2/9

The SHORT WAVE Magazine

VOL. XVIII NOVEMBER, 1960 NUMBER 9

Technical Publications

Available from stock

	Post Free
ANTENNA HANDBOOK (*Published by A.R.R.L.*) (9th Edition)	19s. 0d.
A COURSE IN RADIO FUNDAMENTALS (*4th Edition*)	10s. 6d.
BASIC AUDIO COURSE	22s. 6d.
BASIC RADIO COURSE	19s. 0d.
BEAM ANTENNA HANDBOOK	22s. 0d.
BETTER SHORT WAVE RECEPTION	24s. 0d.
COMMAND SETS (*Published by CQ.*) Information on conversion of many Command Transmitters and Receivers	12s. 6d.
CQ ANTHOLOGY	16s. 9d.
DXERAMA (*3rd Edition*)	16s. 0d.
DX GUIDE (*New Edition*)	16s. 9d.
GUIDE TO BROADCASTING STATIONS (*Twelfth Edition*) pp.112	3s. 10d.
HAMS INTERPRETER (*Published by OH2SQ*)	7s. 0d.
HIGH FIDELITY (*Gernsback*)	12s. 6d.
HIGH FIDELITY CIRCUIT DESIGN (302 pp.) (*Gernsback*)	48s. 0d.
HINTS AND KINKS, Vol. 6	11s. 0d.
HOW TO BECOME A RADIO AMATEUR★	5s. 0d.
HOW TO LISTEN TO THE WORLD	7s. 0d.
LEARNING THE RADIO TELEGRAPH CODE	4s. 6d.
LOG BOOKS Spiral bound (*Published by A.R.R.L.*)★	7s. 6d.
MOBILE HANDBOOK (*Published by CQ*) (*Second Edition*)	24s. 0d.
MOBILE MANUAL (*Published by A.R.R.L.*)	23s. 0d.
NEW SIDEBAND HANDBOOK (*Published by CQ, latest issue*)	25s. 6d.
NOVICE HANDBOOK, Tx and Rx	23s. 6d.
OPERATING AN AMATEUR RADIO STATION (*Published by A.R.R.L.*)★	2s. 8d.
QUAD ANTENNAS	23s. 0d.
RADIO AND TV HINTS	8s. 6d.
RADIO DESIGNERS HANDBOOK (*4th Edition*) 1,498 p.p. (*F. Langford Smith*)	55s. 0d.
RADIO VALVE DATA (*Iliffe*)	5s. 9d.
S—9 SIGNALS	8s. 6d.
SCATTER PROPAGATION THEORY AND PRACTICE (*H. W. Sams*)	25s. 0d.
SURPLUS SCHEMATICS (*Published by CQ*)	21s. 0d.
SHORT WAVE RECEIVERS *For The Beginner*	6s. 6d.
SINGLE SIDEBAND FOR THE RADIO AMATEUR (*A.R.R.L.*)	14s. 6d.
SURPLUS CONVERSION MANUAL Volume 1	21s. 0d.
Volume 2	21s. 0d.
Volume 3 (New)	21s. 0d.
TELEVISION INTERFERENCE — ITS CAUSES AND CURES	15s. 6d.
THE INTERNATIONAL RADIO AMATEUR YEAR BOOK	4s. 0d.
THE OSCILLOSCOPE	18s. 6d.
THE RADIO AMATEUR OPERATOR'S HANDBOOK (*Data Publications*)	3s. 6d.
THE RECORDING AND REPRODUCTION OF SOUND (*H. W. Sams*)	64s. 0d.
TRANSISTORS— THEORY AND PRACTICE (*New Edition*) (*Published by Gernsback*)	23s. 0d.
TRANSISTOR THEORY AND PRACTICE (*Published by World Radio Handbook*)	9s. 6d.
TRANSISTOR TECHNIQUES (*Gernsback*)	12s. 6d.
VHF HANDBOOK	24s. 0d.
WORLD RADIO HANDBOOK, 1960 Edition, 198 pages	16s. 6d.

(★ *Not strictly applicable under U.K. conditions*)

Latest Issues

New and Greater Edition of the

RADIO HANDBOOK (15th Edition)

Published by *Editors & Engineers*, W6-U.S.A. 800 pages, durable binding.

