frequency Meter.

higher harmonics of the 50 kc oscillator. The output across the anode load is brought out through a blocking condenser to a Pye plug on the panel (terminals E, F, on the diagram, Fig. 2.).

The screen grid, control grid and cathode of V2 are also used with associated components to form a 1 mc crystal oscillator of the series-resonant type, or by suitable switching, to act alternatively as a VFO. Further switching by Sw.4 cuts out the VFO and the crystal oscillator and permits V2 to be used as an RF or AF amplifier, from an input applied to the terminals C, D.

The series-resonant crystal oscillator has already been described by the writer ("Flexible Crystal-VF Oscillator," *Short Wave Magazine*

October 1948). It is employed in the present case because it can be changed into a VFO merely by short-circuiting the 1 mc controlling crystal.

All the internal circuit changes are made by the action of two switches only. The first is a 2-pole, 4-way Yaxley which selects :

- (i) 50 kc crystal only.
- (ii) 1 mc crystal only.
- (iii) VFO only. (1000-1050 kc).
- (iv) VFO modulated by 50 kc.

A separate single-pole change-over switch Sw.4 cuts out both the VFO and 1 mc crystal oscillators and permits V2 to be used as an RF or AF amplifier. In this case, according to the setting of the 4-way Yaxley switch, the

Table of Values

Fig. 2. Circuit of the Frequency Meter complete.

Condensers (all 500v. working)

C1	= 10-50 μ F, ceramic trimmer
C2	= 300 μ F, silvered mica
C3	= 40 μ F, ceramic
C4	= 500 μ F, silvered mica
C5	= 5-50 μ F, air dielectric trimmer
C6	= 5-50 μ F, variable air dielectric (VFO tuning)
C7, C13	= 0.5 μ F, paper
C8	= 0.1 μ F, paper
C9, C23, C24	= 2 μ F, paper
C10, C22	= 8 μ F, electrolytic
C11, C12, C18, C19	= 3-15 μ F, ceramic trimmer
C14, C21	= 0.001 μ F, moulded mica
C15, C16, C17	= 0.01 μ F, moulded mica
C20	= 500 μ F, moulded mica

Resistors (all $\frac{1}{2}$ -watt size)

R1, R4, R6	= 100,000 ohms
R2	= 5 megohms
R3	= 800 ohms
R5, R11	= 50,000 ohms
R7	= 150,000 ohms
R8	= 500 ohms
R9	= 1,000 ohms
R10	= 25,000 ohm potentiometer
R12	= 500,000 ohms
R13	= 2,000 ohms
R14	= Series resistor in Pilot Neon Lamp N.

Coils

L1	= 70 mH, universal wound.
L2	= 50 μ H, on $\frac{1}{2}$ in. dia. former.
L3	= 25 μ H, centre-tapped and closely coupled to L2
L4	= 5 μ H, single layer coil on $\frac{1}{2}$ in. dia. former

L5	= 30 μ H, single layer coil on 1 in. dia. former
L6	= 20 H, 20 mA. filter choke
L7	= 2.5 mH, RF choke, universal wound

Transformers

T1	= RF transformer (See L2, L3)
T2	= Miniature type output transformer (Ratio 1 : 1) (20,000 ohm load)
T3	= Power transformer

Terminals	Voltages
1 and 2	230v 50 c.p.s. Mains
3 and 4	150v 40 mA.
5 and 6	12.6v Heaters
7 and 8	6.3v Heaters

Miscellaneous Components

Sw. 1, 2, 3, 5	= 2-Pole, 4-way, Yaxley
Sw. 4	= SP Change-over, Yaxley
Sw. 6	= SP ON-OFF 5A. 230v
N	= 230v Pilot Neon
F	= 100 mA. Fuse
Q1	= 50 kc, Quartz Bar
Q2	= 1 mc Quartz Plate
M	= 0.5 mA. Moving Coil Meter
Rectifiers	= 200v, 20 mA. Voltage Doubler

Terminal Connections

AB	= Input RF
CD	= Input 'AF or RF
EF	= Output RF Pye plug
GH	= Telephone Jack

Valves

V1	= German RV12, P.2000 (6SK7, 6AK5)
V2	= German RV12, P.2000 (6SK7, 6AK5)
V3	= Acorn 955

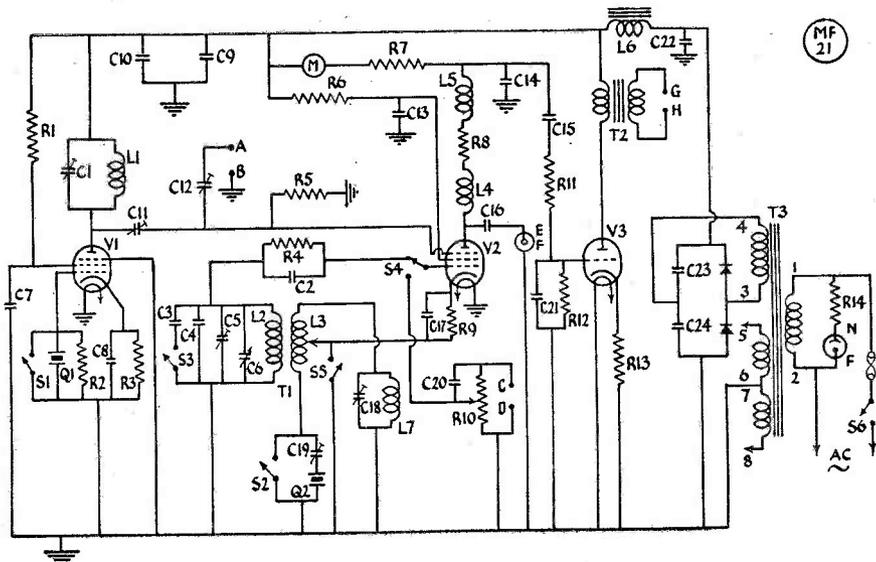
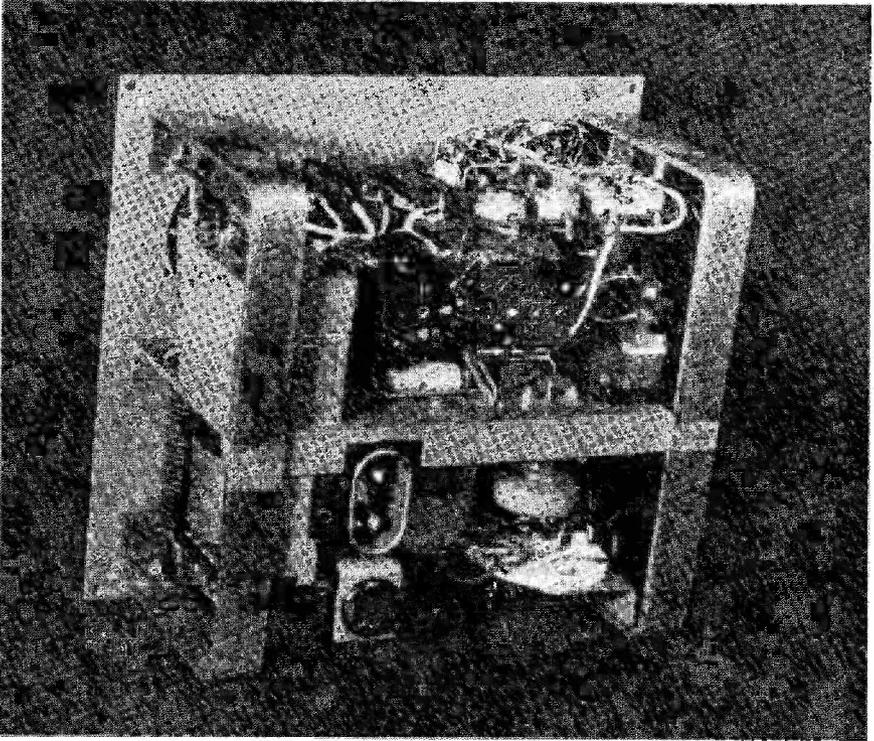


Fig. 2. Circuit diagram of the Wide-Range Heterodyne Frequency Meter, simplified as to switching (see Fig. 3.) It is an instrument having many useful practical applications in any amateur station and can be built from standard parts.



Suggesting the general construction of the instrument and the placing of the parts.

50 kc crystal oscillator output may also be applied to V2 or a single external input at the terminals C, D, may be employed, the 50 kc oscillator being disabled. The capacity C20 associated with the potentiometer R10 is to offset shunt capacity losses at RF.

For simplicity in Fig. 2, all switching is shown separately. The practical wiring diagram in Fig. 3 is that actually used to make the desired fundamental changes. The VFO tuned circuit is formed by L2 (50 μ H) in parallel with C4, C5 and C6. The latter is the main tuning condenser, and covers the range 5-50 μ F, corresponding to the fundamental frequency range 1000-1050 kc. C4 is a silvered mica padder (500 μ F) while C5 is a ceramic trimmer, required for band-setting purposes. The figures quoted are nominal values, and some experiment is necessary to cover the tuning range with a safe overlap at each end of the band.

The lower portion of the centre-tapped coil L3 is the VFO reaction winding. The upper half is the 1 mc crystal neutralising unit

and the RF choke in parallel with C18 is required merely to pass the DC cathode current of V2.

The capacity C3 calls for some comment. It is brought into circuit when the VFO is changed to crystal control, and its value is so chosen that the dial setting of the VFO at 1 mc remains unchanged when the crystal is switched into use.

When V2 is operated as a beat detector, the AF output in its anode circuit, developed across R7, is applied, after RF filtering, to the grid of V3. An Acorn 955 is used as an audio amplifier because of limited space for fitting a larger type.

Practical Construction

The frequency meter is built into an aluminium box measuring 9 \times 9 \times 4 in. Some ingenuity is required to fit everything into this space. Sub-assemblies of components are made having the minimum number of interconnecting wires and the layout is

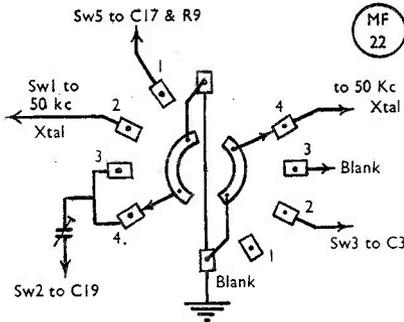


Fig. 3. Diagram showing the switch connections, as devised by the author to produce the changes shown in Fig. 1.

arranged with the following points in mind :

- (i) Short RF leads.
- (ii) Reduction of unwanted couplings.
- (iii) Avoidance of induced hum voltages in the 50 kc oscillator coil and in the output transformer.
- (iv) Separation of the power unit from the VFO coil to minimise temperature effects.

Various German valves and components are used in the construction of the instrument because they happened to be available. The RF pentodes shown are roughly equivalent to the 6SK7 but a still better type for the purpose is the 6AK5 or any of its equivalents.

VFO Calibration

The output of a frequency meter of this type is a confusing aggregate of RF signals, and calibration requires the use of an auxiliary communications receiver. Over the relatively narrow band of 1000-1050 kc there is an almost linear relationship between dial setting and VFO frequency. The calibration technique is described in the "Measurements" chapter of the A.R.R.L. *Handbook* (p. 394, 1947 Edition). Following this commonsense procedure, a graph may be drawn connecting dial setting and VFO frequency. Subsequent drifts of frequency, causing departure from calibration, can be corrected by use of the pre-set trimmer condenser C5.

In actual use, the drift, from cold, over the first half-hour of operation is about 500 c.p.s. at the fundamental frequency. Subsequently there is scarcely any noticeable change, except for momentary fluctuations due to some cause so far unidentified.

One disconcerting fault is that there is a change of VFO frequency during the switching transition from VFO-plus-50 kc to VFO only.

At 1 mc this is only about 100 c.p.s. and normally it is not of much consequence. There are means of allowing for the effect, but its elimination requires a basic re-design of the equipment to include buffer amplifiers. The attraction of simplicity is lost if these are provided.

Test Results

As a check on the performance of the instrument, the frequencies of several B.B.C. broadcast transmitters were measured. All were within 1 kc of the known frequencies. The accuracy of the VFO is not to be compared with that of, say, a BC-221 frequency meter, but the precision of frequency of the 50 kc quartz bar is far higher than that of the small 1 mc plate used in the American equipment. The 50 kc crystal used was cut for the purpose from raw quartz, using a home-built machine. It is mounted in a special stainless steel holder of high thermal capacity. Its frequency was adjusted by zero-beating its fourth harmonic against the 200 kc B.B.C. station, which is known to be held within a very close tolerance.

XTAL XCHANGE

Notices should be set out on separate slips in the form shown below, headed "Xtal Xchange—Free Insertion." Buy-or-sell insertions can *not* be accepted for this space, and all negotiations should be conducted direct.

G3COY, 2 Langdale Crescent, Sneyd Green, Stoke-on-Trent, Staffs.

Has Brookes Type S 7017-5 kc crystal, certificated, $\frac{3}{4}$ -in. pin spacing. Wants any frequency 3500-3574 kc, similar mounting.

G3DJD, 2 Canfield Road, Brighton 7, Sussex.

Has Bliley 14367 kc crystal in standard holder, also 7092, 7100 and 7140 kc with $\frac{3}{4}$ -in. pin spacing. Wants frequency 8060-8065 kc, mounted or unmounted, also 1850-1900 kc crystal with $\frac{3}{4}$ -in. pin spacing.

G3EPC, 63 Neville Street, Oak Hill, Stoke-on-Trent, Staffs.

Has 3550 kc crystal, $\frac{3}{4}$ -in. pin spacing, BC-610 fitting. Wants frequency in 'phone area 80-metre band.

G3GGL, Little Gables End, Otley Road, Bramhope, Nr. Leeds, Yorks.

Has Bliley Type MC82 1875 kc crystal, $\frac{3}{4}$ -in. mounting, no certificate. Wants any make crystal, same fitting, for frequency 7005-7045 kc.

SWL, 77 Wood Lane, London, N.W.9.

Has Bliley 100 kc bar in American 3-pin holder. Wants 3-5 mc crystal suitable for harmonic operation on 7 and 14 mc bands.

Self-Contained QRP Portable Transmitter/ Receiver

For 7 mc—Design and Construction

By A. P. NEWPORT (G3ECX)

SINCE he first took an interest in radio, the writer has always been attracted to the construction of self-contained portable and midget receivers; so when, at last, the great moment arrived, in the form of the transmitting licence, attention was focused on portable equipment.

On reading up the usual literature on the subject, however, the writer found that the majority of the so-called portable sets described were not truly portable at all. Most of them needed either an AC power supply, or a permanently set up aerial system, or they were transmitters only and not Tx/Rx combined. What the writer wanted was a com-

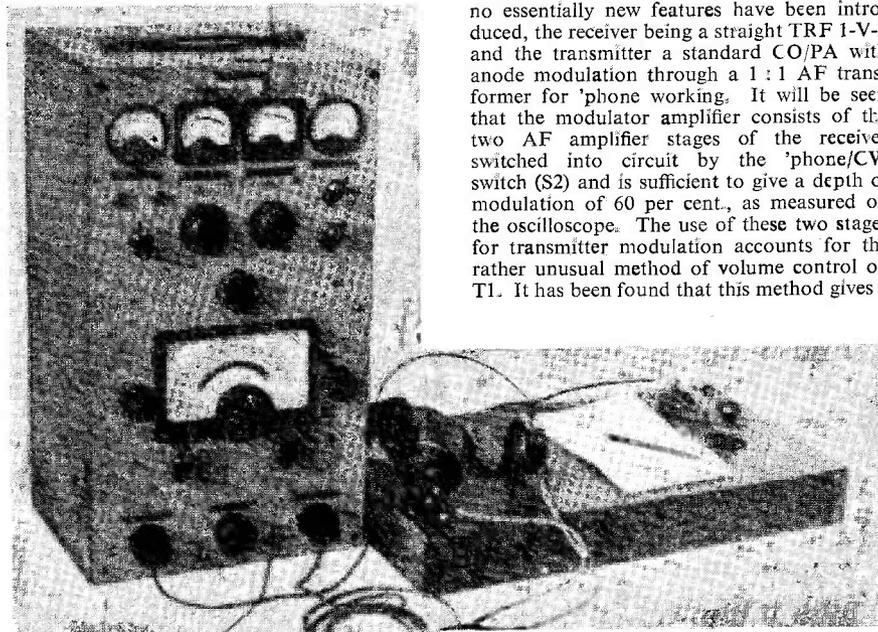
Our contributor's requirement was for a low-power 'phone/CW transmitter-receiver assembly, completely self-contained and truly portable, and requiring only an aerial to put it on the air. He describes his resulting design for 40-metre operation. It could of course be adapted for other bands.—Ed.

pletely mobile station which could be packed into a carrying-case and set up anywhere at a moment's notice, all ready to go on the air. Various theoretical designs were sketched out and made up and the apparatus described here gradually took form.

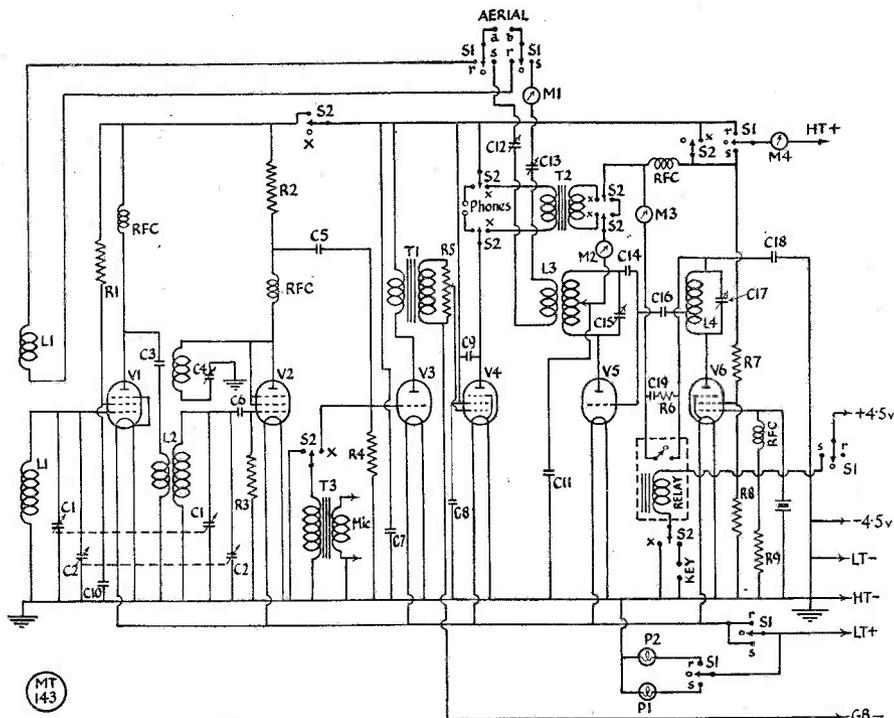
As can be seen from the photographs the whole station packs into a carrying-case 19 in. high, 10½ in. wide and 11 in. deep (including the lid) which is made of fibre board. Full use has been made of ex-Government equipment and very few new components were bought. The lid, which covers the front panel when the set is not in use, carries the aerial, key, microphone and 'phones, but when the station is in operation it becomes the operating table—the key bolting on to the outside by means of the same bolts which hold it inside when packed away (see photograph).

Circuit

Examination of the circuit will show that no essentially new features have been introduced, the receiver being a straight TRF 1-V-2 and the transmitter a standard CO/PA with anode modulation through a 1:1 AF transformer for 'phone working. It will be seen that the modulator amplifier consists of the two AF amplifier stages of the receiver switched into circuit by the 'phone/CW switch (S2) and is sufficient to give a depth of modulation of 60 per cent., as measured on the oscilloscope. The use of these two stages for transmitter modulation accounts for the rather unusual method of volume control on T1. It has been found that this method gives a



Panel appearance of the portable 7 mc station (transmitter, receiver and power supply) designed and described by G3ECX, as set up ready for working. The protecting lid can be used as an operating desk when the outfit is on the air.



Circuit complete of the CW/'phone portable 40-metre station designed by G3ECX. Valves V1-V4 comprise the receiver section; V6 is the CO-driver and V5 the PA on the transmitting side. For 'phone operation, V3-V4 become speech amplifier-modulator. The photographs suggest how this circuit can be built up as one compact unit, entirely self-contained.

Table of Values

Self-Contained QRP Transmitter/Receiver for 7 mc

C1	= 25 μ F, 2-gang
C2, C15, C17	= 150 μ F
C3, C4	= 300 μ F
C5	= .04 μ F
C6	= 200 μ F
C7, C19	= 0.5 μ F
C8	= 0.1 μ F
C9	= .002 μ F
C10, C11,	
C16, C18	= .01 μ F
C12, C13	= 500 μ F
C14	= See text
R1, R2, R8,	
R9	= 50,000 ohms
R3	= 3 megohms
R4, R5	= 250,000 ohms
R6	= 1,000 ohms
R7	= 7,000 ohms

L1, L2	= Denco Range 4 RF/Det coils
L3	= 9 turns 24 SWG on 1½-in. former 2-turn link
L4	= 9 turns 24 SWG on 1½-in. former, tapped at 3 turns up.
T1	= 1 : 3 AF transformer
T2	= 1 : 1 AF transformer
T3	= Microphone transformer (see text)
S1	= 6-pole, 3-way (Receive-Off-Send)
S2	= 8-pole, 2-way ("X", send 'Phone)
M1	= 200 mA range, RF reading
M2, M3	= 30 mA, DC
M4	= 50 mA, DC
P1, P2	= Red/Green pilot lamps
V1, V2	= Z21
V3	= HL2
V4, V6	= K124
V5	= P2

better regulation when transmitting than the more standard method of putting the potentiometer (R5) in the grid circuit of V3.

General Layout

As will be seen from the photographs the apparatus is built up on the rack principle.

The two chassis are 6 in. \times 8 in. \times 2 in. and supported by ½-in. brass strips. The HT battery is housed in its own compartment at the bottom and, in order to provide as much room for it as possible, the three sockets selected for key, microphone and 'phones were of the 1-amp. mains type (obtainable at the

emporium of Messrs. Woolworth's) as these occupy no space at all inside. Above the battery is the receiver chassis which also incorporates the 8-pole, 2-way 'phone/CW switch (S2). On the top shelf is the transmitter itself, together with the LT accumulator, aerial tuning unit and the Send/Off/Rec. switch, S1.

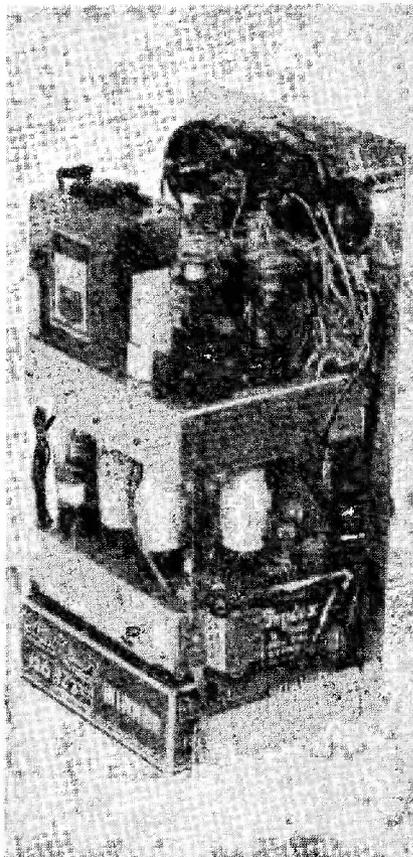
Receiver

The circuit of the receiver follows standard TRF lines and no special comment is called for as to its wiring. Coils are Denco "Maxi-Q" plug-in; these have octal pin spacing and so fit standard octal holders. The RF coil L1 is the blue range 4 (for 7 mc) and the detector coil L2 is the green range 4 (for 7 mc). C2 is a two-gang 150 $\mu\mu\text{F}$ variable tuning condenser and is used as a pre-set band-setter. It is fitted with a standard epicyclic drive and a collar locking nut for holding it rigid when it is set. These collar locking nuts are to be found in large quantities in the various ex-RAF viewing units as locking nuts for the pre-set potentiometers. The main band spread tuning condenser is a two-gang 25 $\mu\mu\text{F}$ driven by any suitable slow-motion drive. Used with the Denco coils these condensers will give a spread of about 130 deg. on the tuning dial for the 7 mc amateur band. To save space C4 can be of the solid dielectric type, and it does not need a slow motion drive of any sort. The best value for R3 (the grid leak) is found by experiment, the one in the existing set being 3 megohms. C7 is simply a decoupling condenser and can be any value between .25 μF and 2 μF according to the space available for it. The microphone transformer (T3) must be chosen to suit the microphone in use. The microphone used on the present set is a low-level throat microphone, and with it, a Radiospares midget speaker transformer used backwards has been found to give the best results. T1 is a Radiospares midget AF transformer with a ratio of 1 : 3, and the volume control potentiometer (R5) is connected straight across the secondary winding. The reason for this rather unusual position for the gain control has already been discussed.