Price 60s. post free, from stock.

RADIO AMATEUR CALL BOOK

The CALL BOOK is published in two parts: *American* Section only, appearing quarterly, at 41s. 6d. post free; *Foreign* (non-American) Section half-yearly in March and September, at 25s. post free. Includes latest callsign/address listings for all countries, with much DX data. The only complete directory to the radio amateur stations of the world.

American Section Fall Edition, 41s. 6d.; *Foreign* (non-American) Section, Fall-Winter Edition, 25s.

The two together at 60s. post free.

THE RADIO AMATEUR'S HANDBOOK

LATEST (1960) EDITION

Published by the American Radio Relay League.
Price (standard binding) 34s. post free
(*Bound in whole Buckram, de luxe, 44s.*)

DX ZONE MAP Latest Revision

Paper Edition, 9s. 3d. post free
Linen Backed (*de luxe*) 11s. 9d. post free

MAGAZINES BY SUBSCRIPTION

	One Year
73 MAGAZINE	32s. 0d.
AUDIO	40s. 0d.
*CQ, RADIO AMATEUR'S JOURNAL	44s. 0d.
ELECTRONICS (*Trade only*)	160s. 0d.
POPULAR MECHANICS	32s. 0d.
POPULAR SCIENCE	48s. 0d.
QST, *ARRL*	43s. 0d.
HIGH FIDELITY	56s. 0d.
ELECTRONICS WORLD (*formerly "Radio and Television News"*)	48s. 0d.
RADIO ELECTRONICS	36s. 0d.
SERVICE	24s. 0d.
TELEVISION	48s. 0d.

*Binders for CQ 30s. 0d.
Post free, ordinary mail only

Subscription Service for all American Radio and Technical Periodicals

SHORT WAVE MAGAZINE

Publications Department

55 VICTORIA STREET, LONDON, S.W.1

ABBEY 5341

INDEX TO ADVERTISERS

SHORT WAVE MAGAZINE

Vol. XVIII NOVEMBER, 1960 No. 205

CONTENTS

Managing Editor: AUSTIN FORSYTH, O.B.E. (G6FO)

Advertisement Manager: M. GREENWOOD

Published on the first Friday of each month at 55 Victoria Street, London, S.W.1. *Telephone: Abbey 5341/2*

Annual Subscription: Home and Overseas 33s. ($5·00 U.S.) post paid.

AUTHORS' MSS

Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets. with diagrams shown separately. Photographs should be clearly identified on the back. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Show *Once again, we come round to the annual Amateur Radio Exhibition — not only a show to bring visitors up-to-date on all that is best in the way of Amateur Radio equipment and facilities, but also the occasion for meetings of every sort in the radio amateur context.*

Indeed, as the years go by, this Exhibition becomes more and more an opportunity for doing business (whether as buyer or seller) while at the same time making those personal contacts which add so much interest to Amateur Radio activity. Saturday is naturally the big day, with excursion visitors from all parts of the country, bringing an afternoon crowd that always suggests the Exhibition ought to be held in a hall at least twice the size. Friday is also a busy day, but it is then that people are more serious about the Exhibition itself for what it has to display.

This year's Amateur Radio Exhibition promises to be one of the most interesting we have yet had in the thirteen years since it was instituted. The dates are November 23–26 inclusive and some information about where the show is held, and how to get to it, is given on p. 477 of this issue.

We hope that you will be there!

Austin Forbes G6FO.

Adaptor for SSB Reception

SUITABLE FOR ANY COMMUNICATIONS RECEIVER

W. H. RILEY (GM3GOC)

This very useful and interesting article discusses the design of an original type of adaptor, or converter, for Sideband reception; it can be incorporated in any existing receiver, as a switchable unit. The author also gives, in an easily digestible form, design data for phase-shift networks at the IF's used in most receivers. The adaptor itself achieves, after the initial setting up, the ideal of entirely satisfactory SSB reception merely by switch control.
—Editor.