This receiver will bring in signals of 1 micro-volt at reasonable audio level and will separate stations of more than 1 kc apart so that either can be read R5 with a little effort.

Transmitter

This a standard CO/PA circuit, keyed in the anode circuit of the CO stage by means of a Siemens high-speed relay. The power for operating this relay is drawn from the unused half of the grid bias battery, which will account for the apparent anomaly of having the earth line at -4.5 volts of grid bias battery. C19



The G3ECX portable station. Internal view. The receiver section is on the second deck, with the battery supply HT at the foot of the rack assisting in stabilising the assembly in the mechanical sense.

and R6 are the keying filter. The CO coil (L4) is 9 turns of 24-SWG enamelled wire, spaced 1 width, wound on a 1 $\frac{1}{4}$ -in. former and tapped 3 turns up from the anode end.

In the PA stage the coil (L3) is 9 turns of 24-SWG enamelled wire wound identically with the CO coil (L4) but centre tapped. The aerial coupling link consists of 2 turns of 24-SWG wound round the centre of the coil and held off by $\frac{1}{8}$ -in. distance pieces. If the PA valve chosen is a triode it must be neutralised by inserting condenser C4. This must have a very small capacity and is best made by twisting together one or two turns of insulated wire until the stage is completely neutralised. The two tuning condensers call for no special

comment, being ordinary air spaced 150 $\mu\mu\text{F}$ variables with some sort of slow-motion drive.

Meters

The four meters used in this apparatus are all off ex-Service equipment. The two tuning meters used in the CO and PA stages are ex RAF Mag. Feed ; when the internal shunt has been removed these become 0-30 mA meters and, as the scale reads 0-300 mA, they are very suitable for the purpose. The other two meters M1 and M4 are refinements which are not absolutely necessary. M4 (0-50 mA) gives a constant check on the total current being drawn from the HT battery, and, of course, it is always advisable to know what current is going into the aerial. The average aerial current given by this set is between 25 mA and 50 mA so the RF milliammeter chosen should be of suitable rating to cover these ranges.

Aerials and Aerial Tuning

The set, as shown in the circuit diagram is designed for use with a half-wave dipole centre-fed with 72-ohm co-axial cable and with such an aerial it gives excellent results. It was found, however, that it was not convenient to fold 66 ft. of aerial, together with its feeder, away into the lid of the apparatus every time it was used, so experiments were tried with a 33-ft. Marconi aerial and the results were found to be almost as good. For use with a half wave dipole, the co-axial feeder is connected to the aerial terminals "a" and "b" and an earth connection is optional. For the quarter-wave Marconi, however, some minor adjustments must be made. In the first place the two aerial tuning condensers must be shorted out. This can be done by soldering a piece of bare copper wire across the tips of the moving vanes so that at full mesh the wire makes contact with the fixed vanes. The end of the 33-ft. aerial is connected to the aerial terminal "a," while terminal "b" is connected to earth. With these modifications to the aerial tuning condensers the set can be operated on either a 66-ft. dipole or on a 33-ft. end-fed Marconi.

Choice of Valves

In the receiver the best valve line up was found to be : Z21 as an RF amplifier, Z21 with screen and suppressor grids strapped to the anode as a regenerative detector, HL2 used as AF amplifier and KT24 used as power output valve. With 120 volts on the anode the KT24 will give .39 watts audio output, which will provide a good depth of modulation when used as a modulating valve for 'phone transmission.

On the transmitter side a KT24 is used in

the CO stage, but for the PA stage an output triode such as the P2 was found to give more power than a pentode or tetrode. A spare KT24 is carried (mounted in a holder on the Tx chassis) as, in an emergency, it will replace any valve in the set (except V1 or V2) which happens to blow. So that it may be used in place of V3 or V5, should they blow, these two valves have been mounted in 5-pin holders with the centre pins of these holders connected to HT+.

Operating Conditions

The receiver draws between 8 and 9 mA, so is quite light on the HT battery ; the transmitter, however, is not so kind. When tuned for CW operation, the CO stage takes 5 mA, and the PA stage takes 17 mA thus giving an input of 2 watts and taking 22 mA out of the HT battery. For 'phone operation the CO stage takes 5 mA, the PA stage 14 mA and the modulator 8 mA, thus giving an input of $1\frac{1}{2}$ watts for the 27 mA load on the HT battery.

At first sight it may appear unnecessary to keep the filaments of the receiver hot during transmission periods, but it was found that if this was done the set came back spot on to its frequency *immediately* on switching back from send to receive ; a thing which did not happen in the prototype model where the filaments were switched off during stand-by periods.

Results

Fantastic results should not be expected with 1 to 2 watts on the "QRM Band," but this model has proved itself to be reasonably efficient in average QRM. No abnormally good reports have been received as regards signal strength but, as is to be expected, all reports have been T9. Reports have ranged from 549 to 579, when using the full 2 watts, the latter report being from a distance of 200 miles. One report of 599 was received but, as the other station did not send his QTH or a QSL, and, moreover, since he was received at S9+, it is presumed that he was very local.

'Phone working has been restricted to artificial aerial and oscilloscope experiments as G3ECC is not yet licensed for 'phone, but the RF power is there and modulation, as measured on the oscilloscope, is 60 per cent.—moreover, it gives a good quality on sidetone so some interesting results are anticipated when the 'phone side goes on the air in due course. Incidentally, the microphone lead should be fully screened by an earthed sheath or feedback troubles will make their appearance.

HT Without Transformers

Interesting Practical Circuits

IN these days of shortages and high prices, it would seem appropriate to turn our attention to that rather expensive item of equipment, the Power Pack with Mains Transformer.

So often one hears the not-so-wealthy enthusiast bemoan the fact that he cannot afford to build the transmitters and receivers appearing in the various technical magazines, due to the specification of components beyond his pocket.

But suggest that he might economise by using a transformerless power unit, and one is immediately met with rather vague comments about being "dangerous," "not being able to earth the HT— and chassis," and "only low HT voltage being obtainable," and so on.

In this article an attempt will be made to disprove these statements, at the same time presenting some practical facts, figures and

The author of this article, himself professionally concerned with transmitter design in the commercial field, shows that there is scope for much ingenuity in the application of transformerless HT supplies for QRP working. In particular, the voltage-doubler circuit should be used more than it is in present amateur practice.—Ed.

Reference to the necessary valve data charts will show that the current rating for the heaters of all four valves is .3 amps, so that if they are connected in series there will be a volts drop across the heaters of the sum of the individual voltages, *i.e.*, 6.3 + 6.3 + 25 + 25 = 62.6 volts. In addition, a resistance R is placed in series with the heaters to drop the difference between 62.6 volts and the mains voltage. Assuming that, for example, the mains voltage is 240 volts AC, the value of R can be calculated by the formula:—

$$R = \frac{(\text{Mains Voltage}) - (\text{Total Heater Voltage})}{\text{Heater Current (amps)}} \text{ ohms}$$

$$\therefore R = \frac{240 - 62.6}{.3} = 591.33 \text{ ohms}$$

In practice, R would be either a length of

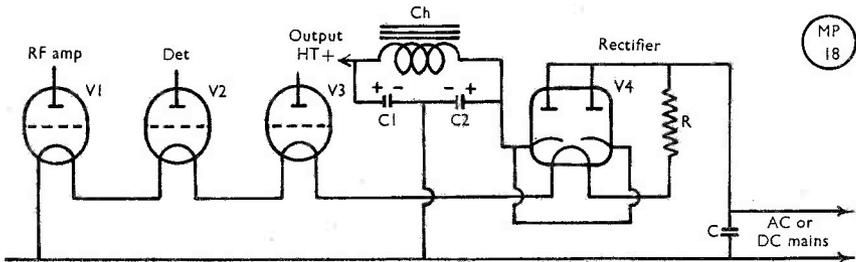


Fig. 1. The standard transformerless AC/DC power circuit frequently encountered in the design of midget receivers.

suggestions for the design of transformerless HT supplies using, as far as possible, components on hand or of low cost.

Fig. 1 illustrates one of the commonest basic circuits of this kind, generally met with in the American type of AC/DC Midget medium/long wave receiver, and as it is probably the best known of its sort, will serve as a basis for discussion.

The rectifier is of the conventional half-wave type, using a full-wave rectifier valve 25Y5 with anodes and cathodes strapped together. The other three stages are RF amplifier (6K7) detector (6J7), and output (25A6). It will be seen that the smoothing circuit (L1, C1 and C2) is quite conventional.

Table of Values

Fig. 1. The Standard Circuit for Direct Working

- C1, C2 = 16μF
- C3 = 0.1 μF
- R = See text
- Ch. = Smoothing choke
- V1 = 6K7
- V2 = 6J7
- V3 = 25A6
- V4 = 25Y5

line cord cut to the required resistance, or a dropper resistance of 1,000 ohms (.3A) with adjustable preset tapping.

One of the chief objections to this circuit as it stands is that the chassis (HT—) is live, unless connected to the "earthy" side of the mains, and as a result the chassis cannot be earthed, because if the live conductor should be connected to the chassis when

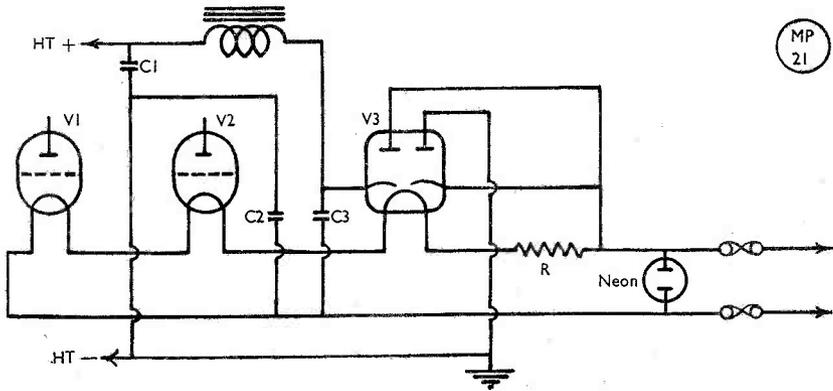


Table of Values

Fig. 4. Suggested Transmitter Circuit

- V1, V2 = Tx valves as required
- V3 = 25Z5 or 25Y5
- C1, C2 = 16 μ F, 600-volt wkng.
- C3 = 8 μ F, 600-volt wkng.
- R = Calculated as for Fig. 1.

The calculation of resistance R has already been discussed. The filter C3, C4 and L2 is quite conventional, and the higher the inductance of Ch.2, the better the smoothing. Alternatively, it is possible to use a resistance in place of Ch.2. A suitable value would be some 8,000 ohms, but if a heavier HT current were required this value would have to be lower. Additional smoothing in this case is obtained by putting another 16 μ F in parallel with C3.

It will be noticed that the phones are isolated from HT+ and earth by means of C1 and C2. These, for safety purposes, should be at least 500 volts working. If it is required to use a speaker with the circuit, the phones can be eliminated and Ch.1 replaced by the primary of the speaker transformer.

One last point. To minimise hum, it is essential that one side of the heater of the first RF valve is connected to chassis, rather than to the live side of the mains.

An alternative rectifier circuit to that shown in Fig. 2 is suggested in Fig. 3. The advantage is that any 4-, 5- or 6.3-volt rectifier valve can be used, and the disadvantage being that a suitable heater transformer is required. In Fig. 3(a) any suitable half-wave rectifier valve will do, or a full-wave rectifier with anodes strapped together.

Fig. 3(b), on the other hand, is suitable for rectifier valves having a cathode in addition to heater.

Transmitters

The rectifier circuits previously discussed

Fig. 4. Practical direct-mains transmitter circuit using the voltage doubling rectifier to boost plate HT.

are suitable for low-power transmitters, and any one of them used together with a simple crystal oscillator provides a cheap and useful "standby rig."

However, what is not generally realised is that it is possible to use a voltage doubler circuit along the same lines, and with the normal mains voltages in this country, such a circuit would provide some 400 volts HT, and would be the foundation for quite a useful transmitter. A suggested circuit is illustrated by Fig. 4.

In this particular case the neon (or light bulb) indicates whether the unit is on or off. The HT-, it will be observed, is isolated from the mains.

The circuit can be adapted for rectifier valves with lower heater volts by using heater transformers, as Fig. 3.

The HT voltage available from such a circuit is between 300 to 400, depending on the mains

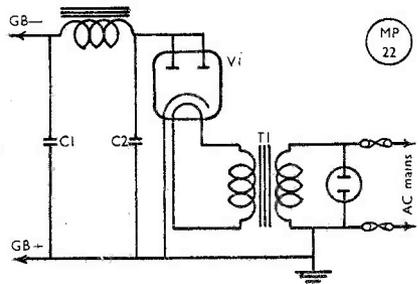


Fig. 5. An arrangement for obtaining bias voltages for a high power transmitter.

input volts which in this country range from 200 to 250 volts AC.

Bias

Another use for the type of circuit under discussion is for biasing high power transmitters. A suggested circuit is shown in Fig. 5.

A suitable valve for this circuit is the 6X5 which has a 6.3 volt heater, the necessary heater voltage being obtained from transformer T1.

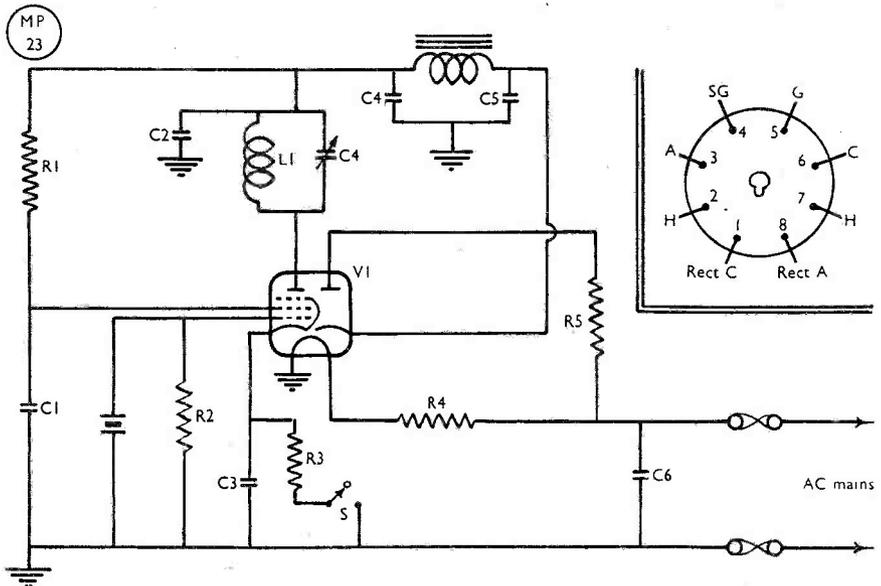
The required bias voltage can be either stabilised or unstabilised. If the former, it is suggested that a normal neon stabiliser circuit be used. Such circuits have already been described in the *Magazine*. If, however, it is

Table of Values

Fig. 6. Suitable Self-Contained Stand-By Tx

- C1, C2, C3 = .01 μ F, 500-volt wkng.
- C4, C5 = 16 μ F, 500-volt wkng.
- C6 = 0.1 μ F, 500-volt wkng.
- L1, C4 = Tuned to crystal frequency
- R1 = 15,000 ohms
- R2 = 50,000 ohms
- R3 = 1,500 ohms
- R4 = 1,133 ohms (*but see' ext*)
- Valve = 70L7 (Heater, 70v., 0.15a.; Pentode anode, 110v. 40 mA; Pentode screen, 110v. 3 mA; Rectifier, 125v. 70 mA).

Fig. 6. A compact self-rectifying single-valve transmitter, suitable as a portable or QRP stand-by rig. The single 70L7 can be made to do everything.



proposed to use unstabilised bias, the correct voltage can be obtained by means of suitable dropping resistors.

Conclusion

In conclusion a novel low power transmitter circuit is shown in Fig. 6. Such a transmitter would be useful for QRP work and could be constructed to take up very little space.

The valve is a 70L7, but other suitable types are 25A7, 32L7 and 70A7. It will be seen that the valve is a combined rectifier and pentode in one envelope, and in the circuit is

operated as a combined "crystal oscillator-rectifier." The anode of the pentode section can be loaded to about 40 mA at 125 volts, though the makers specify 110 volts. An input of about 5 watts is possible.

It should be noted that the tuned circuit L1-C4 should be suitable to tune to the crystal frequency which can be either 1.75, 3.5 or 7 mc. The resistors R4 and R5 are suitable valves for 240v. AC mains.

It is hoped that this article will prove useful to readers when considering building new power supplies.

Mention the Magazine when writing to Advertisers—It Helps You, Helps Them and Helps Us

GP Crystal Checker

Useful Modulated Oscillator For General Test Purposes

By J. H. JOWETT (G3CFR)
& P. J. TOWGOOD

THERE are large numbers of surplus crystals, to be obtained quite cheaply at the present time, apparently on frequencies of no practical value. Many of these crystals are not so useless as might at first be thought.

Although they may be of little value for transmitter control, it is often the case that some odd harmonic may fall into, or close to, an amateur band; the harmonic can then serve as a check point for a receiver operating on that particular band, and will also assist in compiling a calibration chart for the receiver.

Surplus crystals can be obtained with widely differing fundamental frequencies, so that an oscillator is required which is to a large extent independent of the crystal frequency, and will also oscillate readily with "difficult" crystals. The Pierce circuit, as shown in Fig. 1, satisfies these requirements admirably; crystals of almost any frequency will oscillate immediately in the circuit, provided that the fundamental is not lower than the resonant

frequency of the anode side of the Pierce oscillator. Uses to which the oscillator may be put come to mind at once: When grinding crystals to a required frequency, the crystal after having been ground can be tested by connecting it into the circuit, when it should oscillate easily; for it is a general rule that a crystal which will not go off in this oscillator will not perform in any other type of circuit,

Table of Values

Fig. 1. The Pierce Oscillator

- C1, C3 = .001 μ F
- C2 = 10 μ F
- C4 = 150 μ F
- C5 = .005 μ F
- C6, C7, C8 = 500 μ F
- C9 = 2 μ F
- Cf = see text
- R1, R3 = 50,000 ohms
- R2 = 500 ohms
- R4 = 25,000 ohms
- R5 = 2 megohms
- R6 = 250,000 ohms
- R7, R8, R9 = 470,000 ohms
- R10 = 1,500 ohms
- RFC1 = VHF RF Choke
- RFC2 = S/W RF Choke
- V1 = EF50, EF54 or similar
- V2 = SP61, or similar
- S = Crystal Selector Switch

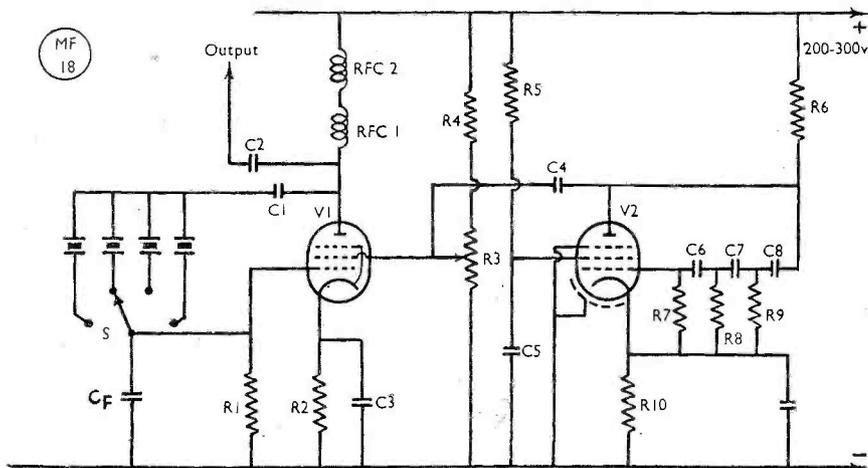


Fig. 1. Pierce oscillator (V1) with RC audio oscillator (V2) to modulate the signal. Good output is obtainable over a wide range of harmonic frequencies.

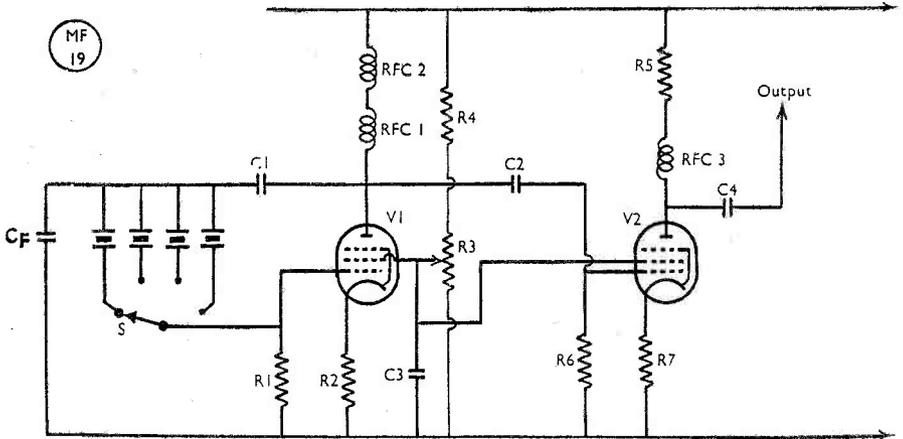


Fig. 2. Another version of Fig. 1, using 6SH7's for V1 and V2. Values are given in the table.

and will have to be reground and reactivated before further use.

Applications

The writers have not only been using the oscillator for this purpose, but being actively interested in the 2-metre band, have been employing it to calibrate converters, and at the same time as an ever-available check on the converter stability. (These oscillators have proved invaluable when the writers have been endeavouring to get T9 notes out of their 2-metre converters ! !)

One version of the oscillator used an EF54, which oscillated strongly enough to produce S9 harmonics on 2 metres—strangely enough, the least efficient EF54 (for ordinary amplifying purposes) produced strongest harmonics.

A second version using a 6SH7, although producing oscillation in a crystal just as easily, required a second 6SH7 as a buffer amplifier (see Fig. 2), to produce strong harmonics as low as 2 metres.

A modulating valve is useful for identifying the signals, and a resistance-capacity oscillator, connected as shown in Fig. 1, is found sufficient to modulate the signal up to about 50 per cent.

Modifications

For low-frequency crystals, a small feedback condenser may be needed ; this is shown as Cf in the circuit diagrams, and will usually be about 20-50 $\mu\mu\text{F}$, but the smallest value necessary for stable oscillation should be used to prevent the frequency of the crystal being "pulled."

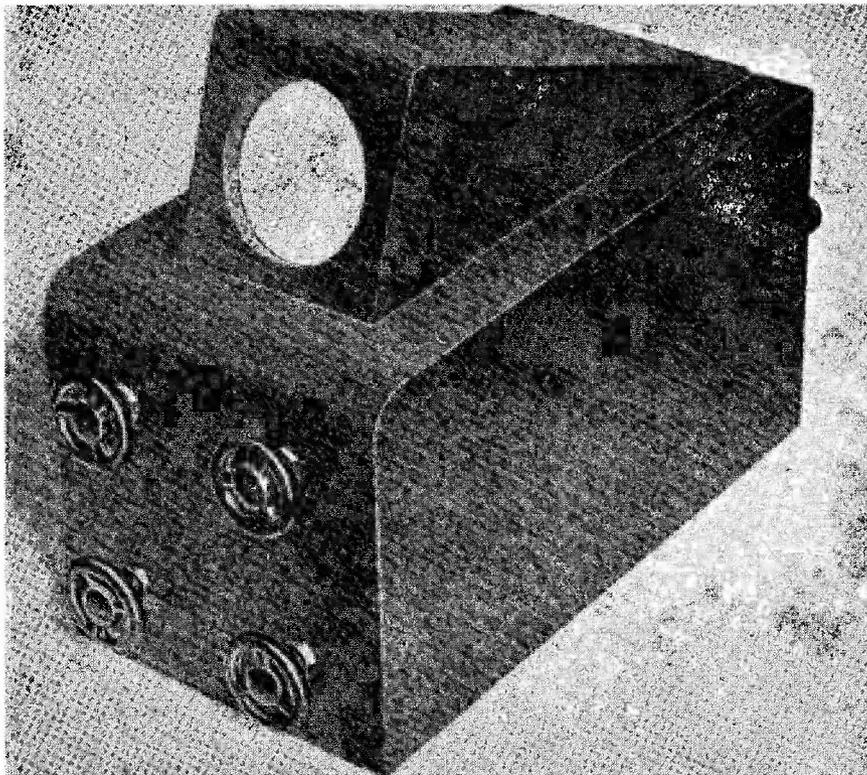
Table of Values

- Fig. 2. Modification of the Circuit**
 C1 = .001 μF
 C2, C4 = 300 $\mu\mu\text{F}$
 C3 = .01 μF
 Cf = see text
 R1, R6 = 50,000 ohms
 R2 = 500 ohms
 R3 = 50,000 ohm potentiometer
 R4 = 25,000 ohms
 R5 = 10,000 ohms
 R7 = 4,700 ohms
 RFC1, RFC2 = As Fig. 1
 V1, V2 = 6SH7
 S = Crystal selector switch

A number of crystals may be incorporated in the unit and switched into circuit by means of a multi-way switch, thus giving numerous calibration points. If the harmonics are too strong for the required purpose, the output may be reduced by lowering the potential of the oscillator screen by means of the potentiometer R3.

In the original unit, the audio oscillator was of the resistance-capacity type because of space considerations, but in a unit where this is of no importance a simple triode oscillator, using an ordinary AF transformer in the usual way, would be quite satisfactory — and somewhat easier on the components !

In conclusion, originality is not claimed for the circuits shown, but it is hoped that they will illustrate the usefulness of the Pierce oscillator, besides giving some idea of its performance ; perhaps a use will also be found for some of those crystals lying about in the shack !



CRT Phone Monitor

Design for Utility and Appearance

By J. A. PLOWMAN, Grad.Brit.I.R.E.
(G3AST)

THINGS built in a hurry, or on the spur of the moment, have a nasty habit of getting left in their original form. The author found, shortly after receiving his phone licence, that a CRT phone monitor is almost essential. To comply with this urgent and unmistakable need a Mullard ECR30 cathode-ray tube was hastily assembled with a few components on an old chassis and placed at a vantage point on the operating desk. A visual indication was then available of modulation characteristics.

Unfortunately, the monitor remained in this condition, just as it was, for well over a year, until it was decided to give the shack a more "professional" appearance.

While extensions were being made to the transmitter, some thought was given to a suitable case to house the monitor. One or

Many amateurs believe, and rightly, that a piece of equipment designed to work well should also look good. Our contributor discusses the dressing up of a CRT phone monitor.—Ed.

two lessons had been learned during the previous year. Cathode ray tubes were found to be very prone to extraneous interference, especially when running at low gun voltages; secondly, shift controls for both X and Y plates are a wonderful help. The prime consideration was of course cost, but even here, (as it later transpired) it was better to expend a few extra shillings and finish up with an instrument of superior appearance than to "make do."

Circuit

Since the Mullard ECR30 will run well at 500-800 volts on the gun, and is quite sensitive, the HT supply is obtained entirely from a small replacement domestic mains transformer; the ratings of the one used were 300-0-300 60 mA, 4v. 2a., 4v. 3a.

One of these filament windings is used to supply the tube heater, the other the heater of a Marconi U17. Incidentally, surplus components for both the tube and rectifier are abundantly available.

The centre tap of the secondary HT winding is ignored—one end is earthed and the other end used in a half-wave circuit. The current drain is so absurdly small that a 1 μ F 1,000 volt working condenser is ample for smoothing purposes. Due to this low drain the smoothing condenser charges up nearly to peak value and the PD at the top of the network is 925 volts. The shift controls expend a considerable number of volts and the PD between the gun and cathode is about 800 volts. At these potentials, it has not been found necessary to insulate the shafts of the shift potentiometer; however, be sure to use good quality components or there may be trouble.

Construction

The construction of the case is self explanatory. (See drawing). The material used was commercial sheet steel with seam welded joints. However, for the amateur constructor sheet brass of heavy gauge may be used and the corners sweated up with a small alcohol torch. In order to preserve a finished appearance the sweating should be done on the inside of the case. Any surplus solder exuding through the

joints should be cleaned off when the case is given its final rub down. (Of the two, sheet steel is to be preferred owing to its shielding effect from electromagnetic interference.)

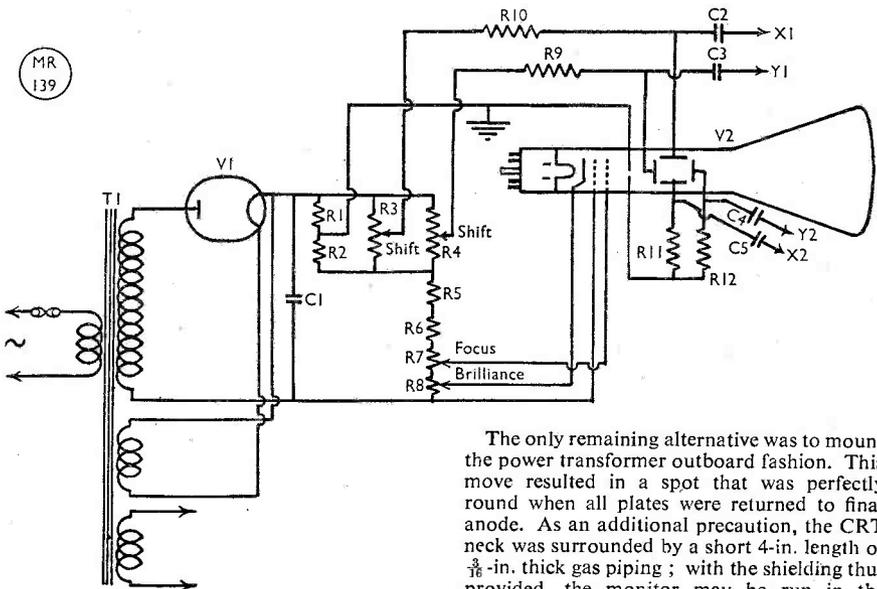
Amateurs not feeling confident to assemble the job themselves can fold up the components and take them down to their local sheet metal worker. For a few shillings, any self-respecting welder will finish off the seams of the case, and produce a really first-class job. The prototype installation employed all the components inside the case. However, at the low gun voltage employed the tube is particularly prone to electromagnetic interference and serious distortion of the spot was experienced with the mains transformer inside. Orientation of this component resulted in a minimum only and did not eradicate the trouble.

Table of Values

Fig. 1. Circuit of G3AST's Monitor

- C1 = 1 μ F, 1,000 volt working
- C2, C3, C4, C5 = 0.1 μ F, 350 volt working
- R1, R2 = 250,000 ohms, $\frac{1}{2}$ -watt
- R3, R4, R5 = 1 megohm, $\frac{1}{2}$ -watt
- R6 = 250,000 ohm potentiometer
- R7 = 150,000 ohms, $\frac{1}{2}$ -watt
- R8 = 50,000 ohm potentiometer
- R9, R10, R11, R12 = 2 megohms, $\frac{1}{2}$ -watt
- V1 = Marconi U17
- V2 = Mullard ECR30
- T1 = 300-0-300 volts, 4 volt 1 amp (twice)

Fig. 1. Circuit of the CRT phone monitor as described by G3AST



The only remaining alternative was to mount the power transformer outboard fashion. This move resulted in a spot that was perfectly round when all plates were returned to final anode. As an additional precaution, the CRT neck was surrounded by a short 4-in. length of $\frac{3}{8}$ -in. thick gas piping; with the shielding thus provided, the monitor may be run in the

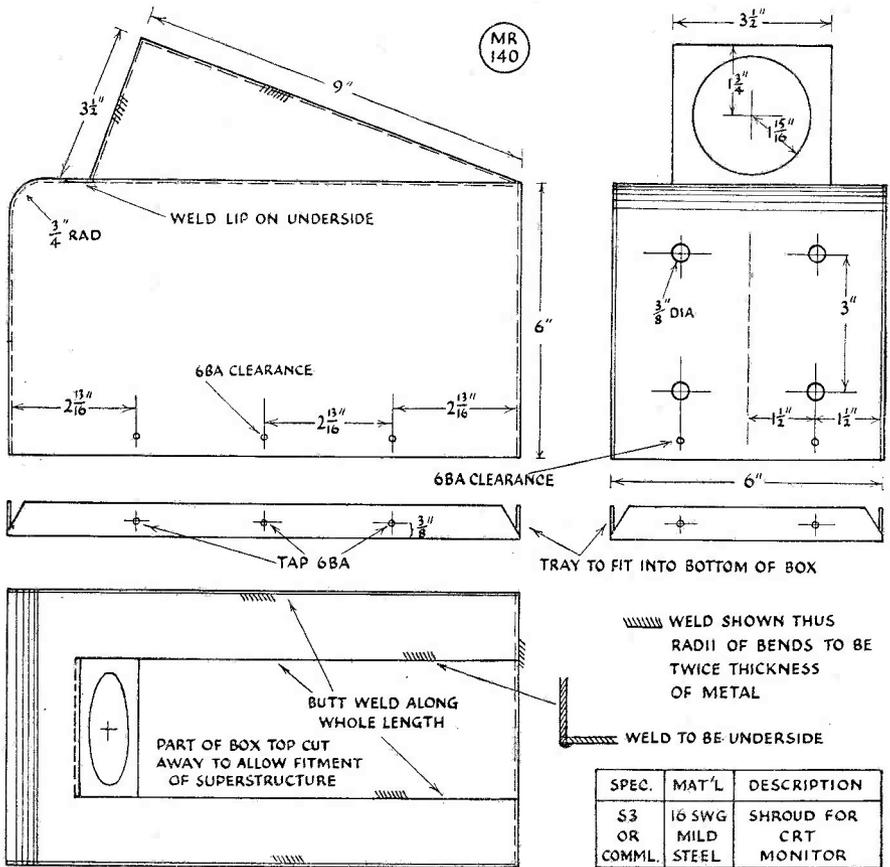


Fig. 2. For those who would like to make it neat and tidy, here are the detail drawings for the fabrication of the metal cabinet to house the unit.

vicinity of large power components without the least trouble.

The "works" of the monitor itself are mounted dish fashion between two pieces of 5 in. x 5 in. 20 SWG dural. The four potentiometers for shift X1, shift Y1, focus and brilliance, are all provided with two shaft nuts. The first nut secures the potentiometer to the unit, while the second secures the unit to the front panel. As the four controls are well separated from one another, this method provides a very rigid structure. No other attachment was found necessary. A ring of sorbo rubber was squeezed over the viewing end of the ECR30. This helps to steady the tube face internally and also affords a cushion against which is pressed a 3 in. convex clock glass to protect the tube. The presence of this glass enhances the appearance of the unit considerably, as do the Hallicrafters type wheel knobs.

To economise in components the HT positive line is earthed. The connections to the deflector plates may either be direct or *via* low voltage condensers. Five connections are brought out on the rear drop above the HT transformer: X1, X2, Y1, Y2, and a terminal for earth. In order to preserve the symmetry of the front panel the power toggle switch is at the rear.

Operation

For use as a phone monitor, a saw tooth horizontal sweep is not essential, and sufficient indication can be obtained by employing the straight portion of the mains sine curve. By placing 100-200 volt; AC across X1, X2 the top and bottom maxima are completely off the tube and may be ignored. The Y plates are fed from a pick-up loop from the PA tank *via* an aperiodic step-up RF transformer, the centre tap of which is earthed.

DX COMMENTARY

CALLS HEARD, WORKED & QSL'd

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

ALTHOUGH we confess to taking a poor view of being called "the man with the meat" (as we are by a correspondent this month), we must admit that the description probably fits. There is certainly some meat in the mail this time—so much, in fact, that we had better stop nattering forthwith and get down to it.

December and January, are always interesting months for the LF bands, but seldom so much so as these last two have been. Transatlantics on the Top Band are still not easy or frequent, but they are going on all right, and they are being made by far more people than those who write to tell us so. (We know—we've heard them). At the same time the 3·5 mc band has been giving off goodly showers of sparks, and from about December 23, onwards the ZL's have been steadily working G's and other Europeans from about 0730 until 0900 in the mornings.

The best period for them seemed to be round about December 21-27, when they peaked most decisively at 0745. Dozens of G stations also made their first eighty-metre ZL contacts during the first two weeks of 1950. More of that later.

The Top Band Story

We just had time to report briefly, last month, that G3PU (Weymouth) had worked W4NNN at 0730 on December 18. Our additional remark, to the effect that this might well be the first G/W4 contact on the band, brought forth a letter from G6LB (Chelmsford). This gently reminds us that G3JU of Sandy, Beds., worked two W4's in 1939—and of course, 'LB is quite right.

Since G3PU's contact—the first we know of this season—we have had the following details sent in: G2PL (Wallington) has been running a sked with his old friend W1BB for two months, and on January 8, 'PL heard him from 0530 until 0810, peaking S7 at 0700. W1BB was on 1815 kc and was listening for G2PL on 1790, but this didn't stop G stations from piling up on the W's frequency, calling him and also (you've guessed it) "CQ DX." Of all the insane things to do, you have to go a long way to find one worse than calling CQ

DX in the very narrow USA band, where a G hasn't a chance of being heard anyway but is quite certain to make a complete nuisance of himself to other G's. Use your loaves, fellows.

'PL worked VE1EA, and had a report of "119" from W1BB, but naturally feels somewhat irked about the stupid behaviour mentioned above. As he says in concluding, G2's and G6's are old enough to know better.

Next comes GD3UB (Ramsey), who, on December 16, worked cross-band with VE1ZZ and W1BGW. They were on 3·5 mc and he was on Top Band. On December 19, at 0500 he had a proper Top Band contact with VE1EA, who also reported hearing G5UF and G6BM. GD3UB is convinced that the best frequency for the W's is 1815 kc and the peak time 0515, and remarks that WWV on 2·5 mc gives a good clue to conditions.

Now for G2YS (Chester), who had a cross-band with FA8BG (received on 3·5 mc calling "CQ 1·7 mc"). 'YS also heard W1BB and VE1EA exchanging reports with G2PL and GD3UB in a "sketchy" sort of contact in which nobody seemed to take control.

Flashback

This seems an opportune moment to hark back 11 years to February, 1939, when the *Magazine* organised the Second Series of Transatlantic tests on the Top Band. Following are some of the G's who got across then: G3JU (using 4 watts), G2DQ, G6SQ, G5MP, G5RI, G2PL, G6WY, G6GM and the late

PREFIX LIST REPRINT

For the convenience of readers, we have had a limited number of copies of the "Country List by Prefixes, with Scoring Values" (as published in the January issue) reprinted on a stiff card for wear-and-tear use at the operating position. It is this List which is to be used for scoring in our first Dozen DX Contest.

The reprint is obtainable by return on sending 6d. and a card marked "Prefix List Reprint" to the Circulation Manager, Short Wave Magazine, Ltd., 53 Victoria Street, London, S.W.1.

Even if you are not interested in the Contest as such, it is worth noting that this new Country List by Prefixes is the most complete and up-to-date of its kind now extant.



The station of W1QNC. Lawrence, Mass., with the handwheel for swinging the beam above the operating position.

Mrs. Myler, G3GH. Chief stalwarts on the other side were W1BB, W1AW, W2CAY, W1ME, W2FGK, W1CPL, W4FAZ and W4FLF. Listeners over here heard many W's who did not make contacts, including W4's and W8's. Altogether, it was a most successful test.

The Top-Band results achieved already this year *without* the aid of any specially-arranged tests indicate that we shall certainly have to organise something in a big way for *next* January and February. In February, 1939, we had co-operation from G, GI, GW, F, FA, HB, HA, SM, OZ, W1-4 and W8; no doubt we can do even better in February, 1951, and we still don't know what February, 1950, may bring forth in the way of "casual" results.

Other Top Band news in brief: The Counties Worked table continues to grow, and G6ZN (Horbury) and G6AB (Holland-on-Sea) are strongly challenging G2YS for his lead. G3FZW (Lichfield) worked OK1EA and OK2QL on the same day, and has piled up 37 counties in a short time. G3BEX (Southwick) has also worked a nice lot of counties and has heard OK1EA (599) and some DL2's.

Eighty Metres

To return to the realms of 150-watters, we find so many first QSO's with ZL that they hardly warrant individual mention. Instead, we will hand a bouquet to ZL's 1BY, 1CI, 1HM, 1MB, 3GQ, 3NH and 4JA, all of whom

have put beautiful signals in at various times. Two of the best mornings were December 27 and 28, when one or two G stations (at least) worked four of them each morning. Again, stupid behaviour has marred what might have been a very nice little party. We just can't think of the right word for a G who signs off with a ZL (dead on the same frequency) and *immediately* calls "CQ DX." Even the Greeks didn't have a word for this one. Nor, we suspect, did they have one for the G's who were busy calling ZL1BY on his own frequency while he himself was calling "CQ G" on the very same spot.

Other nice appearances on Eighty have been KZ5DR, who apparently made a WAC within a few hours of his first call on the band, and AP5B, who worked DL1FF at about 1830 GMT with 20 watts. ZS5YF also showed up once more, and we worked him for the second time—on this occasion at 1900 GMT.

G6ZN with his potent 3 watts raised VE1 and W2, 3, 4, all in one morning, W4KFC giving him a report of 469. Fine QRP work, this. Another 3-watter is G3FPQ (Bordon), who has now worked 24 countries on the band—including VE and W. He has also heard ZL, VO, SV, EK and KZ5, and remarks that some of these chaps are so keen on working W's that they are very difficult for G's to get hold of.

G3FXB (Hove) raised his first DX with W1, W3 and VE3. He then encountered a type

calling himself NY4TT (589) purporting to be in the Canal Zone. On being told that the C.Z. prefix was KZ5 this phoney told 'FXB to get a Call Book ! The QSO ended with rude remarks on both sides. Another almost certain phoney is that VK5AL, mentioned last month. RST 578 at 0230 seems fishy, somehow. On the other hand AG2AB—a nice new one—seems genuine. G3AWR (Greenford) heard VK5AS at 1700 GMT (579), which, to our mind, places *him* in the doubtful class too. VK5AS is a well-known op. at Darwin, North Australia, but we suspect the genuine one is using 28 mc phone only. G3FWI (Blackburn) encountered JA2MW and JA2OW—both T6—at 2330 GMT !

G5BZ (Croydon) has worked CT3, EK and TG on the band, but gives no further details.

All the foregoing work, needless to say, has been done on CW. We have no Eighty-Metre phone news this month.

The 14 mc DX

Twenty has been somewhat down on last winter, but still produces the genuine stuff. GM6IZ (Aberdeen) mentions HC1KN, FE8AB, ST2TC and CR4SS. (We suspect the

latter and will refer to him later !). Others from 'IZ were EZ1MS (!), F9QV/Corsica, CR7AD, EA6AF and I1SN/M1.

G3BNE (London, N.W.3) doesn't agree that conditions have been good on the band, but has worked VP6CDI, VQ3SS, GD3UB and VQ8AX for new ones. An OA or HC will give 'BNE his last Zone. G2WW (Penzance) has raised ZD9AA at last ; G5FA (London, N.11) mentions SP5AC and CT3AA "plus the usual bits and pieces." Otherwise no one has anything outstanding to offer, nor have we heard anything of great interest on Twenty this month, with the possible exceptions of ZS7C and CR4AD, 4AE and 4AF. The latter three always appear to be working South Americans late at night, but no one over here seems to be able to raise them.

Phoneys and Suchlike

This "CR4SS" affair, now . . . Quite a few seem to have worked him in good faith, but don't they remember "FM1SS" with his beautiful T1 or T2 note last month? This type said "QRA Alger." Well, now, G3ATU (Roker) says he worked CR4SS and gave him a report of RST 571, which appeared to delight him. A week later the same joker popped up as SU1SS and got another 571, with the additional remark that if he intended to become a permanent pirate, he might try a little smoothing. The reply was silence. 'ATU adds that the most difficult station for *anyone* to work must surely be EA9AI, who seems to send one CQ and disappear ; we agree that we have never yet heard him come back to a soul. 'ATU has also heard KJ6AF again (1800 GMT).

QSL Corner

Last month we asked "Has anyone seen a card from Haiti?" The joke's on us ! G6ZN tells us that G8KP (Wakefield) has six ; G2AVP (Debden) has one from HH2CW ; G3ACC (London, S.E.22) has one ; G6QX (Hornchurch) has one from HH2CW ; G3FWI (Blackburn) has one from HH3DL (acknowledging an SWL report !); and GM3CSM from HH2BL ; but the crowning joke is that we now have one from HH2W on our own wall—and he sent it off without waiting for our card, either. We will now ask "Has anyone ever seen a card from KM6AH ?—in hopes that a similar state of affairs will prevail by next month.

On the subject of cards, G3ATU tells us that he has (in addition to two HH's) cards from HP1BR and HP2X, but complete blanks from YN, ZP, YO and YU (also KM6AH !). Quite a few people are the fortunate recipients of LX cards, but a good many complain about YN and YS. We agree about YN, but we have worked two YS stations (1RA and 2AG) and

TOP BAND LISTING

Starting August 1, 1949

Station	Counties	Countries
G2YS	50	9
G6AB	46	9
G6ZN	45	9
G4LX	45	9
G2LC	44	9
GM2HIK	43	8
G3BTP	41	8
G2HDT	40	8
G5XF	40	6
G3BEX	37	7
G3FZW	37	6
G2ABT	36	6
G3GDW	35	5
G3EJF	33	7
GW3CBY	33	6
G2AJU	31	7
G3ALE/A	28	4
G3ATU	27	6
G3NT	24	4
G3FGT	10	5

they both sent cards off right away. G2CMR (Prestwich) says that the influx of American voices in many parts of the world makes it possible to work some of these rarer countries, but, despite all the atmosphere of good fellowship and the usual fairy-tale promises, no cards emerge.

G2BJY (West Bromwich) also takes a very poor view of some of the DX stations, and says that there are so many who will not QSL unless they receive your card first by air mail that we shall soon reach a state where only the comparatively wealthy can afford to collect QSL's!