THE problem of receiving SSB signals is not simple and calls for a lot of patience when using a standard receiver. After trying, with varying degrees of success, the generally accepted methods the writer thought how nice it would be to be able to tune in an SSB signal for reasonable "noise" and then, by pressing a switch or knob, be able to read the signal without any further adjustment.

A lot of thought was given to this and eventually an experimental circuit was evolved which seemed likely to offer a reasonable solution.

This is shown in Fig. 1 and a "mock-up" was constructed and tried out (on an Eddystone receiver). Several snags were soon evident, namely:

(a), Difficulty in adjusting L2/L3 for equal volts with 90° phase difference. No doubt a transformer could be made (with the proper facilities) to give equal primary and secondary voltages with 90° phase shift, and would be pre-tuned at the required IF.

(b) Distortion on audio signal. This was found to be caused by detection (demodulation) at V5A, as a result of which this "extra" audio signal appeared and was out of phase.

(c) Overloading of receiver when on ordinary AM, due to lack of AVC.

(d) Slight instability of oscillator, due to inevitably long leads on the "mock-up" chassis.

These difficulties were solved as follows: *(a)* re-design of the circuit; *(b)* putting the secondary of the last IF coil to ground through a 500k resistor instead of straight to ground; *(c)* using the voltage developed across the network in V3B anode-cathode circuit to be

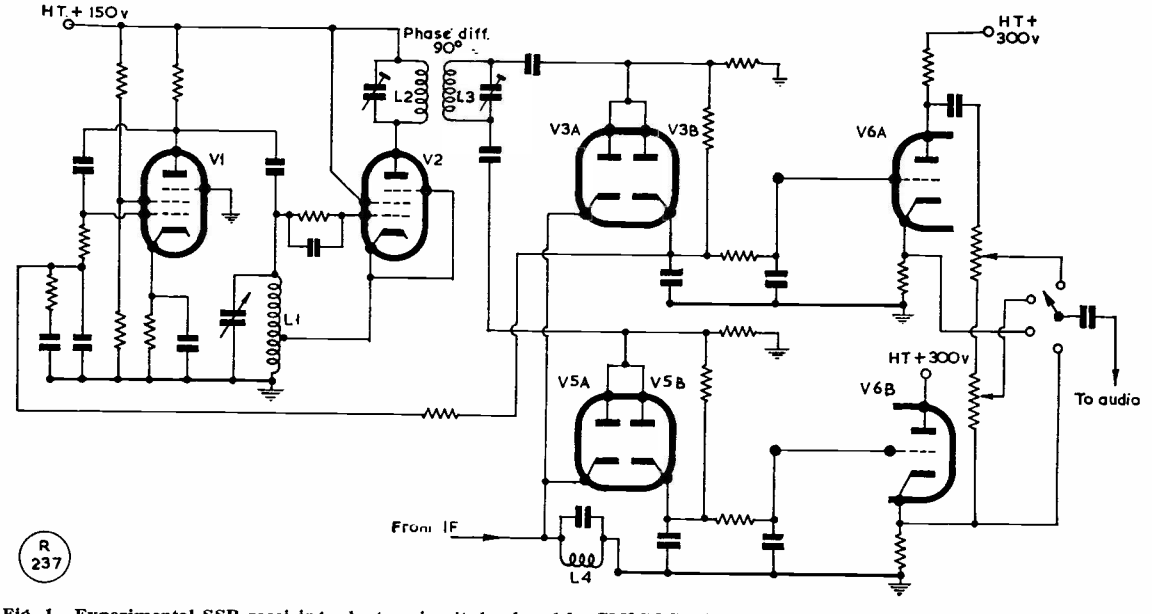


Fig. 1. Experimental SSB receiving adaptor circuit developed by GM3GOC. As explained in the text, there were difficulties in getting this working satisfactorily, but it was the basic design from which the circuit of Fig. 2 was evolved.