We agree with all this, and wish we could see a way out. The main trouble is that a rare DX station makes so many contacts (none of which mean very much to *him*) that *he* simply can't afford to distribute QSL's to all and sundry. Some of them are selective in their methods and will only reply to those who swell their collections of Air Mail Covers; others just don't bother at all. What a pity that the QSL, originally such a good idea, should have turned into something which is neither more nor less than a Racket.

Ten Metres

Returning to G2BJY—he has now made his century on 28 mc, and seems to be the first 25-watter to do so. Nice work! He has not found things good this month, but managed to snag HZ1KE, AP2G, MP4BAO, HC1OY, ZD2S and others. G6BB (London, S.W.2) made a determined onslaught on his 39th Zone and was rewarded by XZ2FK; he is now wondering how to find a VQ8. G2WW raised CT2AE, MP4BAO and W8ZQL/Mobile on 28 mc phone. G2FUU (Hoddesdon) reports for the first time. He uses 20 watts to an 832 with a 3-el. beam, and has found the band very erratic. He is disappointed at the high proportion of fruitless calls made on the band; but his first and only CQ to be answered brought back a VK at 1330 GMT.

G5FA reports plenty of W, VK, ZL, VE4, VS9 and the like but no new ones. G2HIF (Wantage) says the DX is there, but "less of it and more for it," and adds that signal reports are down one or two S points both ways. Apart from the usual DX he has only bagged XZ2GM and 2PM, FF8AH and TF3SF—all on phone.

General Comment

As there's no outstanding 7 mc news this month we won't give it a heading on its own, but let it seep through with the miscellaneous gossip. G3BXN (Kenton) passes on the news from SP1CM that about eight SP's are licensed, the genuine calls being ICM, 1KM, 1SE, 1SJ,

5AP, 5AC, 5SG and 5ZPZ. The 1's are pre-war amateurs, the 5's newcomers.

G2CAWT (Jersey) reports a QSO with VS5SS—QTH given as Oulia, Brunei. Well, we hope it's OK, but see those remarks about

FOUR BAND DX

Station	Countries Worked					Power
	28 mc	14 mc	7 mc	3.5 mc	Total	
G6QB	129	172	74	38	195	150
G3DO	103	158	37	21	188	150
G3ATU	100	173	67	26	181	10/150
G2WW	100	167	45	21	176	150
G2BJY	100	76	24	4	131	25
G2VD	98	161	60	28	168	150
G2HIF	92	42	9	6	106	150(P)
G8QX	73	111	18	12	131	150(P)
G5FA	66	127	93	19	144	35/150
G8IP	65	114	38	13	130	3/150
G3BOC	64	32	24	17	75	50
G3FNJ	63	113	40	21	133	150
G8VB	61	124	49	52	144	120
G8KU	61	131	38	9	143	50/120
G2VJ	55	79	13	4	99	? (P)
G3AKU	47	131	52	29	144	70
ZBIAR	43	94	41	29	106	100
G6BB	41	106	47	22	119	10/70
G3FGT	35	79	33	23	97	25
G2AVP	32	162	55	28	169	25/120
GM6IZ	32	110	2	5	114	100
G8VG	26	107	54	21	122	60/75
G2YS	25	113	27	22	123	150
G6TC	17	80	41	11	92	20/75
G3EIZ	15	39	23	36	54	25
G5WC	12	119	50	1	121	45
GW3C8Y	10	45	27	17	59	15/30
G2HKU	8	93	36	1	102	4/25
G3FXB	8	39	31	19	50	25
G3ACC	6	104	13	21	113	150
G6BS	4	173	106	28	178	150
G2DHV	4	81	21	18	86	25/60

FMISS/CR4SS/SU1SS—and if his note was T1 or T2

GM3FBA (Helensburgh) is active with QRP on four bands, but thinks someone has been "hiring out" his call (without payment) while he was inactive. It seems to have stopped now. He says "Hope some of your remarks on procedure won't be taken badly by the 'three-plus-threes'; I've heard OT's with pretty bad fists and T8 notes." Well, now—have we ever given the impression that we were preaching to the "three-plus-threes"? If so, it was quite unintentional. On many occasions, we have noted some of the worst operating you could ever wish to hear from two-letter calls; the three-plus-threes are no worse (and no better) than the average, and there are an awful lot of them. So on the whole they must be very good! (But *some* of them simply can't send

that figure 3 on a bug; just log all the calls you hear beginning with "GSM" instead of G3). And now we're off to a safe hiding-place. . . .

G5MR (Hythe) worked M1B but has his doubts, as the QTH was given as "Snt Marino." Any offers, please? G5FA has been busy on 7 mc, collecting MD7DC, ZS6UN, 11YAT/Trieste, ZB1AJX, VO, CM, SP, TF, ZL and AK2PI (Padloping Island). This AK call is one of the US Military Network stations, surely, and should have been just *outside* the band. FA also heard FK8AA on 7020 kc.

G2WW has been missing out on Delaware for a long time, so he went on 7 mc and collected W3LML! Others worked on the band were UA9CV, a pair of ZL's, TF5JB and OX3UE. The latter is said to be the most northerly amateur station in the world—in Peary Land, at the northern tip of Greenland. G6BB, also on 7 mc, ferreted out TF5TP, ZB1AJX, KZ5DR, KP4KF, and EA6 and a UF6. G8KU (Scarborough) has been on 7 mc for a change, and worked UA9, UO5, ZB1, FA8, CN8, Trieste and Corsica for new ones.

SHORT WAVE MAGAZINE
FIRST "DOZEN DX" CONTEST
FOR UNITED KINGDOM STATIONS
ONLY

1. The Contest will take place over the six-hour period 2200 Saturday, March 25 to 0100 Sunday, March 26, and 1700 to 2000 Sunday, March 26.

2. Only the 14 mc amateur band shall be used. CW stations to operate between 14000 and 14150 kc, and Telephony stations between 14150 and 14400 kc.

3. Any number of contacts may be made during the six hours of the Contest, but in forwarding the log, only the twelve best contacts are to be claimed. These are to be decided on the "Points Value" figures given on pp. 842-843 of the *Short Wave Magazine* for January, 1950.

4. No DX station may be worked more than once to count for points during the period of the Contest.

5. Each contact chosen for scoring purposes is to be logged as follows: (1) Times of start and finish. (2) Stations Worked. (3) Country. (4) Frequency of Station Worked. (5) Frequency of Own Station. (6) Incoming Report (RST or RS). (7) Outgoing Report (RST or RS). (8) Points Claimed.

6. Contacts may be made on CW or Telephony. CW/Telephony or Telephony/CW contacts may also be counted for scoring purposes.

7. Entries are to be in the Editor's hands by April 4, 1950.

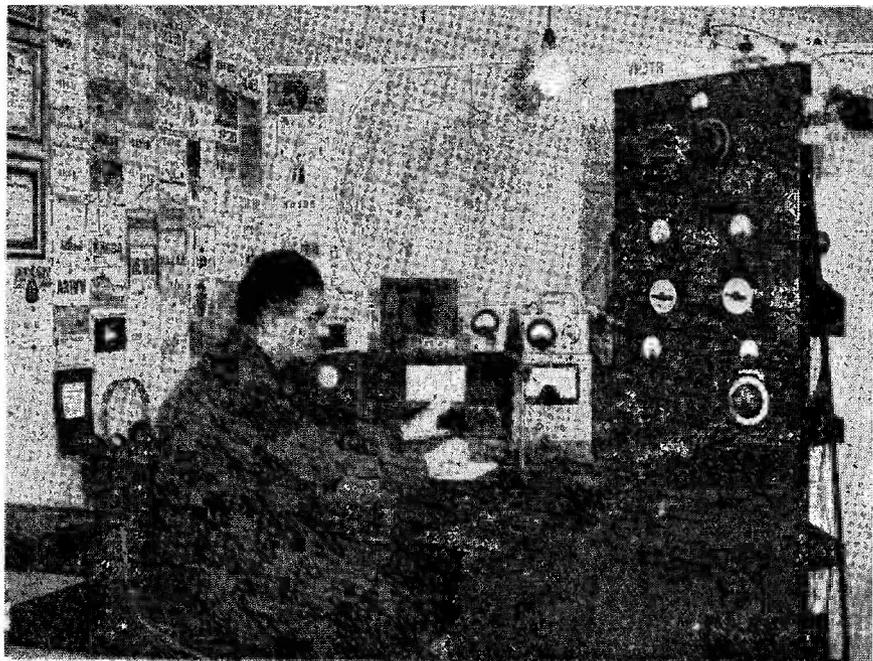
Further details will be given in the March issue.

Behaviour Again

A long letter from GW3ZV (Rhigos) brings up the subject of general ethics where rare DX is concerned. ZV called ZS7C, who came back with "GW3Q?", but was soon edged out of the way by one of the high-powered DX Kings (a W1). This W1 then proceeded to hold the ZS7 for 35 minutes while he went up to 14250 and made sure of a phone contact. Then a lecture on the necessity for two cards—one phone and one CW. Then an offer to make skeds "So as to help the ZS to work some rare DX"; then "listen for my friend so-and-so" And so on *ad nauseam*, by which time the ZS7 had faded out. Yes, we've suffered the same way. It's yet another angle on the way the QSL Racket is spoiling the true amateur spirit. You would think that a chap's livelihood, not to mention the safety of his wife and family, depended upon the dispatch of those precious bits of paper.

On more pleasant subjects, GW3ZV tells us that he is now using two Clapp oscillators back-to-back—one on 8 mc and the other on 4.5 mc. The idea, of course, is that if they can be persuaded to drift by equal amounts, the difference frequency remains constant at 3.5. A further advantage is that with a few 8 mc and 4 mc crystals one can obtain a goodly host of crystal frequencies with relatively few crystals. (How much better all this is than struggling for some wretched QSL!)

And so to the Contest angle. ZV, for one, likes the "Points" idea and is all out for a six hours' session. Lots of others have now pronounced themselves in favour of it—their comments are too numerous to mention at



G3CFK, Great Yarmouth, has a nice outfit and is active on 3.5, 7, 14 and 28 mc. with occasional appearances on the Top Band and on Two Metres. Licensed in July '47, the present Tx is Clapp 6J6 VFO-6SK7, into 6J5-6V6-6L6-807 exciter, with P/P 807's in the PA, and a pair of 807's as modulator. Aerials are a 68-ft. Zepp and a 3-element beam for Ten, with a broad-band pre-amplifier to match the latter into the 640. Both CW and 'phone are worked, and the present score is 126C in 36Z with 47S, qualifying for WAC and DXCC.

length. Several suggest that it should be combined with a *Short Wave Listener* contest, which it will be. We shall have several SWL's keeping their eagle-eyed watch on the bands—to say nothing of your Commentator and a few hired henchmen.

In an accompanying panel you will see the scheme and the very simple rules for the first of our DX Contests, and note the dates now—March 25 and 26. The six hours' stretch has been split into two periods of three hours, so that neither loss of sleep nor TVI need enter into the thing too seriously. You don't even need to operate for the full six hours to stand a reasonable chance of winning. And it's not the least good calling CQ !

Miscellany

Quotation from the DX column in *Journal des 8*, by F8ZW: "My friends, if you do not wish to see the complete disappearance of phone, spend a little time on CW and you will be surprised with the renewed interest you will find in your QSO's. . . We all know that the meagre 50 watts allowed to us by the Post Office do not always allow us to have comfortable contacts. On CW, however, even with

low power, contacts are certainly easier, and in my opinion, more restful." (This a *propos* the fact that the new arrivals, the F9's, are very active on CW but the old-timers seem to take little interest in it.)

G6AT (Hampton Hill) comments on ZD9AA's "lovely note," and remarks "even the Spivs can't zero-beat on him." G6TC (Wolverhampton) is approaching his 100 mark and has been having a good time on 7 mc with VK and all W's except 6 and 7. 'TC, with many others, comments on the incredible 7 mc signal from WIBOR, who runs a kilowatt into a three-element vertical beam.

G3FDV (London, S.E.24) sends in his first report. He has moved up from Dawlish and is QRT at present, but down there he made 1,000 QSO's in just under six months from the time he was first licensed. His best DX, with 25 watts, was FO8AC, HP2RO, CE3DZ, FE8AB, VP6PV, KL7UM, XE1PJ, VU2JP. A great rebuild and an onslaught on TVI precautions are the next items on the agenda.

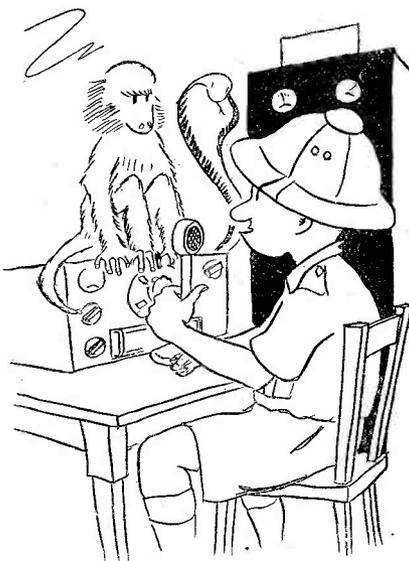
Talking of TVI, Meg of G3ACC is suffering agonies in that direction, apart from her Tx having gone T7, and her Rx having become

temperamental. She remarks "Now that the DXCC is on the wall, the station has decided to fall to pieces." (But she has cards from HH and LX, so why worry?)

Certificates Again

The suggested certificates for working 100 ZL's .100 ZS's, 100 VK's, and so on have called forth little comment (except for derisive remarks from some quarters). But we are faced with quite a solid demand for a "Worked All English Counties" Certificate. It is suggested that for home consumption this should be limited to 1.7 and 3.5 mc, but that it should be widely publicised abroad so as to make G contacts more popular! We agree that it is a Good Idea, but we very much doubt whether it would have the effect of making the DX chase the G's. Some of the W's would doubtless catch on, but who ever has any trouble working *them*, anyway? No, you'd probably be trying to get that ZS9 and find him buried under W's calling "CQ Northumberland." If there's enough demand for it, we will issue such a certificate; but not on the strength of six letters, which is all that we have at present. Will our DX readers please tell us how *they* feel about it?

G2ZF (Bramhall) sends us a grave warning



"... I have some visitors in the shack but I doubt if I can persuade them to speak ..."

**ZONES WORKED LISTING
POST WAR**

Station	Z	C	Station	Z	C
Phone and CW			Phone and CW		
G2FSR	40	200	ZD4AM	35	109
G6QB	40	195	G2AKR	34	116
G3DO	40	188	G3ACC	34	113
G3ATU	40	181	G6QX	34	112
G2WW	40	176	G3FDV	34	100
G2AVP	40	169	G3FGT	33	97
G2VD	40	168	G6TC	32	92
G3AKU	40	144	G2SO	31	93
G3FNJ	40	133	G2DHW	31	86
G8IP	40	130	G2HKU	30	102
G5MR	40	121			
G5FA	39	144	Phone only		
G8KU	39	143	G3DO	37	151
GM3CSM	39	139	G2WW	36	125
ZS2AT	39	138	G6QX	35	131
G3DCU	39	138	G2VJ	34	99
G3CNW	39	130	G2HIF	32	106
G6BB	39	119			
G3BNE	39	116			
G8VB	38	144			
G6WI	38	128			
G3CVG	38	124			
GM6IZ	38	114			
G2BJY	37	131			
G5WC	37	121			
G3BDQ	37	116			
G2YS	36	123			
ZBIAR	36	106			

about the dangers of the competitive, certificate-collecting side of Amateur Radio altogether submerging the more pleasant, friendly aspect of the game. He says "we have long passed the stage where the mere working of DX is technically out of the ordinary. We know that an efficient 20-watter will get anywhere that is open providing the other chap is listening on the frequency and that QRM is not too bad."

Agreed—we *do* know that. But isn't the fascination of DX, nowadays, the attempt to work stations in places that are *not* "open," when we *don't* know the other chap is listening on the frequency and when the QRM is shocking? The meaning of "DX" is completely different these days; the "D" that once stood for "distance" now stands for Difficulty. Working VK or ZL on 14 mc is no longer DX; but on 3.5 mc it *is*—and on 1.7 mc it would be super-DX. And Amateur Radio is full of these keen types who will burn midnight oil, and watts, and give themselves a hangover, just to work a station on a "difficult" band, even if they know they could have a nice leisurely chat with him on the "proper" band.

Let's admit that Amateur Radio is still big enough for the super-keen DX-chasing type and the friendly, leisurely-ragchew operator. If you are getting the most out of your hobby you go in for *both*.

"Points Value"

Not many people have sent in their total score of points, as calculated from last month's table, but, for the record, here are a few: G3ATU, 448; GM3CSM, 265; G5MR, 210; G2BJY, 189; G2HIF, 176; G3ACC, 162; G2HKU, 120; G2DHF, 103. We should be interested to see a few more, but we agree that all that addition is pretty tedious.

Stop Press

A message from ZS5YF, via G5DQ (Cambridge) imparts the following: ZS6DO will be on the air as ZS7A for one week in March, on 14 mc. Look out for him and QSL to 16 Fourth Avenue, Lambton, Germiston, Transvaal.

Conditions were pretty low for the first week-end of the BERU Contest (January 14/15), but it seemed to differ from previous events chiefly by the fact that swarms of VE stations were on the bands. On 28 mc at 1700, when the Contest opened, VE's were giving (and getting) the points; so they were from 1900 until after midnight on 14 and 7 mc, and at 0600 next morning there they were on 3.5 mc, too. VK and ZL activity was not heard to any great extent (because of conditions), but there seems a chance that a VE will come out on top this year.

Forthcoming Events

February 10-12: ARRL Contest, CW.
February 17-19: ARRL Contest, Phone.
March 10-12: ARRL Contest, CW.
March 17-19: ARRL Contest, Phone.
March 25-26: *Magazine* "Points" Contest.

DX QTH's

AK2PI	Cpl. J. D. Jones, 4 AACs Sqdn., APO 677, c/o PM, NYC.
CM9AC	Box 543, Havana, Cuba.
CT3AV	Fernando O. Tavares da Silva, Beco do Chao da Loba 5, Funchal, Madeira.
EA8RB	Manuel Cruz Barrios, Post Box 12, La Laguna, Tenerife.
FF8AH	Box 566, Dakar.
HP1BR	A.R. Rowley, Apartado 883, Panama.
KL7HV	Box 239, Anchorage, Alaska.
MD7DC	G. Howse, Royal Signals Radio Club, c/o APO, Famagusta, Cyprus, MELF 3.
MP4BAO	Box 333, Awali, Bahrein Is., Persian Gulf.
SP's ;	PZK, Box 320, Warsaw.
VO6VB	Goose Airport, Labrador.
ZS9F	Box 4, Victoria Falls, Southern Rhodesia (<i>Station in Bechuanaland</i>).
ZS7A	16 Fourth Avenue, Lambton, Germiston, Transvaal. (<i>Station in Swaziland</i>).

Next month's deadline is regrettably early, being first post on February 8. This is due to the shortage of days in February, and the fact that publication date is March 3. So as soon as you have read this Commentary, sit right down and send in your scores, news and everything for the next one. Address it all to "DX Commentary," *Short Wave Magazine*, 53 Victoria Street, London, S.W.1. For the benefit of overseas readers, closing date for the issue following will be March 14.

Until then, we wish you all the DX that's going. 73 and BCNU.

**'WARE THESE FREQUENCIES**

As is well known by all 1.7 mc operators, we share the Top Band with certain ship-shore services established for the safety of small craft round our coasts. The channels to avoid in the band are 1825 kc (GKZ), 1835 kc (GNF) and 1845 kc (GLV). These are GPO-operated shore stations working CW and 'phone to ships on 1650 and 2012 kc.

**The DX-Chasers Quiz**

In deference to the vogue of the Quiz, we reluctantly present the following, for which we can offer no prizes for correct answers. In fact, we doubt whether there *are* any correct answers.

1. KJ6AB calls "CQ Africa." How many G stations reply?
2. Two G's work duplex 'phone on 3.5 mc—one in the 'phone band and the other on 3502 kc. Which of them would you sooner meet on a dark night near a duck-pond?
3. G5-- always has much stronger signals on the Top Band than G6--. Is this due to (a) a very long aerial (b) a good location, or (c) push-pull 813's?
4. AC4RF calls "CQ DX—QLM." Three stations reply (the others are all calling CQ DX). Which one makes a QSO—the one on his frequency, the one on the band-edge, or the one just outside?
5. G2-- finishes a 'phone QSO three times and then says he is "Overoffanclear." Does this mean he has really finished? Or, if not, what *does* it mean?
6. EA1-- has a T2 note. You call him, with a crystal on his frequency. Is his report to you T9x, T9, T8 or T7?

(Further thrilling instalments from time to time).

L. H. T.

FIRST CLASS OPERATORS' CLUB

EDITORIAL NOTE: *It is just three years since the revived First Class Operators' Club published its statement of policy and first list of members ("Short Wave Magazine," January, 1947). Since then, under the guidance of Capt. A. M. H. Fergus, G2ZC (to whose unswerving enthusiasm the present success of the FOC is very largely due) the membership has expanded both in numbers and by prefix to an extent never expected by the anxious sponsors of the FOC when the first plans for its revival were being discussed towards the end of 1946.*

The Club's fourth year opens with well over 250 members in all parts of the world, a healthy organisation and a sound financial position, the full support of all its members, and high ideals in the practice of Amateur Radio.

In the pursuit of its activities, the First Class Operators' Club will continue to have the full backing and encouragement of this Magazine.

General Notes

Since July, 1949, the Club Circular Letters have gone out punctually within the first few days of each month; but a few members appear not to have been receiving them regularly. An up-to-date address list was posted direct to every member last December and should be used by those forwarding C/L's, as many amendments have been necessary to the address list previously published. Anyone not having received the new membership list, or who



President :

GERALD MARCUSE, G2NM

Hon. Secretary :

Capt. A. M. H. FERGUS, G2ZC

Asst. Hon. Secretary :

J. E. CATT, G5PS

has not been getting the C/L's regularly, is asked to write the Joint Honorary Secretary, J. E. Catt, G5PS, 33 Hempstead Road, Kings Langley, Herts.

Activity

An interesting point about the G3PU/W4NNN QSO on the Top Band—which is of course, a Club record—is that both are members of the FOC and both are QRP stations. (What may also be another "record" is the wedding of G3CTE, FOC, to a lady who holds a ticket in her own right, G3EYO.)

The January, 1950, issue of the *Short Wave Magazine* shows that FOC members have been very active, and these details are extracted from the Achievement Tables: Top Band Listing—1st place taken by G2YS; Four Band DX—2nd and 3rd are G3EIZ and G6QB; Zones Worked—1st, 2nd and 4th places go to G2FSR, G6QB and G3ATU;

Two-Metre Contest—7th, 13th and 15th places taken by G6NB, G2CIW and G8SM. In the "Fourth MCC" G3FAB was third and G2YS fourth. All of which demonstrates that the Club, despite its relatively small numbers, is holding its own on all bands.

On January 8, a brief inter-Club contest was played off on 3.5 mc between teams representing the Tops CW Club and the FOC. Much has been said about the good, clean and friendly operating of both teams, and this first match was much enjoyed.

More and more FOC members are emigrating to the Top Band, which is still hurry-free, spiv-free—yes, and fairly free of QRM—to enjoy those contacts which are such a change from the hurly-burly of the DX bands; plenty of Club QSO's are on offer.

Election Notice

In accordance with the Rules of the First Class Operators' Club, the following are declared elected to active membership:

G. F. Barrett, G8IP (Hampton)

R. J. Boal, G13AXI (Belfast)

W. A. Henson, G3DGG (Cheltenham)

P. J. Naish, G3EIX (Swindon)

N. F. O'Brien, G3LP (Cheltenham)

J. M. Davie, G2XG (Chingford)

All FOC correspondence on matters other than the C/L's (G5PS) should be addressed direct to Capt. A. M. H. Fergus, G2ZC, 89 West Street, Farnham, Surrey.

BACK NUMBERS

It is not economically justifiable to maintain a large stock of back numbers of each issue—in any case, we sell all we can print. But as we have a few copies of some of the more recent

issues, readers who wish to complete their files should enquire of the Circulation Manager for the copies they may be wanting. Send no money until asked, however.

Testing the SSB Transmitter

Adjustment and Setting Up

By H. C. WOODHEAD (G2NX)

HAVING constructed an SSB drive unit according to the previous articles (or, in fact, having constructed any type of SSB driver) it will be found that there is much to be done in the way of testing and line-up to make it work properly. Indeed, it should be appreciated at the outset that in order to produce a satisfactory SSB signal in the aerial, more knowledge and skill will be required than with a comparable DSB signal. Hence, it follows that unless care is taken, the results are likely to be disappointing.

The standard of amateur transmission in this country is on the whole fairly high though there are always the odd few whose quality cannot be attributed entirely to a "carbon mike". An expensive crystal microphone cannot compensate for an overloaded or wrongly terminated audio stage or a limiting PA caused by inadequate power supply and it is fairly safe to say that these failings are more often the culprits than the much maligned "carbon mike". The results of these and other mis-adjustments is going to be even more drastic on SSB than DSB though there is really no excuse for any of it nowadays when there is so much test gear at reasonable prices available from ex-Government sources.

It is a matter for surprise how often one hears the type of QSO which may be characterised as the "How-am-I-doing-now?" Granted that outside tests are the only simple means of checking such points as microphone and aerial performance, there are nevertheless a vast number of common faults which it is quite possible to check locally and which should, in fact, be checked in this way—on a dummy load, if necessary—without ever inflicting them on an already overcrowded band. Among such common faults may be listed hum, distortion in the transmitter, instability in the HF stages and, even worse, instability in the audio stages.

As a further example, how many QSO's do not include a request for a report on percentage modulation? It is not unreasonable to expect that every operator should possess a modulation meter when in these days one can be constructed for the cost of a few shillings, if not from the contents of the junk box. A modulation meter is more important than an

To be able to radiate a worthy SSB signal a good deal of bench work is called for, as the author makes plain in this article. He describes in detail the testing of the driver unit, having regard to the special requirements of SSB operation.—Ed.

HT voltmeter and it is far easier for the operator to measure his own percentage modulation than it is for the receiving station to give a reliable estimate of it:

So, if SSB is to come into the band and add to the general cacophony because of lack of proper testing beforehand, it were better that it had never been taken up by the amateur at all! Therefore, let us make a plea for more time spent in construction and testing at the bench and less hurry to get a signal on the air at all costs; this latter approach has produced some appalling results on CW and 'phone, and it is likely to be fatal on SSB.

In examining once more the special requirements of SSB they appear to come within the following list:

- (1) Carrier of constant frequency.
- (2) Correct filter shape.
- (3) Correct relation of filter shape to carrier frequency.
- (4) Accurate carrier balance in the balanced modulator
- (5) Freedom from distortion in subsequent stages.
- (6) Stability in subsequent stages.

Carrier Stability

Since all the other oscillators are crystals and all are fed from stabilised HT, the most likely cause of frequency change or drift in the final signal will be Oscillator 2 (variable 1.8 to 2.2 mc). One may be sure that sooner or later one will encounter a report of drift, even though it may be located finally in the first oscillator of the receiver at the other end. Therefore, Osc. 2 should be above suspicion or if it is not, at least its vagaries should be known. It is recommended that a day or two should be devoted to checking against a standard wavemeter of some kind (BC221). It should be switched on from cold and its drift measured for a period of five hours and plotted. It is not sufficient to say that it has "no drift", or that the drift is "very small indeed". The first is bound to be untrue and the second too vague. The drift should be measured as accurately as possible, even though it is only a few cycles. The comparison crystal in the wavemeter should have been switched on for several hours before the commencement of the test to enable it to reach a steady temperature.

Filter Alignment

This is not easy and, in the absence of a wobulator, requires a great deal of patience

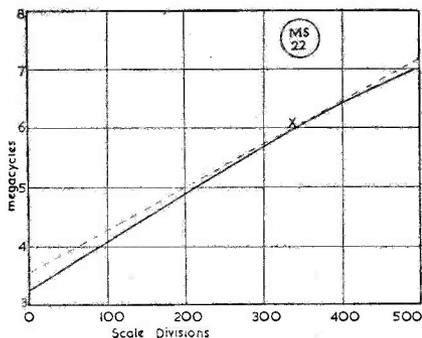


Fig. 1. G2NX's method of obtaining interpolated readings from the main calibration curve.

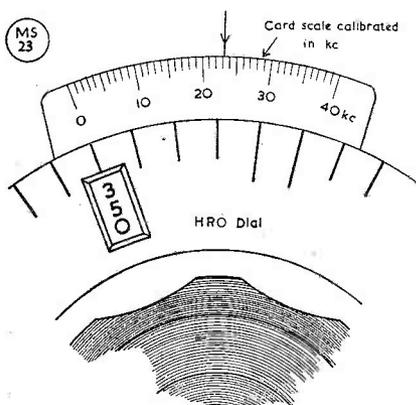


Fig. 2. Calibration card fixed to the main dial.

in plotting curves and making adjustments. The best way to set about it is to remove the crystal from Osc. 1 and inject the carrier frequency into the input of the filter. (See T2 of Fig. 17, p. 428, August issue.)

The output of the filter is measured with a valve voltmeter, or if the signal is too low at this point a preliminary line-up can be made on the rest of the set including the output amplifier and the output from this latter used as the point of measurement. In doing this, however, one must make sure, by taking a load curve (input against output), that the readings one is taking are below the limiting point on any of the intermediate stages, otherwise false results will be obtained from the flattening of the top of the response curves. The balance condenser should be adjusted to give an equal slope on either side of the response curve, each crystal being checked in its holder separately with the other removed.

Now the band of frequencies is so small that it is most unlikely that any signal generator will be found with calibration sufficiently close for accurate setting; but so long as one is

available which has a reasonably smooth-working slow motion dial, the frequency calibration may be carried out on a receiver tuned to the same frequency. To do this it will be necessary to calibrate either the main receiver dial or the BFO frequency adjustment dial in terms of frequency. In the case of the HRO, for example, a calibration figure can be obtained for 5.65 mc from the main calibration curve, as shown in Fig. 1. If a tangent is drawn to the curve at the point X where close calibration is required, the slope of this line can be measured in terms of megacycles-per-scale-division. In the example shown this gives one dial division as being equal to 7.4 kc, or 1.35 divisions for 10 kc.

A separate card scale is made, using a watchmaker's eyeglass for dividing, to conform to this calibration and is fixed to the main scale with adhesive tape as shown in Fig. 2. This scale is, of course, only a difference-scale and not one of absolute frequency. It is

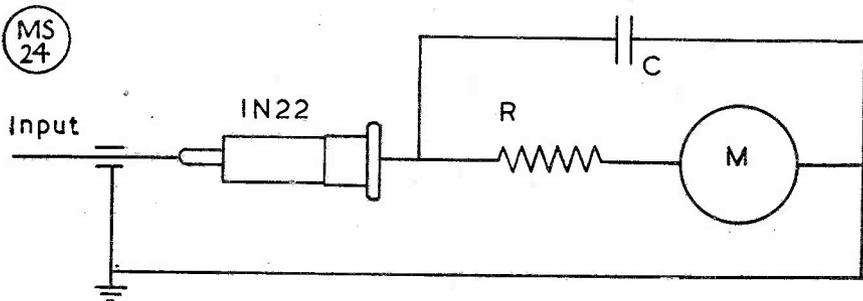


Fig. 3. Circuit of the HF voltmeter, described in the text.

used in conjunction with one of the crystals for reference so that the frequency of the signal generator is related to that of the crystal by the difference reading on the scale. In this way reliable readings can be obtained to an accuracy of about 200 cycles. It is as well to switch on all the units concerned for at least an hour before commencing the tests so as to let the various oscillators reach stability. The reference setting of the crystal should be checked on the scale from time to time to see that there has been no drift. If any drift is observed, it should be corrected on the BFO.

Having lined up the two crystal filters to have identical responses it is as well to plot the shape of the final curve, as given in Fig. 4, which shows sample curves obtained with a 5.655 mc filter. If the curve for exact balance of the phasing condenser is found to be relatively broader than the one shown at Fig. 4a, the number of turns on the secondary of the input transformer and on the primary of the output transformer (*T2* and *T3* of Fig. 17, p. 428, August issue) should be decreased until the desired width is obtained. It has been stated previously that it is difficult to obtain two crystals of exactly the same frequency for two circuits in cascade with response similar to Fig. 4b, but it may be possible to combine two crystals of slightly different frequencies by adjusting one to conform to Fig. 4c (which has a steeper cut-off than Fig. 4b) and using the other to remove the objectionable response to the left of cut-off. The second crystal would have to be adjusted to between Fig. 4a and 4b. The final result is illustrated at Fig. 5.

This final arrangement is a matter for tests and measurement and depends on the crystals available but there are a large number of combinations which can be made to suit and either side band may be selected according to the combination chosen. The first step is to check all the crystals available, relative to one of their number, by comparing the audio beat between them with the output of a calibrated audio oscillator. These difference frequencies can be measured quite accurately even if the absolute frequency is unknown. The SSB filter is the most important part of the whole unit and time spent in perfecting it is time well spent. It is most essential to know the exact performance of this filter in the narrow band in which it is required to work.

In Fig. 3 is shown an HF output meter which may be made up quite cheaply if no valve voltmeter is available. It consists of a crystal diode of the 1N22 type and a 0.1 milliammeter, or 0-100 microammeter if available. The resistance should be adjusted to suit the meter scale and the condenser can be .001 μ F. Using the 1N22, the meter is not

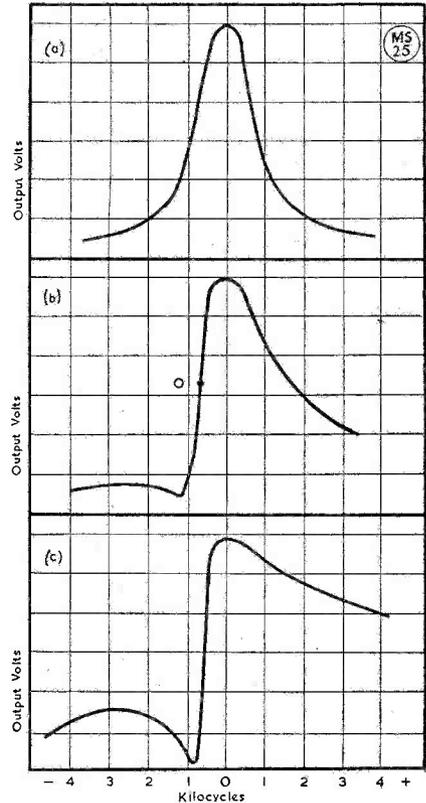


Fig. 4. Sample curves obtained with a 5.65555 mc crystal bridge circuit.

suitable for more than about 2 volts, but with a germanium diode it can be used up to 10 volts and more.

Carrier Setting

The next job, having obtained the required characteristic from the crystal filter, is to set the frequency of the carrier oscillator to the point where the crystal filter will be most effective. This condition will be met when the frequency of the carrier oscillator coincides with a point half-way up the steep side of the response. It is best done by the same method used for checking the filter. With the valve removed from the balanced modulator and the output of a signal generator fed into the test loop position in the filter input transformer, the frequency of the signal generator is adjusted until the reading on the output meter shows that it is at the point 0 in Fig. 4b.

If a suitable crystal is plugged into the carrier oscillator, the difference frequency between it and the signal generator will be heard as an audio note in a receiver tuned to the carrier frequency. This note is adjusted to zero beat by selection of the crystal and by trimming with a parallel condenser of about 50 $\mu\mu\text{F}$ and also parallel inductance, if required. The value of this latter must be found by experiment. During the adjustments it will be necessary to check occasionally that the signal generator is still set to the point 0 to avoid the possibility of drift.

Carrier Balance

Carrier balance is relatively easy to check. With the set working normally, and no audio input to the unit, the R and C components of the balanced modulator are adjusted alternately for minimum reading of carrier on the output meter. This should, in general, be less than one-tenth of the normal output signal reading; the smaller the better. It should be checked occasionally while working to see that the balance does not vary with supply volts or other changing conditions.

During the tests it was found that the circuit of Fig. 6 gave a better balance than the original method of adjusting the dust core for phase balance shown in Fig. 17 of the previous article. (August 1949).

Distortion and Stability

All subsequent stages (and this includes the

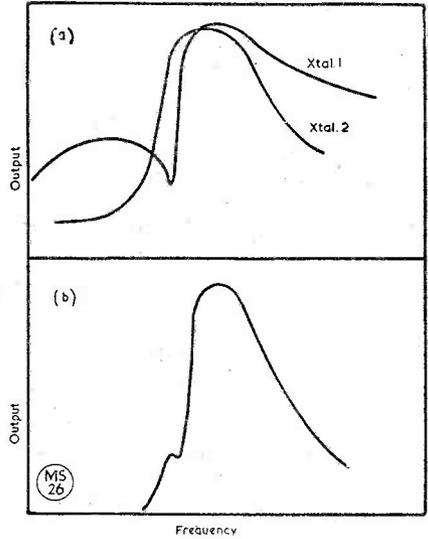


Fig. 5. Showing how two crystals of slightly differing frequencies (a) may be combined as in (b) to produce a steep-sided response suitable for an SSB filter.

PA as well as those in the drive unit) should be tested to make sure that they are not limiting. The amplitude of an audio tone (say, 1,000 cycles) applied to the input, plotted

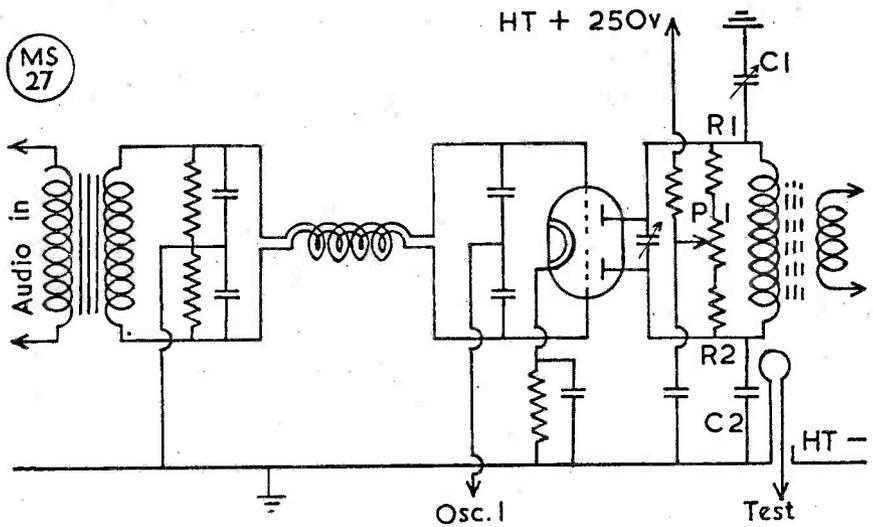


Fig. 6. Some desirable modifications to the balanced modulator stage. R1, R2, 3,000 ohms, 1-watt; P1, 750-ohm w/w potentiometer; C1, 50 $\mu\mu\text{F}$ variable, ceramic; C2, 25 $\mu\mu\text{F}$ ceramic. All other values are as given for Fig. 17 p. 428, August issue *Short Wave Magazine*.

against aerial (or dummy load) current, should give a straight line within the range of output required. Further, when the audio input is reduced to zero there should be no output from any stage due to any tendency to oscillate in the undriven condition. It may be advisable to remove the carrier oscillator crystal for the purpose of this test.

Any tendency to instability should be tackled in the usual manner by first ascertaining the approximate frequency of oscillation. If the frequency is much higher than normal one

must locate the parts of the circuit forming the spurious resonance and either remove them or load them up with resistances. If the oscillation is at or near the normal frequency this is, of course, impossible and the solution lies in reducing the feed-back by substituting a pentode for a triode, better screening or perhaps a limited amount of loading according to the circuit.

The next article to appear will cover the general testing of SSB drives by means of the oscilloscope.

Another Top Band Tx

Built Round TU Type CAY-47155

By C. T. ATKINSON (G2CZ)

THE considerable interest in Top Band Transmitters has induced the writer to offer yet another conversion design, using this time the surplus plug-in tuning unit Type CAY-47155, Range C.

This unit is designed to cover a band of 1,500 to 3,000 kc and the circuit diagram is as shown in Fig. 1.

In all cases the tuned circuits comprise fixed capacities and variable inductances, obtained by a combination of stud switches and small variometers. The points intended

There is still plenty of scope for ingenuity in modifying or adapting ex-Service equipment for the amateur bands. Here is a suggestion for a simple 1.7 mc transmitter utilising a well-built 1,500-3,000 kc tuning unit.—Ed.

for external connections are brought out at the back to six sockets and three large studs, all unmarked.

For present reference purposes these have been designated A-F for the sockets and 1-3 for the studs. Fig. 2 is a rear view of the unit with these markings added.

Circuit

From Fig. 1 it will be seen that the oscillator is in the Colpitts circuit; and in the interests of stability the electron-coupled form using a screen grid valve was adopted.

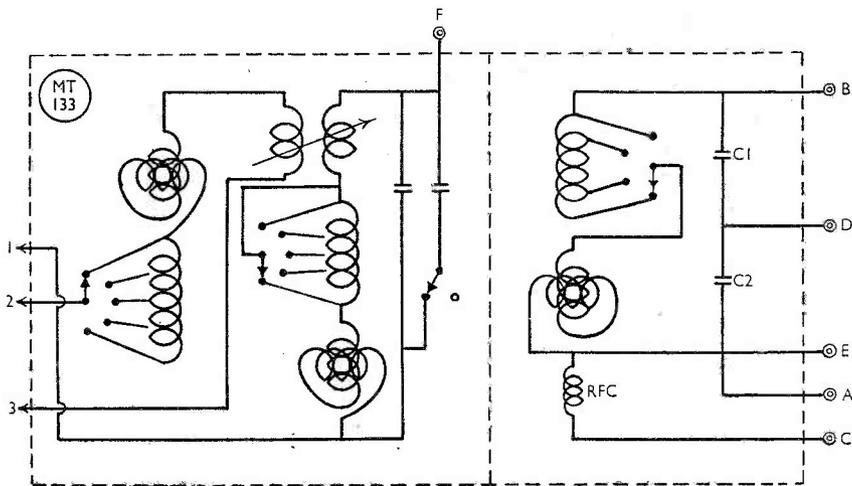


Fig. 1. Circuit of the tuning section of the CAY-47155 Unit. C1 is .000625 μ F, and C2 .00125 μ F.

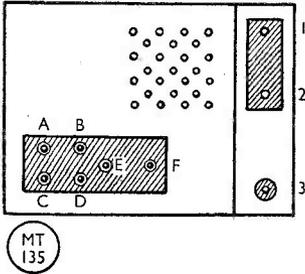


Fig. 2. Rear view of chassis unit, with connector strip (see text).

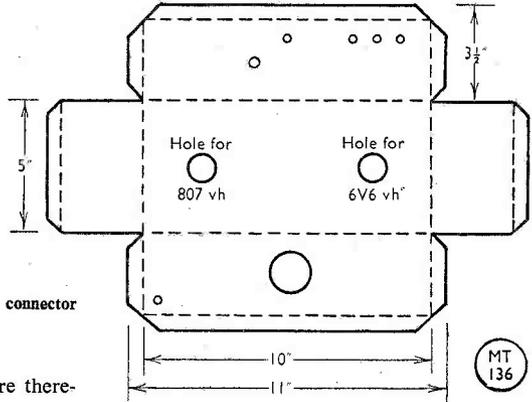


Fig. 3. Drawing detail for the additional mount.

The following slight alterations were therefore made to the unit :

(1) The wire connecting the RF choke to sockets A and E was cut and resoldered to a point connecting it to socket B, also to frame.

This is to enable the correct one of the two condensers to provide the feedback to the oscillator valve, and the existing RF choke to complete the DC path from cathode to negative.

(2) Sockets C and D were connected together by a bridging wire soldered across inside.

(3) A 0.002 μ F condenser was connected

between socket F and frame. This is condenser C in the complete revised circuit diagram, Fig. 5.

There only remains now to make up a small chassis to carry the two valves and their respective condensers and resistances.

Construction

A piece of sheet aluminium 17 in. by 12 in.

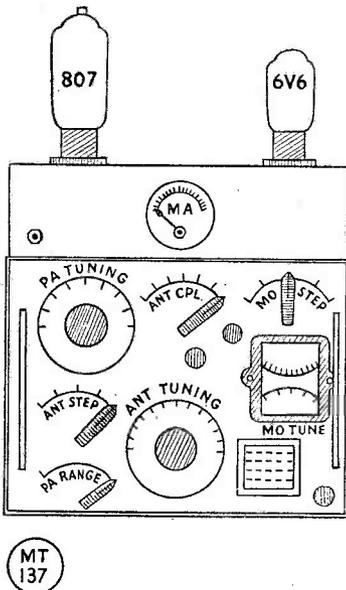


Fig. 4. Sketches suggesting front and rear views of the completed conversion, based on the CAY-47155 foundation.

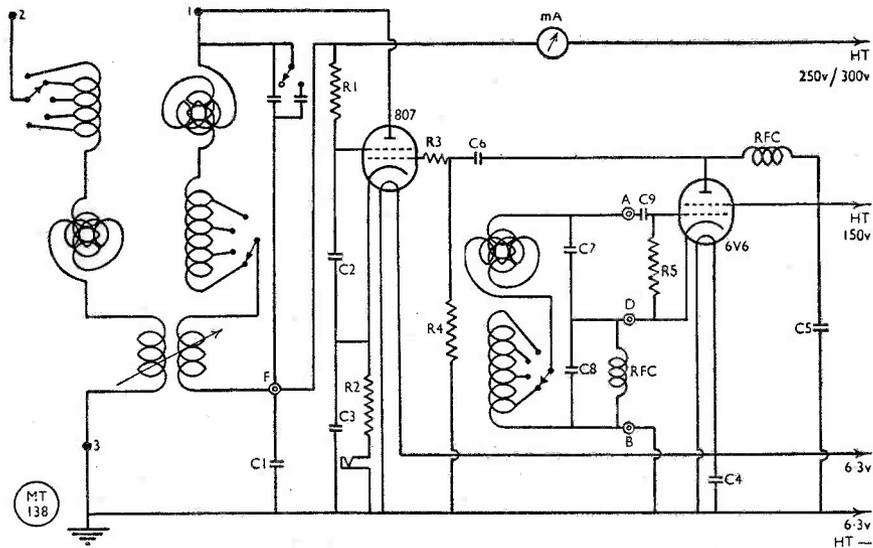


Fig. 5. The circuit complete of G2CZ's Top Band transmitter, as described in the article. In this diagram, C7, C8, are the C1, C2, of Fig. 1.

by 20 gauge was obtained and cut and drilled to Fig. 3, afterwards bending it along the dotted lines and riveting the four corners together.

The two holes in the top take the valveholders while the larger one in the front is for a milliammeter. The smaller one towards the bottom left-hand corner of the front is for the key jack, and there is also a row of four holes along the back, suitably spaced to allow as short connections as possible to drop down to the sockets in the unit underneath. To these they are connected by individual plugs made from brass rod filed down to fit, and slotted.