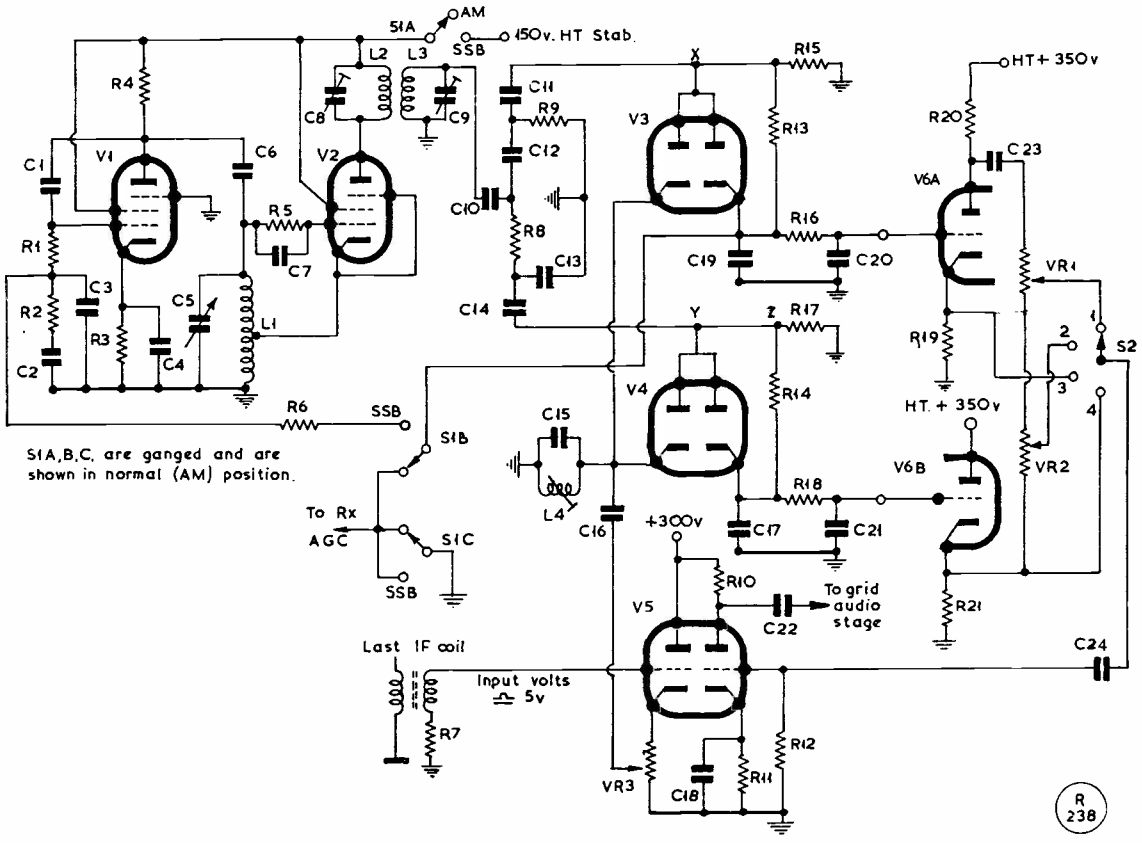


Fig. 2. Finalised design of the Adaptor Unit to give AM or SSB reception, suitable for incorporation in any communications-type receiver. The Adaptor operates between the last IF and final audio stage, V5 taking the place of the double-diode triode normally used as demodulator/AGC/1st audio stage in most receivers. Switching S1A-C gives choice of either AM or SSB reception, and S2 selects the sideband on SSB or AM. This circuit has been evolved by GM3GOC and ensures comfortable SSB reception merely by s witch control. Full details for setting up the Adaptor are given in the text.

switched to the receiver when on AM ; (*d*) more efficient screening and shorter leads.

From the result of overcoming these difficulties the final circuit was evolved as shown in Fig. 2.

This was then made up as a fully screened separate unit, mounted to fit standard 19in. racking, for use with an Eddystone receiver having an IF of 465 kc.

A second similar adaptor was then designed to fit on the existing chassis of a CR300, and so arranged that, when not required, it could be switched out of circuit. It was brought into use, on tuning in an SSB signal, simply by moving the switch to " SSB," when a relay was energised which disconnected the 2nd det., AVC and BFO stages completely, substituting the adaptor. The same procedure could be followed for any receiver.