The chassis stands on top of the tuner unit, as in Fig. 4A, and the back with connections appears something like Fig. 4B. The larger additional hole is furnished with a grommet and through it passes the cable carrying the HT and LT supplies to the valves.

All the small condensers and associated parts are located close to their respective valveholders and where convenient are soldered direct to the actual sockets.

In the writer's case, the PA valve is an 807—not because a valve capable of such a large output is required, but because it is well screened internally, has low inter-electrode capacities and, with well-screened external components, is stable without neutralising.

Quite possibly a 6V6 or 6L6 would serve,

Table of Values

Fig. 5. Circuit complete of the 1.7 mc Transmitter

- C1 = .002 μ F
- C2, C3, C4, C5 = .01 μ F
- C6 = .0005 μ F
- C7 = .00125 μ F (C1 in Fig. 1)
- C8 = .000625 μ F (C2 in Fig. 1)
- C9 = .0002 μ F
- R1 = 20,000 ohms
- R2 = 200 ohms
- R3 = 50-ohm grid stopper
- R4 = 15,000 ohms
- R5 = 100,000 ohms

but these have not so far been tried. The VFO is a 6V6.

There only remains the power supply, which should give about 150 volts stabilised for the VFO and 250 volts for the PA, together with 6.3 volts 1.5 amps for the two heaters. If desired, such a power pack could be built up in a form which would stand beneath the tuner unit, and might also include a simple modulator which could be choke coupled to the PA. As, however, most people will want to use such components as are to hand for this purpose the exact details are left to individual choice. It is quite possible to arrange to operate the unit in its original transit case, but a row of holes or a slot will have to be cut in the back to admit the wires. This method gives a slightly more finished appearance to the set-up and the lid can be put on when not in use to preserve the dials from alteration or damage.

VHF BANDS

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

*New DX Distances on Two—
OH/G5QA and PA/G2BMZ
Results—
Better Conditions but Activity
Low—
Seventy-Centimetre Work in S.
Devon—
Station Reports and Achievement
Tables*

FIRST of all this month, your conductor must express his regrets that much of last "VHF Bands" was delayed in the Christmas post and so failed to reach the Editorial office in time for publication. Sincere apologies go to our Dutch friends for the entire omission of the table containing the results of their entries in the Two-Metre Contest. The large number of competitors in PA was very encouraging and it is hoped that this unfortunate omission—due entirely to the season of the year—will not deter them from entering future contests! The table showing the results of the Netherlands stations is given herewith, together with much of the general news which was missed last time.

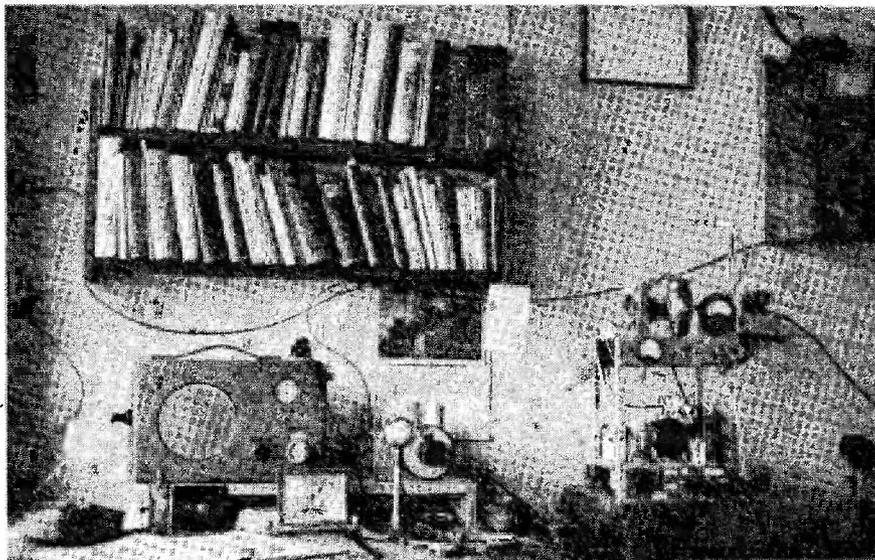
The two highlights this month are items of DX interest. On December 11, at 1935, G5QA (Exeter) heard weak signals which he thought came from OH2OK. He wrote to the Finnish station for confirmation and this has now been received. It has been impossible to pin-point OH2OK on the map but it is known that he is in the vicinity of Helsinki, and the distance from G5QA to Helsinki is 1,275 miles. The longest DX reception on two metres previously claimed was, to the best of your conductor's knowledge, 1,250 miles, so it appears that G5QA has a record to his credit.

The other outstanding achievement was a contact between G2BMZ (Torquay) and PAØEO (Amsterdam) on the morning of January 1. This was certainly an excellent way to start the New Year. It is possible that this contact is also a record. A rough check suggests that it exceeds the G5BY/PAØZQ path by a few miles. Both G2BMZ and G5BY have

been pin-pointed on the map, but until the exact latitude and longitude of the Dutch stations have been received no final decision can be given on the distances. First to receive the PAØEO seems to have been a listener, G. E. Magrow, in Dawlish. He heard an S9 CQ on 'phone at 1100 and was astonished to identify it as coming from PAØEO. As no local stations appeared to be active, G. E. M. telephoned G3AVF (Torquay) who came on the band and endeavoured to make contact, but with no luck, and it was not until 1147 when G2BMZ came up that any progress was made. Even then abortive calls in both directions seem to have been made and only at 1205 did G2BMZ and PAØEO achieve two-way contact. PAØUW was also heard by G. E. M., at 1147, calling G2BMZ.

The cause of this DX was undoubtedly the high pressure system which covered the English Channel and, presumably, produced an excellent duct across Southern England and the sea. Less easily explained is the reception of the 1,275-mile DX heard by G5QA. Like the G6UH/FA8IH achievement and similar long-distance coverages in U.S.A. none of the generally accepted theories of VHF propagation supplies an adequate answer. If the mechanism is a simple reflection at a point midway between Tx and Rx then the geometry of the earth requires the reflecting surface to be at a minimum height of 40 miles for DX of the order of 1,200 miles. Sporadic-E ionisation of great intensity could be the answer here, but such a phenomenon would have affected lower frequencies abnormally and there is no evidence of this. Meteorological soundings do not extend to anything like such a height and so no evidence is available of the existence of temperature inversions and the like in that region of the atmosphere. Even if such inversions did exist the angle of incidence of radio waves at such a height would be far from "grazing" and in consequence the reflected wave extremely weak.

In the troposphere suitable conditions could be produced by an extremely large and extensive duct, but the meteorological evidence is very unfavourable for the dates concerned. W3HZF, writing in *The VHF News* (Illinois, U.S.A.) suggests the explanation may lie in a "happy" combination of circumstances—a bend, here; more bending, there, and so on, in such a way that a transmission path is formed—one, perhaps, in which the loss of only one link would ruin the circuit. Thus, in the case of the FA and OH signals received in this country a half-dozen or so suitably placed small regions of super-refraction may have between them guided the signals over these long paths. Such local irregularities in the atmosphere might well be missed in the ordinary radiosonde recordings.



PAØLU, Voorburg, runs a 6AK5-6J6 converter on 144 mc into the receiver on the left for IF and audio. In the Tx (the two-tier assembly on the right), an 829 is used as PA.

The moon reflection theory now seems unlikely as it is understood that the celestial body was well below the horizon at the times of both the FA and OH reception.

It has been suggested by more than one reader that as these instances of abnormal DX reception are of undoubted scientific interest—as well as being achievements of a high order in the world of Amateur Radio—confirmation of such reception should be obtained in such a way that there can be no doubting its accuracy. G5QA and G6UH are both well-known VHF workers, but the next claimant to honours may be a newcomer to the band or just an unknown listener—and in any case, we do not always know the man at the other end.

With this in mind, it is suggested that the following course could be taken. When you are lucky enough to hear that W, VK or whatever else it may be, send the full details to the *Short Wave Magazine* by the quickest possible means; we will then write to the DX station requesting details of his two-metre transmissions, if any, on that day. A close check can then be made by ourselves, as third party. Your conductor is willing to undertake this checking for any distance over 500 miles.

Power

In the November, 1949, issue of the *Magazine*, in announcing the increased power facilities on Two, the point was made that this

was “a valuable concession which would do much to forward amateur research on the VHF bands.” The following month the criticisms sent by G2ATK and G3ABA were quoted on page 772. Their opinions were based mainly on its unfairness to people with little spare cash, and on their fears that some would now go over the 150-watt mark.

Remarks in this column attributed to readers, as these most definitely were, are not necessarily the opinion of either the Editor or of your conductor. (Last month's Editorial bears on the point discussed here). Our object is to summarise as fairly as possible *all* opinion on such controversial topics! So now here are the views of G3EHY (Banwell), who disagrees with G2ATK and G3ABA on this question of “power.”

He contends that the new power facilities are wholeheartedly welcomed by all those whose aim it is to play a constructive part in two-metre experiments. The higher power may well

VHF CENTURY CLUB

NEW FULL MEMBERS

G3EHY L. Boedo-Yanez (Banwell)

G4DC R. W. Winsford (New Cross)

Total : 67 members

lead to further discoveries being made, especially in the field of propagation. G3EHY has converted his own station from 25 to 120 watts at a total expense of under £3 although this required much searching of surplus stores and considerable "contriving."

But this is one of those subjects in Amateur Radio where there will always be two points of view and having given each side space to state a case, it is not proposed to pursue the matter any further!

Two-Metre Conditions

After the rather poor showing in November, the end of December and early January, brought a marked improvement, and it was a pity so few stations were about to take advantage of the better state of things. The New Year's Day PA contact was, of course, the outstanding event, but signals from the Midlands and North were heard on the South Coast on many occasions, G2IQ being S8 on 'phone in Portsmouth on more than one evening. The early evening has, according to reports, frequently been much superior to late evening for DX working. To what extent TV has been responsible for the low ebb in activity is uncertain, but the tendency for the BBC transmissions to extend their hours in both directions is not making things easier. To go into the shack at 2230 or later is not very attractive on cold winter nights, and instead one tends to spend that odd half-hour before bedtime in the more comfortable position by the sitting-room fire.

Some Station Reports

In Eire, EI2W (Dublin) is active on 144.06 mc. He is, unfortunately, using vertical polarisation and that may make a G/EI contact all the more difficult. However, Lancashire and North Wales stations may care to look for him on Wednesdays, Fridays and Saturdays

from 1930 to 2100 GMT, and also to radiate some calls in the Dublin direction. EI2W will send reports on all signals heard.

PAØE (Amsterdam), who worked G2BMZ, uses three 4-element Yagis, and a 6J6 type converter. The CC transmitter ends in an 829B. PAØLU, at a New Year's party missed the DX of January 1, but says PAØZQ worked F8GH that day, while numerous PA/ON contacts were also made. PAØLU is using 40 watts to an 829 PA. PAØUW (Amsterdam), who was heard in Devon, also uses an 829, with 30 watts and a 4-element beam.

G4HT (Ealing) has worked Derbyshire at last, but still wants Somerset. He hears G3EHY but cannot attract his attention. G6CI (Kenilworth) wants another Contest to rouse the dormant stations. He is rapidly tiring of listening to receiver background noise, but cannot tear himself away. As for more contests, the trouble is that they involve such a lot of work in checking and the compiling of tables that one a year is about the practicable limit! Much of G2XC's inactivity during past weeks has been directly due to the recent Contest.

G6CB (Wimbledon) has become one of the more consistent stations on Two after much work on his beam. He still gets discrepancies between transmitting and receiving and thinks this may be due to local screening—yet exactly how, he is not certain. The standing-wave ratio is extremely low on the feeder, as measured with an *Electronics* SWR meter. The Balun used to connect the coaxial cable to the beam definitely improved matters. G6CB says "with the utmost emphasis" that there is no truth whatever in the allegations made by some operators that it is impossible to obtain more than one QSO with another station, and that once all the local stations have been contacted no more QSO's can be made with them.

TWO-METRE ACTIVITY REPORT

To maintain the usefulness of this section, please set out your list on a separate sheet and exactly as shown below. That is, with call signs in numerical and alphabetical sequence, arranged horizontally, repeating the numeral but not the prefix, and divided into "worked" and "heard" listings. And please print all calls clearly!

G4HT, Ealing, Middlesex.

WORKED: G2AIO, 2AOK/A, 2BMI, 2DSW, 2FJD, 2IQ, 2MQ, 2OI, 2XC, 2XS, 3AHT, 3AQC, 3AUH/A, 3AZI, 3BUN, 3CGQ, 3ENS, 3FAN, 3HAE, 3WW, 4MW, 4NT, 5BD, 5LC, 6BO, 6PR, 6XM, 8SY, 8WV, GW2ADZ.

HEARD: G3CFR, 3EHY, 5UD, 8IL. (November 14 to January 10).

G6CB, Wimbledon, Surrey.

WORKED: G2AHP, 2BN, 2CIW, 2CPL, 2DSW, 2FJD, 2XC, 3AQC, 3BUN, 3CFR, 3CGQ, 3CVO, 3FXG, 3GBO, 3GM,

3HAE, 3EJL, 3QK, 4CG, 4HT, 4MW, 5BC, 5LQ, 5PY, 5TP, 6LL, 6WU, 8KZ, 8LY, 8QC, 8TB.

HEARD: G2IQ, 2UJ, 2QV, 3FAN, 8IL. (December 1 to January 10.)

G8IL, Salisbury, Wilts.

WORKED: G2BMZ, 2CIW, 2QV, 2WI, 3AUS, 3EHY, 3FXG, 4DC, 5BY, 5TP, 6OH, 6XM, 6WT, 8QC, 8SY.

HEARD: G2MV, 3AHT, 3QK, 4CG, 6CB, 8KZ, PAØEO. (December 27 to January 9.)

G6CI, Kenilworth, Warwickshire.

WORKED: G2AOK/A, 2ATK, 2BFT, 3ABA, 3AUH/A, 3AHT, 3BA, 3ENS, 4RK, 5JU, 5ML, 5SK, GW2ADZ.

HEARD: G2IQ, 2XS, 3BKQ, 3BLP, 3DUP, 4HT, 6XM, 8WV (November 15 to January 7.)

G2XC, Portsmouth, Hants.

WORKED: G2BMZ, 2CIW, 2MV, 2NM, 2WJ, 3AZI, 3CFR, 3FAN, 3GBO, 3GSE, 4MW, 5TP, 6CB, 8IL, 8IP, 8LY.

HEARD: G2ATK, 2IQ, 3ENS. (January 4 to 12.)

TWO-METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From fixed QTH only

Worked	Station
43	G3BLP
40	G2AJ(225), G5MA, G5WP
39	G2OI (111)
38	G2IQ, G2NH (212)
37	G3ABA (112)
36	G5BY, G6NB (167)
35	G3APY, G5GX
34	G2XC (210), G3CUJ, G4DC (188), GW2ADZ
33	G3EHY (111)
32	G8WV
31	G2KG (110), G2XS (121), G4LU
30	G4AU (123), G5BM, G4HT (156)
29	G3DMU, G5RP, (114)
28	G2HDY, G5BD, G6VC (102)
27	G3BKQ, G3DAH, G5JU, G8QX, G8SM (106)
26	G2CIW (158), G2RI, G5MI
25	G2AXG, G6PG (109), G6WT
24	G3CGQ, G3VM, G5NF (111)
23	G2CPL (101), G2NM, G3BOB, G8IP (127), G8QY
22	G3WW
21	G3CCP, G6UH (130)
20	G3FD, G8KZ
19	G3EJL, G5ML
18	GM3OL, G6DT
17	G3AUA
16	G8KL
15	G2ANT, G2FLC, G3AKU, G3CWW, G3FLJ, G4RK, G8IL
14	GM3BDA, G3BW, G6LK

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

His experience in recent weeks has been exactly the opposite. He further makes the point that two metres is ideal for local use during TV hours, due to the absence of TVI.

G3EDN/A (Padstow) was active for a week or so in November, but found conditions poor. Now he is hoping to put up a 4-over-4 beam similar to the one in use at G2XC (see *Short Wave Magazine*, December 1949, page 770). The Tx will run at about 70 watts using an 829B, and the converter will employ three 6J6 stages.

G3WW (Wimblington), in common with G3BK (March) is using a 6J6 converter of the G2IQ type and is very satisfied with it. G3BK is about to erect a 4-over-4, having noticed the signal being put out by G4MW with a 3-over-3. Others active in and around Cambridge include G2AIQ, G2FJD, G2XV, G3EDD, and G8SY.

G4RK (Bridgwater) would like to exchange his crystal for 144.9 mc with anyone in Zone J who has a suitable crystal for Somerset. He has put up a 4-element stack to ensure plenty of low angle radiation and is considering adding some parasitic elements to it; his new location does not appear to be too well placed for VHF work. G3EHY (Banwell) comments that the surprising thing about the past month has been the almost consistently good conditions that have prevailed throughout. Lack of interest in the band has limited activity to a few operators but they have sufficed to permit conditions to be assessed.

G8IL (Salisbury) has been consistently active with a 4-over-4 fed similar to your conductor's version. At a height of only 6 ft it gave results superior to a dipole 45 ft high at least in unscreened directions, and stations were worked up to 40 miles. Since raising the beam to 45 ft. in December a number of very good contacts have been made and local signal strengths have increased markedly. For two days at the beginning of January one side of the 300-ohm feeder became disconnected at the change-over relay and during those days G3EJL (Southampton) 18 miles away could hear G8IL's third harmonic on 70 cm. at S5 in spite of an intervening 500-ft. hill. Reconnecting the feeder removed the harmonic! G8IL makes the point that it is very obvious that there is considerable discrepancy between the signal reports given by various stations, and the decibel readings turned up by different receivers would appear to vary considerably.

The receiver at G2BMZ has been improved by the use of two 6AJ5's in push-pull RF with a new input circuit consisting of a series tuned $\frac{1}{4}$ -wave line, the 400-ohm open feeders being tapped about half-way up the line. 6AJ5's have been found much superior to 6AG5's in this circuit.

The only mention of northern activity comes from G6MI (Blackpool) who asks for it to be recorded th. he is still on the band.

Achievement Tables

The Counties Worked tables reappear this month, and this would seem to be a good opportunity to stress once more the need to make all claims for the Tables on sheets of paper separate from the main letter. In order to facilitate the production of the Tables, separate files are kept here with such headings as "General News," "Counties Worked," "Activity Reports," and so on; when a letter arrives with all these topics on the same sheet of paper it is very difficult to allocate it to a file, and as a result claims may be missed when the tables are compiled.

It is hoped to inaugurate the new "Best 20 of the Month" list in the April 1950 issue. List the best 20 DX contacts you make during February together with the mileage involved and add them up. Send the list in with your report for the April issue, *i.e.* by March 15. For this first effort you may only count any particular station once in any period of 7 days. Thus, a station worked on February 3 cannot be counted again for score until February 10. (Comments on this rule are invited). No minimum mileage has been set but may be introduced at a later date if it is found to be desirable.

During the present period of fluctuating levels of activity it is considered misleading to produce an Activity by Counties list. But this Table will be reintroduced just as soon as circumstances warrant it.

SHORT WAVE MAGAZINE Two-Metre Contest NETHERLANDS SECTION

Position	Call	Location	Points	Input	Aerial
1	PAØZQ	Voorburg	21	22	4-ele
2	PAØLU	Voorburg	15	27	4-ele
3	PAØUW	Amsterdam	14	—	—
4	PAØJU	Rotterdam	12	—	5-ele
4	PAØJW	Amsterdam	12	—	—
4	PAØPD	Amsterdam	12	25	4-ele
7	PAØUK	Haarlem	6	—	—
8	PAØKD	Dordrecht	5	15	4-ele
9	PAØPAX	Hilversum	4	—	3-ele
10	PAØJHK	Hague	2	—	—
10	PAØZT	Hague	2	5	Folded dipole

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1949

Starting Figure, 14

Worked	Station
31	G2AJ, G2XC
27	G4HT
26	G2OI, G3ABA
25	G2XS, GW2ADZ
24	G2CIW, G6VC, G6NB
23	G3EHY
20	G3VM, G5UD
19	G3EJL
17	G2CPL
16	G3CGQ
15	G8IL
14	G3CWW, G3DCC

Note: Scoring for this Table is cumulative, and it will run for one year to August 31, 1950.

Seventy Centimetres

G5BY (Bolt Tail) sends news of some interesting activity on 430 mc down in Devon. G2BMZ and G3AVF both of Torquay, have been encouraged to become active on that band and on January 4, G5BY received them both. G2BMZ was heard weakly, but at R5 on 'phone, and RST569 on CW. G3AVF was RST549 CW.

Both the Torquay stations are using triplers, (G2BMZ 832A and G3AVF 832) with 7-element Yagis and open-wire feeders. At G5BY, two aerials were available, a 5-element Yagi and a 24-element array. The latter proved to be 1 to 1½ S-points better. During these tests the 1N23A crystal in the Rx had only a 2½-to-1 ratio. On January 6, a better ratio was obtained and G2BMZ was received at good strength on 'phone. About 0.6 to 0.8 mA injection is obtained from an acorn oscillator and G5BY would like any information that may be available on the various crystals obtainable and what injection is permissible. The acorn oscillator in the Rx gives T9 notes and is operated 8.5 mc on the high side of the incoming signal.

The distance from Torquay to Bolt Tail is 22 miles. G5BY is 400 ft. a.s.l. while the Torquay stations are 200 to 300 ft. and there is high ground at 660 ft. midway. On the Tx side G5BY has his 8012 triplers working at about 30 per cent. efficiency.

In Conclusion

The number of reports received was considerably down this month and little was forthcoming from the Midlands and North. Perhaps the early date for receipt of reports was partly the cause, but with the slight signs of increasing activity during the past few days it is hoped the mail will be heavier next time.

Latest date for next month is February 9, which is about as early in the month as it has ever been, so perhaps you had better start writing that report straight away and address it to E. J. Williams, G2XC, *Short Wave Magazine*, 53 Victoria Street, London, S.W.1. Remember it is February 9, for appearance on March 3.

Parallel-Fed Modulator

Preventing Core Saturation

By D. E. PASFIELD, A.M.Brit.I.R.E.
(G5NH)

FROM time to time, various types of modulators with different output powers have been described. It is not claimed that the modulator discussed here is unorthodox, but it is to some extent original!

It was thought better to deal in detail with the events which led up to the present design rather than describe the modulator itself, as the circuit will be easily followed. A few points, however, are enlarged on at the end of the article.

When licences were reissued, a simple 807 PA was in operation at G5NH, running at about 45 watts input. With the object of increasing this to 150 watts at a later date, 807's in AB2 formed the basis of the modulator, and it was designed to run at the manufacturer's rating of 80 watts output. This was entirely satisfactory for about two years.

Following this, two 807's were adopted as a push-pull PA and rather than use the maximum of 750 volts at 200 mA, a rating of 1,000 volts 150 mA was thought the better. This would not exceed the actual input to the 807's, but the efficiency would be slightly better and, as the anode load would be higher, also, aerial coupling would be easier. It is interesting to note that the same pair of 807's have been operated in this way all through the last 12 months, running at the 1,000-volt rating—and they are the ex-Service VT-60A's. No signs of deterioration have yet set in!

It so happened that the modulation transformer was a correct match for the push-pull PA as it was rated to carry the 80 watts audio, and a maximum secondary current of 200 mA. Thus, it should have been possible to modulate the 150-watt carrier fully.

Modulation Failure

However, reports on all bands showed con-

The essential point of this article is that the author shows that under certain conditions saturation of the core of the modulating transformer can be the cause of modulation failure, or inability. He also indicates how saturation can be avoided by the use of the well-known parallel-feed principle at the output end of the modulator.—Ed.

sistently that full modulation was not taking place, and although verbal reports can be misleading, one or two oscilloscope checks were obtained from time to time. With due regard to fading and receivers, under-modulation was confirmed.

To be absolutely certain an oscilloscope was brought into use at the station, and it was found that 100 per cent modulation was not obtained even on peaks with the audio gain flat out! On further investigation, the anode current of the 807 modulator valves did increase as the gain was increased, but after a certain point on the volume control the RF ammeter did not show any further increase at all, although apparently more power was going into the modulator. The oscilloscope also confirmed this effect.

The early stages of the modulator were suspected, but as the modulator anode current increased with increased input, this was thought unlikely. The driver valves to the 807 grids were, however, tried on a speaker (including the driver transformer) suitably matched. The quality was excellent even with the gain fully open.

Local reports showed that splatter was present across the whole of the band, just like over-modulation, even with the gain control reduced. Since obviously it was *not* over-modulation, another line of thought was necessary.

On reducing the input to 500 volts at 80 mA approximately, all the above effects were absent. Parasitics in the PA were suspected, but it was found that they were in fact non-existent, but neutralising was carried out as a precautionary measure. Still, however, the same conditions existed.

Core Saturation

The only thing left for suspicion was the modulation transformer itself. All the usual

tests applied to any transformer were carried through and no faults were present.

Further investigation with the oscilloscope on sine wave input showed that the tops of the modulated carrier were tending to be flattened. It thus seemed that in spite of the rating of the modulation transformer, saturation was taking place. Some means was then sought of isolating the DC from the secondary of the transformer.

The Cure

The parallel-fed arrangement shown in the modulator circuit was adopted. Following this, local reports of splatter were absent, the bass response was improved, and on sine wave input over 100 per cent. modulation could be obtained with the gain control about two-thirds on. Also the anode current of the 807's in the modulator did not peak to anything like its previous value.

It will be seen from the circuit that virtually no DC is present in the modulation transformer (except on the push-pull side which can be neglected) and thus the core could be smaller as long as it will withstand the peaks of audio without saturation. Also, a modulation transformer already to hand could be used for higher audio outputs by adopting this method of connection.

The splatter was no doubt caused by the peaks becoming almost square topped with the corresponding increase in harmonic distortion.

It will be seen that one end of the modulation transformer is earthed. It could be taken to HT + providing that the smoothing condensers will take the extra AC current produced by the modulator as well as the AC ripple already present. The parallel-fed choke should have an inductance between 10 and 20 henries and be capable of passing the DC to the PA continuously. The choke actually shown in the circuit is a 20-H., 350-mA unit, but obviously a 200-mA choke would be adequate.

It should perhaps be stated here that all the usual tests were applied for HT and screen voltage regulation and so on before the final conclusions were reached, as limiting modulation and distorted speech can easily be caused by poor regulation.

General Design

With reference to the modulator itself, the phase-splitting circuit may be new to some. It is of the "see-saw" or self-balancing type and has the advantage that the gain of one-half of the 6SN7 is obtained and that the cathode is not 100 or so volts positive with respect to the heater. This will not cause hum, as is often the case in the normal type of "split-cathode" phase splitter.

Another point is that although resistance capacity coupling does not reduce second harmonic distortion (this only taking place where a transformer is employed) the fact that each half of the 6SN7 does deliver its own relative peak voltage output (which is in the neighbourhood of 60 volts) means that 120 volts peak will be available for the grids of the following stage. Since this is more than adequate, the valve will be running well within its limits with very little distortion. A point which is often overlooked is that the "split-cathode" phase splitter has a total voltage gain of only 1.8 grid to grid, consequently the input required is considerable higher.

In some designs, a single 6J5 is used to drive the 807 output valves. Assuming the normal 1 : 1 coupling transformer and neglecting transformer losses, from manufacturers' data it will be found that this single valve cannot deliver the peak voltage required, which is 80 volts grid to grid, even at 250 volts maximum HT. In this case, ML6's were chosen in preference to 6J5's as the R_a is lower and thus the regulation of the driver stage will be improved, as well as the voltage-handling capabilities. These valves seem to be easily obtainable from surplus sources.

It will be seen that the SP61 is the only valve fed from the 300-volt line (which is used to supply the screens of the 807's). The 6SN7 and ML6's are tapped off from the main 600-volt supply. This was done quite deliberately in order to have about 200 volts actually on the anode of the 6SN7. The ML6's run at 300 volts on their plates but the bias resistance is made slightly larger in order to keep the anode dissipation within limits. At full output, these valves may run slightly into AB1, but as this occurs only on heavy peaks of audio, they are virtually in Class-A.

It has been found that by adopting this method of HT feed the distortion is extremely low.

It is strongly recommended that R8 to R16 be of the 5 per cent. tolerance maximum and preferably of the 1 per cent. A lot of unnecessary work was caused by having to measure innumerable commercial resistances supposed to be of the same value but anything up to 30 per cent. off rating! Unbalance, increase in harmonic distortion, and a loss of the lower frequencies can be caused by having widely differing values of resistance in grid and anode circuits. Since the lower frequencies do not contribute to side-band splash, the writer prefers to have body in the speech and does not think that an excessively "toppy" transmission gets DX!

Conclusion

The usual precautions should be taken with

NEW QTH's

This space is available for the publication of the addresses of all holders of new call signs, 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.

- DL2PD** J. S. Chandler (*ex-DL2LM*), c/o 11 Ash Road, Sallit, Birmingham, 8, Warks.
- G2TJ** T. P. Auzeas, 33 Fairfield Drive, Perivale, Middlesex.
- G3BVP** E. R. Taylor (*ex-D2CR*), 12 Marton Avenue, Didsbury, Manchester, 20.
- G3DCK** J. A. Smith, 56 County Road North, Hull.
- GW3DFB** J. Fikrlé, 100 Colcot Road, Barry, Glam.
- G3DUZ** B. Froggatt, 18 Smithy Moor Avenue, Stocksbridge, nr. Sheffield, Yorks.
- GM3DYC** A. N. Davidson, 990 Argyle Street, Glasgow, C.3.
- GI3DZE** Ballymena and District Radio Club, 26 Ballymoney Street, Ballymena, Co. Antrim.
- G3EBM** J. K. Carter, 74 Connaught Gardens, Palmers Green, London, N.13.
- G3EEZ** A. Wakeman, 11 Cousins Street, Wolverhampton, Staffs.
- G3EFK** W. T. Clegg (*Z56VJ*), 16 Campden Road, South Croydon, Surrey.
- G3EGF** T. Kellett, Aysarth, Lyndhurst Crescent, Gateshead, 9, Co. Durham.
- G3EOF** T. Gander, 2 Station Road, Cottesbrook, Northampton.
- G3FAT** K. W. Bullock, 10 Kenilworth Avenue, Prestwich, Manchester.
- GI3FFF** Ballymena and District Radio Club, 26 Ballymoney Street, Ballymena, Co. Antrim.
- G3FGF** R. E. Murphy, 22 Albert Street, Windsor, Berks.
- G3FJU** R. G. Crowther, 236 Westwood Lane, Welling, Kent.
- G3EJY** M. A. Pollard, 15 St. Margarets Road, Oxford.
- G3FLO** R. N. Lake, 10 Larkman Lane, Norwich, Norfolk.
- G3FMR** T. Dwyer, 6 Royal Avenue, Chelsea, London, S.W.3.
- G3FRF** W. C. King, 70 Rasper Court, Clapham Road, London, S.W.9.
- G3FTU** J. R. Jones, Jesmond, Hartley Park View, Pontefract, Yorks.
- G3FVH** W. R. Ohlsen, 22 National Avenue, Hull, Yorks. (*Tel. : Hull 10271*).
- G3FVN** R. Machin, Roseleigh, New Road, Barlborough, Chesterfield, Derbyshire.
- G3FWP** K. W. Keenan, 7A Linaker Street, Southport, Lancs.
- G3FXD** F. H. Simkiss, 14 Uffculme Road, Stirchley, Birmingham.
- G3FXS** F. C. Simkiss, 14 Uffculme Road, Stirchley, Birmingham.
- G3FYV** H. G. Gosling, The Bungalow, Walton-le-Wolds, Loughborough, Leics.
- G3FYZ** G. Williamson, 351 Whitesate Drive, Marton, Blackpool, Lancs. (*Tel. : Marton 0819*).
- G3FZW** E. A. Matthews, Gartmore, Hammerwich, Lichfield, Staffs.
- G3GAG** W. Eckerstey, 25 Meanley Road, Gin-pit, Astley, Manchester, Lancs.
- GI3GAL** S. H. Foster, 31 Belmont Park, Belfast.
- G3GBA** B. H. Adams, Clock House, Hayes Wood, Pembury, Kent. (*Tel. : Pembury 297*).
- G3GBT** S. Wood, 21 Hulme Road, Heaton Chapel, Stockport, Cheshire.
- G3GCZ** Rev. F. C. Dorken, B.D., 211 Manchester Road, Walmersley, Bury, Lancs.
- G3GDB** G. A. Bird, 118 Woodpecker Road, New Cross, London, S.E.14.
- G3GDC** T. W. Savage, 34 Pound Avenue, Stevenage, Herts.
- G3GDG** R. P. Towell, 6 Clinton Avenue, East Molesey, Surrey.
- G3GDJ** R. B. Wilson, 9 Hereford Road, Derby.
- GM3GDS** W. J. Graham, Main Street, Douglas Lanark, Scotland. (*Tel. : Douglas, Lanark, 237*).
- G3GDT** Ariel Radio Club, BBC European Service, Bush House, Aldwych, London, W.C.2.
- GM3GDX** W. M. Hamilton, 99 Clydesdale Street, New Stevenston, Motherwell, Lanarks.
- G3GEB** C. H. Ern, 98 Wetheral Drive, Stanmore, Middlesex.
- G3GEH** W. G. Dyer, 188 Gunnersbury Avenue, Acton, London, W.3. (*Tel. : Acorn 3778*).
- G3GEJ** L. M. Airey, 444 North Road, Darlington, Co. Durham.
- G3GEU** E. H. Hildreth, 17 Peebles Avenue, West Hartlepool, Co. Durham.
- G3GFD** D. Skirrow, 13 Thornbury Grove, Bradford Moor, Bradford, Yorks.
- G3GFF** J. D. Spittle, 68 Capel Gardens, Pinner, Middlesex.
- G3GSE** C. W. Leftwich, 119 Church Lane, Kingsbury, London, N.W.9.
- G3GW/A** F. H. Lane, c/o Sgts' Mess, R.A.F. Station, Swingate, Dover.
- G3HOL** R. G. Holl, 76 Humber Road, Stoke, Coventry, Warks.
- G4SC** D. G. Scott, 5 Wood End Lane, Kempston, Beds. (*Tel. : Kempston 3249*).
- G5BT/A** C. W. Crook, 8 Clayton Avenue, Culcheth, Lancs. (*Tel. : Culcheth 3275*).
- G5MI** N. Norman, Chantry Grove, Hadleigh Road, Sproyington, nr. Ipswich, Suffolk.
- G5UK** M. B. Buckwell, Riverview, Undercliff Gardens, Leigh-on-Sea.
- G5YM** H. J. Edwards, 52 Godalming Avenue, Wallington, Surrey.
- G6QM** A. J. Mathews, 26 Hillfield Avenue, Hornsey, London, N.8.
- CHANGE OF ADDRESS**
- G2AIM** C. E. Clarke, 64 Cecil Park, Pinner, Middlesex.
- G2BJW** R. A. Lucas, 38 Junction Road, Gillingham, Kent.
- GM2CHN** D. Niven, 31 Glover Street, Arbroath, Angus.
- G2FST** T. Almond, 48 Kinsale Road, Knowle, Bristol, 4.
- G2HCZ** E. S. G. Fish, 107 Eton Road, Ilford, Essex.
- G3AAE** J. D. Kay, 68 Upton Road, Slough, Bucks.
- G3AFF** R. Short, 76 Roman Grove, Portchester, Hants.
- G3AGZ** S/Ldr. R. A. Evenett, A.M.Brit.I.R.E. (*ex-ZE2J1*), 231 Albert Road, London, N.22.
- G3ANJ** A. J. Wall, 12 Lanchester Road, Kings Norton, Birmingham, 30.
- G3FPR** K. A. Eaton, Basement Flat, 44 St. Mildreds Road, Ramsgate, Kent.
- G5VS** V. A. Sims, The Lodge, Hedsor View, Maidenhead Court, Maidenhead, Berks.
- G5WW** P. M. Carment, Assoc.Brit.I.R.E., Weybrooks, Medmenham, nr. Marlow, Bucks.
- G8PG** A. D. Taylor, 37 Pickerill Road, Greasby, Cheshire.
- CORRECTION**
- G3HA** H. Crowther, 22 Mandale Road, Horton Bank Top, Bradford, Yorks.
- G5QQ** Benton Radio Club, Hon. Sec. : D. King, 60 Haw Lane, Yeadon, nr. Leeds, Yorks.

Here and There

The Next R.A.E.

This year's Radio Amateurs' Examination is to be held on May 10 next, and entries are required by March 1. Intending candidates should apply through their local Technical College (or the Education Authority), as the Examination is under the control of the City and Guilds of London Institute, and is held at local centres all over the country. Details respecting exemption qualifications (either for the R.A.E. itself or the Morse Test) are contained in Form E-in-C 428, obtainable from the Office of the Engineer-in-Chief, Radio Branch W5/5, G.P.O., London, E.C.1.

To assist those who will be sitting the forthcoming Examination, we shall be dealing in detail with the questions set for the last R.A.E. in our *Short Wave Listener*; the current (February) issue contains the first of the series of answers. Copies are available at 1s. 4d., post free, from the Circulation Manager, Short Wave Magazine, Ltd.

Change of Address

The expansion of our business requiring increased office accommodation, we are now to be found on the ground floor at 53 Victoria Street, Westminster, London, S.W.1, two doors along from No. 49. The telephone number remains ABBey 2384 (three lines). All correspondence should henceforth be directed to this address.

Berry's Catalogue

A comprehensive and well-illustrated Radio and Electronic Parts Catalogue is now being issued, price 6d., by the old-established concern of Berry's (Short Wave), Ltd., 25 High Holborn, London, W.C.1. They do a large business not only with amateurs at home and abroad, but also with Government departments and the big radio and industrial concerns. An interesting order recently was that for 40 special Tx/Rx units for operation in the Falklands, in connection with the new season's programme of survey and exploration work.

New QTH Note

The winter 1949-50 issue of the *Radio Amateur Call Book* is now being distributed. The British section contains all addresses appearing in our "New QTH" feature up to and including the listing for November last.

The necessary additions, corrections and amendments—based on information gathered by us—have already been sent in to the publishers for revision of the next quarter's *Call Book* (Spring 1950).

Eric Spencer, G4HV

It is with the deepest regret that we have to announce the death on December 30 last of Eric Spencer, G4HV, principal of Odeon Radio, at the early age of 40. He had been in poor health for a long time with a severe internal complaint, and had spent the last twelve months of his life in bed. On the air from his bedside, and game to the end, he had his final QSO on December 18 with VK2AP.

Index, Vol. VII

The next issue of the *Short Wave Magazine* (March, 1950) will be No. 1 of Vol. VIII, and will contain a complete Index to the series of twelve issues concluded with the present month. As in previous years, the Index itself will be a loose supplement for binding in with Vol. VII.

Correction

In our January issue, the Speda Products advertisement on p. 870 contained a serious printing error, for which we offer our apologies to all concerned. The address should be Grimsby, and not as given. In order to minimise the effects of this as far as possible, the postal authorities were informed and asked to forward mail to the correct address.

TVI—and the Public

We were very interested to see the copy of a letter on the subject of TVI circulated to the local press by the Committee of the Worthing and District Amateur Radio Club. It was duly published by two papers and explained very clearly the relationship between the public, the 18 or so amateur transmitters in the Worthing area, and the G.P.O. Pointing out that amateur operation is very strictly controlled and that amateurs are reasonable beings who have no wish to interfere with their neighbours' reception, the statement makes it clear that the right course is always to ask for G.P.O. assistance where there seems be ground for complaint.

THE MONTH WITH THE CLUBS

FROM REPORTS

From this month's reports it is evident that whereas some Clubs take MCC in their stride as "just another Club activity," others suffer considerable disorganisation as a result of the Contest. This should prove something or other, but we don't quite know what—unless perchance it is that a well-organised Club is prepared for activity on the air and can cope with it without becoming too breathless!

This month we reproduce reports from a total of 35 Clubs. Some of these reports were sent in for the January issue, from which they had to be held out to make room for the Contest story. The movement as a whole is obviously in a fine healthy state, and most Clubs flourishing, but we should like to see a few more original ideas introduced into meetings. So many do not seem to penetrate outside the closed circuit of Junk Sales, Brains Trusts and Talks. Let us hear from any individual members who have Bright Ideas, and we will put them at the disposal of the Clubs as a whole.

Next month's deadline is the earliest ever—February 7. This is necessitated by the fact that the short month brings the March issue out on the 3rd of that month. Please get those reports in as soon as you read this, and forward them to Club Secretary, *Short Wave Magazine*, 53 Victoria Street, London, S.W.1.

And so to the reports

Lincoln Short Wave Club.—This Club held its first Annual Dinner in December, and reports a huge success. At the AGM, later in the month, the Chairman, Treasurer and Secretary were re-elected. A Club Net operates on 7200 kc at 1000 every Sunday; any active amateurs in the neighbourhood are invited to join in. It is hoped, during the coming year, to devote more activity to "Short Wave" matters, as suggested by the Club's title.

Grafton Radio Society.—We are told by the Secretary that every member of Grafton did a turn on watch during the recent MCC event, and every assistant operator admits to learning much from the experience. The Club consider this the most important aspect of the Contest. Meetings continue, every Monday, Wednesday and Friday at 7.30 p.m.

City of Belfast YMCA Radio Club.—The AGM was held recently, and a full programme

has been arranged for the coming season. The Belfast YMCA celebrates its centenary this year, and the Radio Club's claim to be the oldest in the British Isles has never been challenged. A class for the R.A.E. has already been started, a practical class is under way and Morse instruction is given on Tuesdays at 8 p.m. For February 18, a visit has been arranged to the Control Room, Belfast Airport.

Catterick Amateur Radio Club.—This Club is, for the moment, QRT, the licence-holder having been posted! But it is hoped that G3C10 will be back on the air shortly. Recent lectures have covered CRO's, 420 mc, Amateur TV Transmissions and "The 10 Set." During January, a visit was paid to the BBC at Moor-side Edge.

Eastbourne & District Radio Society.—Meetings continue at The Friends' Meeting House, Wish Road, 7.30 p.m.

on the first Friday in the month. At a recent meeting the members heard an interesting lecture on the 16-mm Projector and Sound Equipment, given by Mr. Pratt, of Burville Industries, Eastbourne.

ECCLES, LANCs AND DISTRICT

It is hoped to form a Club in the Eccles district, and all who might be interested are asked to get in touch with Mr. Sidney Watkin, 6 Stanley Avenue, Eccles, Lancs. A club-room has already been offered; all it needs now is the members to fill it!

Enfield Radio Society.—This Club has now taken over new premises at St. James Hall, Durants Road, Ponders End, where meetings are held every Monday at 7 p.m. Facilities are available for constructional work, and new members interested in radio and television will be welcomed.

Exeter & District Radio Society.—The winter session is going nicely, with lectures on D-F, Radiolympia, Apparatus Design, Television, The W/T Act and FM. The Mullard film - strip on "Valves" has also been shown. A club newsletter is circulated, and meetings are on Thursdays at 7 p.m.

Forfar & District Amateur Radio Club.—Readers are asked to note the corrected address of the Club Secretary, in the usual panel. The Club's own address is now 168 East High Street, Forfar.

Lewes Amateur Radio Club.—Welcome to this newly-formed Club, which meets every Friday at 7.30 p.m. in the Southover Grange. While there seems to be a shortage of licensed amateurs in the district there is no lack of

"potentials," judging by the attendances at recent meetings. New members will be welcomed any Friday at the Grange.

Midland Amateur Radio Society.—The festive gathering just before Christmas was highly successful and many members journeyed great distances to attend. Another meeting was held on January 17, at the Imperial Hotel, Birmingham.

Newbury & District Amateur Radio Society.—This newly-formed Club held its third meeting in December. Although its strength was then only 10 members, a vigorous publicity drive was being launched, and it is hoped that this will have borne fruit by now. We look forward to hearing that the Club is flourishing.

DEPTFORD AND DISTRICT

Although no Club exists as such, we have been asked to state that Radio Classes are being held every Wednesday and Thursday, 7.45 p.m., at Deptford Men's Institute, Childeric Road School, New Cross, S.E.14. They cover the Fundamentals of Radio, and Morse instruction is also given.

Romford & District Amateur Radio Society.—The 1950 officers were elected at the AGM, and the year's activities reviewed by the Chairman. The future programme was also discussed and it is intended to send a monthly newsletter to members. An R107 receiver is being purchased, and this will be used both as the station receiver and for D-F Contests. New members will be heartily welcomed by the Hon. Sec.—QTH in panel.

Slade Radio Society.—Future officers are as follows:—February 3, Exhibition of Members' Television Receivers. February 17, a talk on Television Components for the Home Constructor. February 18, visit to Police Radio Headquarters, 3 p.m.

All meetings are held on alternate Fridays, 7.45 p.m.

Stourbridge & District Amateur Radio Society.—At the December meeting G2AU gave an interesting and instructive talk on TVI. A good attendance was recorded, and members picked up some useful hints on the prevention of interference. In January, G2RQ lectured on the Clapp VFO. The Society is holding a competition for two Trophies awarded by the President and is entering gear in a Hobbies exhibition. Meetings are on the first Tuesday and third Friday of the month.

Thames Valley Amateur Radio Transmitters' Society.—A highly successful Dinner, Cabaret and Dance were held in December, and the Club's success in NFD was duly celebrated. Prizes in the draw amounted to a value of about £100. On January 4, the AGM was held, the year's activities reviewed and the Balance Sheet passed. The new Committee was voted into office. G5LC is President and G3HAE Secretary.

Wanstead & Woodford Radio Society.—This Club has not much to report, but the Secretary remarks that they would like to see some of their old members more often. They continue to meet at Wanstead House on Tuesdays.

Wessex Radio Society.—Yet another newcomer, recently formed and meeting fortnightly with some 10 members. Talks have been planned, also visits to local BBC stations and a Field Day. Membership is open to all, and it will be the Club's policy to encourage the novices and to help them through the R.A.E.

Whittington Radio Club.—And welcome to yet another new one! Meetings are held every Wednesday, 7 p.m., in the Angel Club Room, South Street, New Whittington, Chesterfield. See panel for Secretary's QTH.

Worthing & District Amateur Radio Club.—This Club continues to flourish, judging by "Ragchew," its official

journal. The February meeting will be on the 13th at the Adult Education Centre, Union Place, at which there will be a talk on Meters and Test Equipment. On March 13, the Regional Radio Officer of the GPO will talk on TVI, and it is hoped that the April meeting will take the form of a social evening.

GATESHEAD AND DISTRICT

A small group in Gateshead are endeavouring to form a Club, and all persons interested are asked to get into touch with G3EGF, Aysgarth, Lyndhurst Crescent, Low Fell, Gateshead 9, or with G3DJJ, 109 Brighton Road, Gateshead 8.

Brighton & District Radio Club.—The AGM in January, was well attended. Past activities were reviewed and plans made for the future. Two talks and demonstrations of sound recording were given. The January programme included talks on Radio Servicing, Radio Control of Models, and a discourse by the Hon. Sec. on "Cats Whiskers and All That."

Nottingham Short Wave Club.—Meetings are held every Monday, 7.30 p.m. at The Old Boys Club, Middle Street, Beeston. A good programme of lectures has been drawn up, and the Club Tx transmits slow Morse every Thursday, 1.9 mc, from 2000-2030.