Trials on the air with both receivers have proved to be very satisfactory and no trouble

Table of Values

Fig. 2. Circuit of the Receiver SSB Adaptor

C1	= 5 $\mu\mu$F	
C2	= 1 μF	
C3, C18	= 0.1 μF	
C4, C16, C22, C23	= .01 μF	
C5	= 50 $\mu\mu$F	
C6	= .001 μF	
C7	= 100 $\mu\mu$F	
C8, C9	= Trimmers	
C10, C17, C19	= 470 $\mu\mu$F	
C11, C14, C20, C21	= 47 $\mu\mu$F	
C12, C13	= 68 $\mu\mu$F	
C15	= .0025 μF	
C24	= .02 μF	
R1	= 470 ohms	
R2, R8, R9	= 10,000 ohms	
R3	= 2,000 ohms	
R4, R5	= 100,000 ohms	
R6	= 2.2 megohms	
R7	= 500,000 ohms	
R10, R13, R14, R15, R17	= 220,000 ohms	
R11	= 1,000 ohms	
R12	= 400,000 ohms	
R16, R18	= 56,000 ohms	
R19, R20, R21	= 3,900 ohms	
VR1, VR2	= 2 megohm pot' meter	
VR3	= 5,000 ohm pot meter	
L1, L2, L3, L4	= *see text*	
S1	= 3-pole, 2-way	
S2	= 1-pole, 4-way	
V1	= EF91	
V2	= EF92	
V3, V4	= EB91	
V5, V6	= 12AT7	

has been experienced in reading SSB signals on all bands.

The SSB Adaptor Unit

Referring to Fig. 2, it will be seen that V1 and V2 constitute a stable reactor-controlled oscillatory circuit at the IF of the main receiver, with V1 acting as the reactor.

L1 can be made quite easily from a standard Eddystone 2·2 mH choke by using the last pile as the feedback coil. Experiment has shown that with a 50 $\mu\mu$F variable condenser and suitable fixed capacity this circuit can be tuned to all intermediate frequencies in normal use. Where IF's are unusual, *i.e.* 110 kc or 1·6 mc, the oscillator coil could be made up from an