Cheltenham Amateur Radio Society.—This Club took part in a Hobbies Exhibition sponsored by Cheltenham Corporation, and operated a transmitter on the Club stand. The Mayor of Cheltenham spoke over the transmitter and exchanged greetings with stations in Belgium and the Isle of Man.

Berwick-on-Tweed Radio Society.—This Club is flourishing, and attendance at the January meeting was 27. The members are investigating "flutter" on 28 mc, with a



Part of the Sutton & Cheam Radio Society's stand at a recent exhibition locally. G4DH/A was operated on 1.7 and 3.5 mc, and in this picture G2AYC (president, Sutton & Cheam) is at the microphone. Some very fine home-built equipment was on view and the Society's stand was a centre of constant public interest.

view to proving, or disproving, a suggestion that gales are preceded by fluttering signals on that band.

Edinburgh—Lothians Radio Society.—The fortnightly meetings continue, at 25 Charlotte Square, the next date being February 16, at 7.30. The change to Thursdays will be permanent. At recent meetings talks were given by GM3BQO (Conversion of RFU24 for 10 metres) and K. Senior (Conversion of SCR522 for 2 metres). New members will be heartily welcomed.

Wirral Amateur Radio Society.—The recent Constructional Contest was a great success. The judges (G6OM, G8NL and G2OA) complimented members on the high standard of workmanship. Winner was G3ELR (Low-Power Aerial Tuning Unit), second G2AMV (VFO), third G3DLF (CRO). February meetings will be on

the 8th and 22nd, both at YMCA, Whetstone Lane, Birkenhead, at 7.30.

Swindon & District Short Wave Society.—Meetings have been erratic owing to the lack of a permanent clubroom, but they are now being held on the first Saturday, 7.30 p.m., at the Connaught Cafe, Cromwell Street, Swindon.

Chester & District Amateur Radio Society.—Recent meetings have dealt with CRO's, Junk Sales, Festive Evenings and the official opening of the new HQ by the President. Forthcoming events will be lectures, films, a receiving contest, Morse classes and the Annual Dinner. Meetings are held every Tuesday, 7.30 p.m., at the Tarran Hut, YMCA Grounds, Chester.

Coventry Amateur Radio Society.—At the December meeting G2FTK gave a talk on the Amateur Radio Exhibition; a Dance and Social was

held at Christmas; and the first January assembly heard G2LU on "Working DX." On January 16, a lecture and demonstration on Television Aerials was given by a member of a local firm.

West Somerset Radio Society.—This Club unfortunately had to cancel its MCC entry owing to the illness of the Hon. Sec. He is well again, we are glad to report, and the club is holding its AGM late in January. Several members are getting good TV signals from Sutton Coldfield, and membership is increasing because of support from Taunton and district. Still more members from this direction are hoped for.

West Kent Radio Society.—This Club is anxious to contact more potential members in the region of Tunbridge Wells, Tonbridge, Sevenoaks and Crowborough. It meets on the second and fourth Wednesdays at Culverden House, Culverden Park Road,

Tunbridge Wells, where a cordial welcome awaits anyone interested in radio.

West Middlesex Amateur Radio Club.—This Club flourishes, and meetings have been devoted to lectures and to an amusing and profitable Junk Sale. Future plans include talks on Amateur Receivers and Multivibrators. Meetings are on the second and fourth Wednesdays at the Labour Hall, Uxbridge Road, Southall.

Clifton Amateur Radio Society.—This Club now has its own call (G3GHN) and will be on the air shortly (Top Band and 3.5 mc) for contacts with amateurs and other Clubs on

Friday evenings. The Christmas Hamfest was a great success, and the "Club Champion," Mr. D. W. Bruce, was presented with a miniature cup for 1949.

Neath, Port Talbot & District Amateur Radio Club.—Activity continues on an increasing scale, twelve new members having been enrolled in the past few months. At the January meeting GW3XY gave a talk to beginners on Radio Fundamentals. Slow Morse practices continue to be well supported.

Kingston and District Amateur Radio Society.—This Club has

resumed its meetings since the Christmas festivities, and the Net on 3.750 kc continues to run smoothly. Next meeting is on February 15, at the new QTH, Penrhyn House; it will include a Junk Sale and a Brains Trust.

Bradford Amateur Radio Society.—Attractions during February include a talk by Mr. A. R. Sugden on the "Connoisseur" pick-up (on the 14th) and a paper on Practical Aerials by G3FX (on the 28th). New members will be welcomed at either of these meetings at Cambridge House, 66 Little Horton Lane. The Club is also glad to see members of the public.

NAMES AND ADDRESSES OF CLUB SECRETARIES :

BELFAST : S. H. Foster, G13GAL, 29 Dunluce Avenue, Belfast, N.I.
 BERWICK-ON-TWEED : W. Baker, G3AFL, 31 North Terrace, Berwick-on-Tweed.
 BRADFORD : V. W. Soven, G2BYC, Rushwood, Grange Park Drive, Cottingley, Bingley, Yorks.
 BRIGHTON : L. Hobden, 17 Hartington Road, Brighton.
 CATERICK : M. Barlow, c/o 2 Sqn., 1 T.R., Royal Signals, Caterick Camp, Yorks.
 CHESTER : H. Morris, G3ATZ, 24 Kingsley Road, Boughton Heath, Chester.
 CHELTENHAM : S. Kelly, G3COZ, 10 London Road, Cheltenham, Glos.
 COVENTRY : K. Lines, G3FOH, 142 Shorncliffe Road, Coventry.
 CLIFTON (S.E. LONDON) : W. A. Martin, G3FVG, 21 Brixton Hill, S.W.2.
 EASTBOURNE : R. Nugent, G2FTS, Field House, Windmill Hill, Hailsham, Sussex.
 EDINBURGH (LOTHIANS) : I. Mackenzie, 41 Easter Drylaw Drive, Edinburgh 4.
 ENFIELD : F. Tickell, 10 Cowdrey Close, Enfield, Middlesex.
 EXETER : D. W. Thomasson, Aytton Cottage, Matford Avenue, Exeter.
 FORFAR : A. F. Ferguson, 3 Osnaburg Street, Forfar.
 GRAFTON (N. LONDON) : W. H. C. Jennings, G2AHB, Grafton LCC School, Eburne Road, London, N.7.
 KINGSTON : R. Babbs, 28 Grove Lane, Kingston, Surrey.
 LEWES : M. B. Beck, 5 Grange Road, Lewes, Sussex.
 LINCOLN : G. C. Newby, G3EBH, The Vicarage, Nettleham, Lincoln.
 MIDLAND : A. W. Rhodes, 135 Woolmore Road, Birmingham 23.
 NEATH AND PORT TALBOT : W. R. Petheram, GW3CJJ, 7 Tynyrheol Avenue, Tonna, nr. Neath, Glam.
 NEWBURY : A. W. Grimsdale, 164 London Road, Newbury, Berks.
 NOTTINGHAM : R. Woodward, 125 Granville Avenue, Long Eaton, Nottingham.
 ROMFORD : D. L. K. Coppendale, G3BNI, 9 Morden Road, Chadwell Heath, Essex.
 SLADE : C. N. Smart, 110 Woolmore Road, Birmingham 23.
 STOURBRIDGE : W. A. Higgins, G8GP, 28 Kingsley Road, Kingswinford, Brierley Hill, Staffs.
 SWINDON : P. Greenwood, G2BUJ, 49 Western Street, Swindon.
 THAMES VALLEY : Major A. Eden, G3HAE, 31 Chatsworth Crescent, Hounslow, Middlesex.
 WANSTEAD : R. J. C. Broadbent, G3AAJ, Wanstead House, The Green, London, E.11.
 WESSEX : L. H. Waive, 27 Summerleaze Park, Yeovil, Somerset.
 WEST KENT : G. B. Brewer, G4LJ, 80 London Road, Southborough, Kent.
 WEST MIDDLESEX : H. C. Boatock, G3BWC, 1 Grange Road, Hayes, Middlesex.
 WEST SOMERSET : T. C. Bryant, G3SB, 16 The Parks, Minehead, Somerset.
 WHITTINGTON : W. Watson, 44 Handley Road, New Whittington, Chesterfield, Yorks.
 WIRRAL : R. A. Browning, 24 Norbury Avenue, Bebington, Cheshire.
 WORTHING : R. Forge, G3FRG, 2 The Plantation, Worthing, Sussex.

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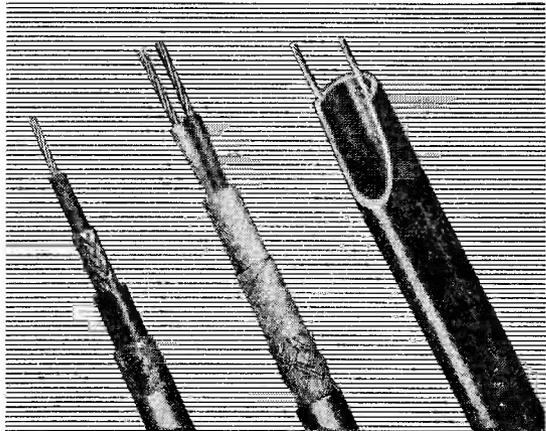
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H.S.30. Input 200/250v. Output 300/0/300v. 80 ma 17/8

H.S.2. Input 200/250v. Output 350/0/350v. 80 ma 17/8

H.S.2X. Input 200/250v. Output 250/0/250v. 100 ma 18/6

H.S.30X. Input 200/250v. Output 300/0/300v. 100 ma 18/6

H.S.3X. Input 200/250v. Output 350/0/350v. 100 ma 19/6

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F.R.2. Input 200/250v. Output 250/0/250v. 80 ma 19/6

F.R.30. Input 200/250v. Output 300/0/300v. 80 ma 19/6

F.R.3. Input 200/250v. Output 350/0/350v. 80 ma 19/6

F.S.2.X. Input 200/250v. Output 250/0/250v. 100 ma 21/6

F.S.30X. Input 200/250v. Output 300/0/300v. 100 ma 21/6

F.S.3X. Input 200/250v. Output 350/0/350v. 100 ma 21/6

All above have 6.3-4.0v at 4 amps, 5-4.0v at 2 amps.

F.S.43. Input 200/250v. Output 425/0/425v. 200 ma 42/6

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6.3v 8 amps C.T. 6.3v 4 amps C.T. 5v 3 amps For Receiver R1355

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6.3v 3 amps C.T. 5v 3 amps. Half shrouded

FS120. Input 200/250v. Output 350/0/350v. 120 ma 27/6

6.3v 2 amps C.T. 6.3v 2 amps C.T. 5v 2 amps. Fully shrouded

FS150. Input 200/250v. Output 350/0/350v. 150 ma 28/6

6.3v 2 amps C.T. 6.3v 2 amps C.T. 5v 2 amps. Fully shrouded

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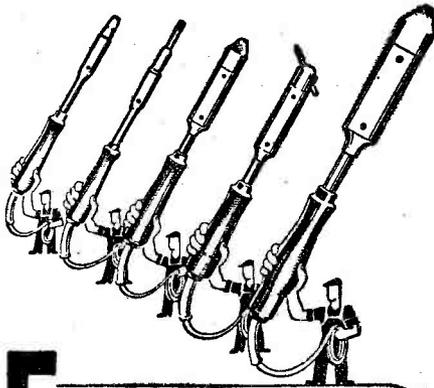
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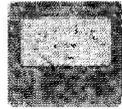
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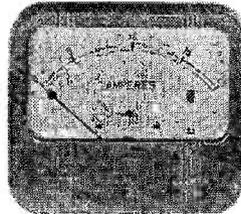
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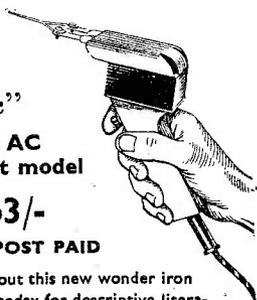
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Constructors in the Midland TV Area will be pleased to learn that the data for our Mk II Televisor for operation on the Sutton Coldfield frequencies is now available. All constructors of this Televisor who have not yet received the information should write in quoting date of purchase and invoice number, when the full details will be supplied gratis.

This Televisor, many hundreds of which are in service, is designed round two Radar Units which cost only 26 the pair. One unit is an Indicator containing a VOB 97 C.R. Tube, and the majority of the valves and components, and the other unit is a ready-made Vision Receiver which only requires modification for the TV Frequencies. Use of this latter item, which was made regardless of cost to a planned lay-out, eliminates many of the headaches experienced by those who have attempted the construction of a Vision Receiver from scratch. The Constructional Data is most detailed, with photographs, parts lists, circuit diagrams, etc., and costs only 7/6, or is supplied gratis with the two Radar Units. Alternatively, it may be purchased, and the cost will be credited against the subsequent purchase of the Radar Units within 14 days. A fully detailed price list shows that the total cost is £15/4/6. Please note that orders for the Radar Units should include an additional 12/6 carriage costs, plus 10/- deposit on packing case.

For constructors embarking on other circuits we can supply a wide range of component parts, many of which are listed below:

RF UNITS TYPE 26, specified for INEXPENSIVE TELEVISION are now all sold, but we can supply the RF Unit 27 with full details of modification to cover the TV Frequencies, simply by retrimming. ONLY 35/- (postage 1/6).

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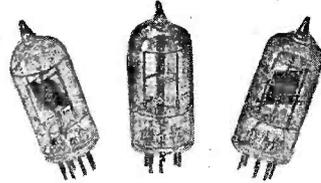
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SENDER 12 transmitter and Eddystone S640. Both in very good condition. Best over £30 secures.—Box No. 681.

WANTED—Any disc recording equipment, must include tracking gear. Anything considered. Exchange RX1082 complete with coils.—Williamson, 13 Cecil Road, Norwich.

420MC, RX115, 300-600, bandspread, xtal mixer, £10. 1359, Rx, 130-550 mc., £12/10/-. CR100/2 exterior like new. S. Meter, limiter, manual, £22/10/-, M58, RF amplifier, OK 144, CV53, 35/-, 3, 144, RL18, PP, oscillators, 144 and 420, 25/- each. Exchange above, AR88D, FB condx. G6VX 144 xtal receiver, pp, 6J6's, etc., crackle case, £10. Offer. G44 oscillator P.P. RL18, 6C5, £5. Calibration curve.—Box No. 680.

LAVOIE LABORATORIES precision wavemeter, .375/725 mcs. 3 valves, £4. BC457A, VFO/TX. pp1625 output. 4/5:3 mc. without modification. Suitable 80m. Circuit available, £4.—G2BVN, 51 Pettits Lane, Romford, Essex.

SALE.—BC348 AC PP FB job, £15. 12v 75AH battery, £3. Class D. wavemeter W/spares, £3. B2 new complete, £14. 220v DC/AC rotary converter, £15 or offers.—Box No. 679.

WANTED B2 transmitter/receiver and power pack. Also spare power pack. All letters answered.—Box No. 682.

2, 6J6, 10/- each. STV280/40, 7/6. Doorknob Triode 2, (VHF) 703A, 10/-. ACR8 5" CRT, 30/- IF strip with 7 6AG5's, 35/-.

BC348R converted re-aligned, excellent condition, less power pack, £12/15/-. Hallicrafters S15, complete. Requires attention HF bands, £10 or offers.—Box No. 685.

BC624 modified for 144 mc. according to OST, 6AK5 R.F., 6AK5 mixer, noise limiter, S.M. drive, excellent performance, £5. Quantity of first-class components, valves, etc. for disposal, state requirements. Wanted. Power pack, instruction book and 10-metre bandspread coil for H.R.O. Eimac 4-65A.—Webb, 26 Waverley Road, Kenilworth.

CR.100 wanted, must be in good condition mechanically. Electrically immaterial.—Box No. 684.

XTALS. 455, 465, 735 kc., 8/6. 455 kc. Xta filter units complete, 12/6. Auto-transformer 230t to 115, 1 KVA, £2/10/-.—Box No. 683.

BC342-N, 230v, fitted noise limiter, S-meter, yshock mounting, perfect, nearest £18. Wanted BC614.—Webber, Claremont Villas, Uplands, Stroud, Glos.

AR88D late model, perfect alignment, condition as new, £55. Consider part exchange similar H.R.O.—"Armada," Manor Road, Burnham-on-Sea. Phone 511.

SMALL ADVERTISEMENTS

READERS'—*continued.*

WANTED.—Two identical G.P.O. type or similar S.P.D.T. relays, coil near 5,000 ohms and closing current 5 mA. Details.—G3FCW, 7 Marshall Street, Yeading, Leeds.

SALE Army 12 Tx 25 watt phone CW and MCW. Break-in and remote control, coverage 20m to 150m with data for 10m simple conversion, £30. BC221 frequency meter by Zenith in metal case, £15. B34 (Eddystone 358X) Communication Receiver 10m to 2,000m, £25. All as new complete with instruction books. Near offer considered.—Howard, 456 Welford Road, Leicester. Phone 78841.

LITTLE-USED transmitting components, including 813's, TZ40's, 35T's, 866's, 836's, 807's, valve-holders, chokes, high-voltage condensers, split-stator condensers, etc. All cheap—e.g. 813, 25/-; 1,500v condensers, 2/-. Callers only—evenings, week-ends.—R. Field, 1 Feckenham Road, Redditch, Worcs.

SALE.—SX24 Hallicrafters, 9 valves, R.F. stage, B.F.O., noise limiter, bandspread crystal filter, S. Meter, 540 kc. 43.5 mc. Instruction book, £17.—Box No. 686.

RADIO Amateur going overseas has for disposal: New valves CV53 (2), 82 (4), DET12 (2), 19 (4), Gammatron 24 (3), PT15 (1), PV135 (7), 175 (2), RK25A (5), 28A (6), TZ40 (4), 35TG (1), 100TH (2), 304TH (6), 801 (2), 805 (2), 807 (24), 813 (12), 815 (1), 829A (4), 830B (2), 1616 (12). Large quantity receiving valves: 5R4GY, 5U4G, 5X4, 5Y3, 5Y4, 5Z4, 6AC7, 6C5, 6F5, 6F6, 6H6, 6K7, 6J5, 6J7, 6K8, 6L6, 6L7, 6N7, 6S7, 6SF5, 6SJ7, 6SK7, 6V6, 6SN7, 6SL7, VR105 & 150/30, EF50, 54, CV6, VR137, VR92. CRT's 3DP1, 4081, 5FP1, 5BP1 all complete with base and shields. Transformers: Mod: 200 watt multi-ratio, 20 watt 6k/6k ohms by Collins, pp807/pp807, Mains 230v primary: 200 watt 230/115 double wound, 1850-0-1850v 250 mA, 6.3v 5A, 500-0-500v 250 mA, auto 500 watt, 5 kV swinging choke 500 mA, 2.5v 10A HT type, many smoothing chokes and paper condensers. 80-metre EC VFO with power pack temp. and volts stabilised. Complete power packs: 550v 250 mA, 1,000v 250 mA, 1,700v 350 mA (incl. variac), 3,000v 5 mA. All 230v AC input. 600v 180 mA, 6.3v 12A. 300v 250 mA stabilised by 6 2A3's, 3,000v 10 mA, 6,000v 5 mA, 450v 150 mA plus 150v bias. All 115 VAC input. Complete pp 813 pa 3-5/30 mcs. All components rotary beam incl. 0.75 HF. DC reversible motor 1250/1 reduction gear, magslips, large thyratrons. PPI type control desk. Large quantity dual tube, 2½ metre Yagi silver plated. GR standard condensers. All above may be seen SW London. No reasonable offer refused. Phone or write (SAE please): G5CI, 1 Spring Grove Road, Richmond, Surrey. Richmond 5575.

EXCHANGE R.1155 in good condition (requires P.P.) for type 62A indicator unit complete. Write—Tweedale, 16 Coronation Road, Wold Road, Hull.

SALE.—*Wireless World*, November 1939-August 1949. *QST.*, July 1943-December 1945. Perfect condition. Offers please. Also many technical books. Reasonable prices.—Williams, 92 Thicket Road, Anerley, London, S.E.20.

OFFERS.—RME69 receiver and DB20 pre-selector; 1481 receiver, resistance capacity bridge (Victoria Instrument Co.)—North, 31 Stumperlowe Crescent Road, Sheffield, 10.

ADVANCE signal generator type B.3 model C, 100 kc to 30 mc, 10 gns. T1154, £4. R.F. Unit Type 26, £1. Items plus carriage.—G3DDM, 29 Mill Lane, Sheet, Petersfield, Hants.

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D.S.T.100, 13 valve Ex-R.A.F. communication receiver. 32 mc to 50 kc continuous in 7 bands on turret. Noise limiter, variable selectivity. Internal 230v AC Power Pack. £15.—Bavister, 70 Crawley Green Road, Luton, Beds.

SALE.—Trophy 6 communications. '55-45 mc, £10/10/-. 6V6-6V6-807-829 Transmitter. 7-14-21-28 mc. Ready for air. £20. S.A.E. for details: Horner, 25 Groveland Road, Beckenham, Kent.

BC342 guaranteed perfect condition, with auto-transformer, plus manual. £25 or nearest offer.—G3PH, 43 White House Road, Dordon, Tamworth, Staffs.

U.S. Manuals for sale. BC728 receiver, 3/6. BC778 transmitter; 3/6, M222 power unit, 2/6. Require BC348 in case without valves. Unmodified, any external condition.—Anthony, 5 Park Farm Road, Kingston, Surrey.

S.640 Eddystone, going cheap—new April. What offers?—J. A. Alan Short, 132 Rye Hill, Newcastle-upon-Tyne, 4.

BC221AJ modulation model new, £14. U.S.A. Valve tester, £15. New BC614E speech amplifier, £7/10/-. BC312 valves in matching case, £3. U.H.F. 3 element beam with fittings in case, £8. BC610 aerial and base, £2. Quantity of QST's, S.W.M., *Wireless Worlds*, 30/-. ARRL and Radio Handbooks, 7/- each. HF300 valve, 15/-, 2 element 10 metre beam, £3. Treated Guy ropes 25 ft. 5/-; 50 ft., 7/6. BC610 spares, cables, P.A. coils, Labgear beam motor, bargain, £7/10/-. Prop. motor, 55/-. Rothermel Torpedo mike, £3. SX24 S. Meter, 50/-. Western Electric new transmission measuring set. Offers. Post war Imperial Good Companion tabulator model portable typewriter. Offers over £25.—G3DAM, Offenham Road, Evesham.

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50 watt transmitter, four bands, VFO, modulator, power packs, as new, £30. Nearest. S.A.E.—28 Ivanhoe Road, St. Budeaux, Plymouth.

SALE.—BC221M, manual, valves and xtal (no case), £7. D.C. Avominer, £2. MRIC1 (no valves), £3. Valves: 6L6, 6SN7, 6AC7, etc., 5/-. Send for requirements. Wanted T.V. rear.—Box 689.

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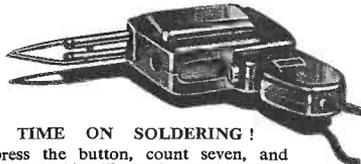
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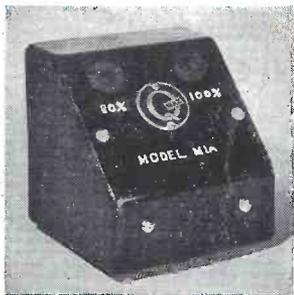
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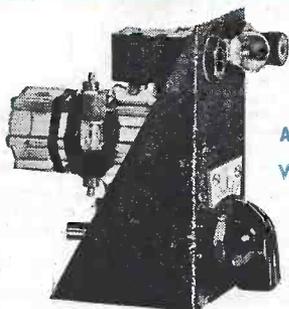
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