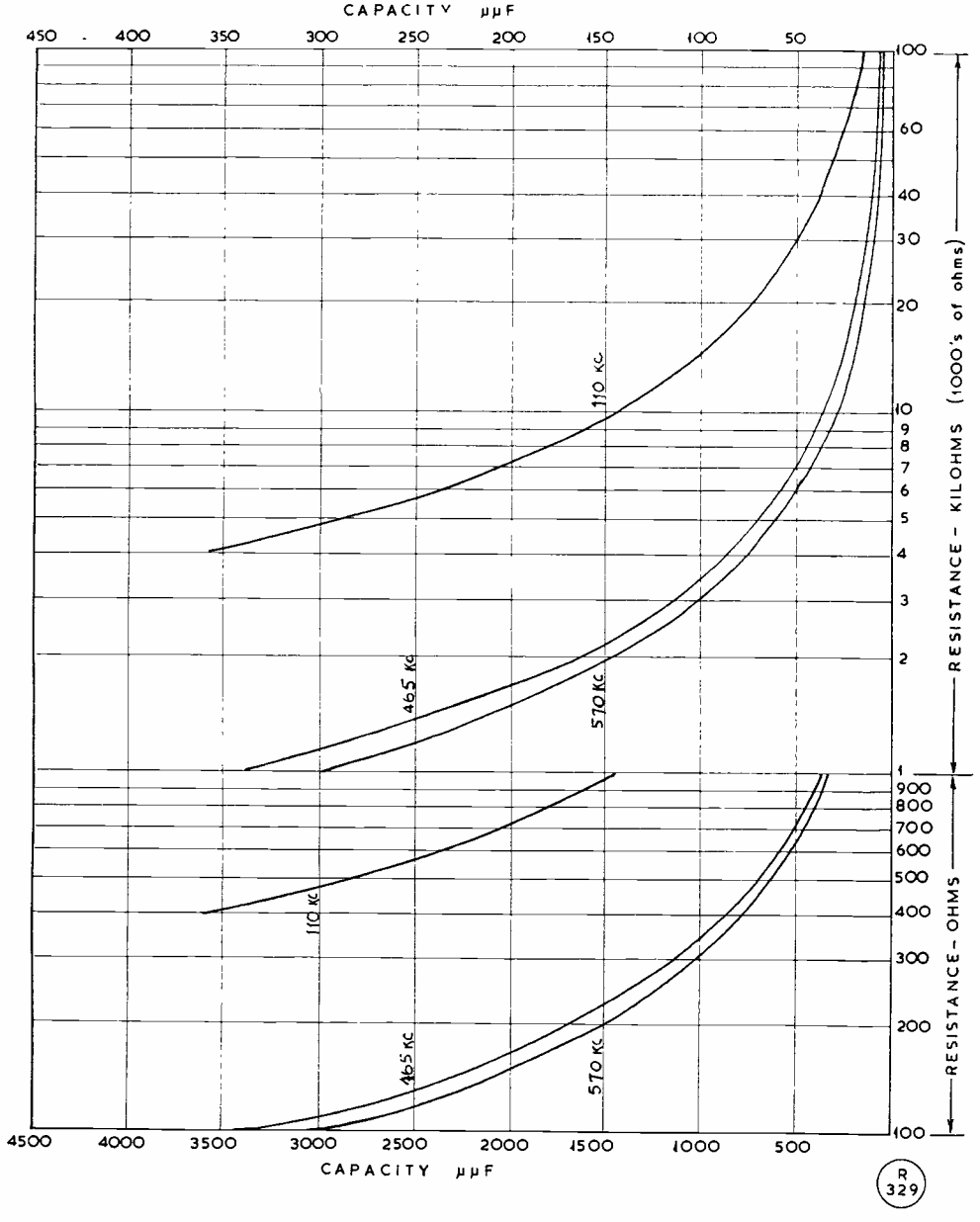
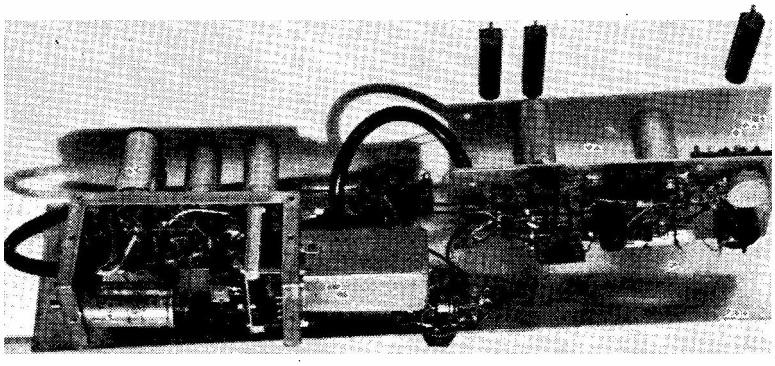


Fig. 3. Curves relating commonly used receiver intermediate frequencies (IF) with resistance-capacity values. From these graphs 90° phase-shift networks can be arrived at, cross-checked by the formulae given in the Appendix on p.462.

IF coil, with about two-thirds of the secondary winding removed, the remainder acting as oscillator feedback section.

L2/L3 is an IF coil at the receiver IF and is tuned to give maximum volts from L3 and maximum output from the two arms of the phase shift network at points X and Y. The voltages at X and Y must be equal within ± 1 volt and will be found to be between 16 and 20 volts, dependent upon the accuracy of the tuning. This range of voltage will be found adequate for the purpose of providing the "lost" carrier of an SSB transmission.



The GM3GOC SSB receiving adaptor is built on a chassis to fit the rack panel above the receiver with which it is used. It is shown here opened out for inspection; this unit is constructed to the circuit of Fig. 2.

The maximum volts to be expected from the last IF stage, *i.e.* at L4, is approximately 5-8 volts on any receiver. L4 is made from half an IF coil at receiver IF. There is always sufficient output from the phase shift network (oscillator) to over-ride any other signal.

The PSN gives two voltages of equal amplitude, at 90° phase difference, at the diode anodes of V3 and V4, whereas the IF input is fed in parallel to the diode cathodes.

Differential networks feed the audio signal to the grids of V6A, V6B which, with their circuitry, form a "sum" and "difference" network from which, by means of S2, can be selected: Upper SB; Lower SB of an SSB signal; or the Upper or Lower SB of an AM signal.

Audio voltage of approximately one volt is fed *via* C24 to the grid of V5 for amplification before being passed to the receiver output stage.

The two 2 megohm potentiometers VR1, VR2, are adjusted to give maximum rejection of the unwanted sideband. The phase shift networks feeding V6A and V6B are designed to maintain a 90° phase shift over the audio range. If desired, to eliminate trouble in the audio stage which might possibly be experienced due to frequencies higher than 3,000 c.p.s., *i.e.* sibilant notes, the audio stage could be fitted with a filter network designed to limit the frequencies to 300-3,000 c.p.s. This has not been found an absolute necessity but would no doubt prove an agreeable amenity.

The 90° Phase Shift Network

As "phase" is one of those conceptions remembered as being present in radio circuitry —and then conveniently and thankfully locked away in the innermost recesses of the "mental" filing cabinet—it comes as a bit of a shock to realize that one has now to deal with this phenomenon and make up accurate networks for specific angles of phase difference at specific frequencies.

To help those who (like the writer) are not enthusiastic about the mathematics, it was thought that the figuring in the Appendix might be of help.

Setting Up Adaptor

This is quite a straight-forward job and is carried out as follows, referring to Fig. 2:

(1) Switch receiver to normal reception on any band,
(2) Feed in a convenient signal by means of a signal generator and adjust RF and AF gain control for a reasonable output (using for preference an output meter),
(3) Set the 5K potentiometer VR3 in the cathode of V5 to approximately two-thirds maximum,
(4) Tune L4 for maximum output on output meter or by maximum audio as judged,
(5) Switch S1A to "on," with grid of V1 (reactor) earthed,
(6) Tune L1 until zero beat is obtained with input signal,
(7) Remove earth from grid of V1, and reactor should be heard to lock in and remain locked. Tune L1 if necessary to hold oscillator locked,
(8) Remove link from junction of the two resistors R14, R17, shown as point Z, and connect a 1 mA FSD meter or, if available, a 500 μA meter, between point Z and earth,

[over

(9) Tune L2 and L3 for maximum current on meter; this will be about 0·1 mA,
(10) Remove meter and solder the two 220K resistors, *i.e.* point Z, to earth.

If the constructor has a good AC valve voltmeter and/or 'scope, then the procedure from (8) onwards is:

(8*a*) Connect VVM set at 240v. range to anode of V2, and tune L2 for maximum RF volts,
(8*b*) Connect VVM to points X and Y in turn and tune L3 for maximum reading on VVM, on scale of about 24v. FSD.

If using 'scope only, then the whole setting up can be done by comparing the amplitude, frequency and phase shifts at the appropriate points—that is to say, oscillator frequency compared with IF input; amplitude of L2 for maximum; amplitude at points X and Y equal and at maximum on tuning L3, with 90° phase shift.

APPENDIX

Calculation of 90° Phase-Shift Network

Angle of phase shift $Q = \frac{X}{R}$ for series circuits or $\frac{R}{X}$ for parallel circuits.

Since angle of phase shift must be 45°, *i.e.* two arms of 45° phase difference for 90° total

Then, since $Q = 45°$ and $\tan 45° = 1$

$$\therefore\ 1 = \frac{X}{R} \text{ or } \frac{R}{X}$$

$$\therefore\ X = R$$

$\therefore$ Capacitive reactance in ohms must equal resistance in ohms of C and R in series.

It therefore follows that to obtain 45° of phase shift for a given value of R, there will be a given value of C.

But C is very definitely linked with the resonant frequency of the circuit.

Now we know (from AC theory) $XC = \frac{1}{2\pi fc}$

$$\text{As } XC = R$$

$$\therefore\ R = \frac{1}{2\pi fc}$$

To bring this to normal values, *i.e.* C in $\mu\mu$F, R in ohms, and f in kc,

$$R = \frac{10^{12}}{2\pi\,(f \times 10^3) \times C}$$

e.g. For f = 465 kc

$$R = \frac{10^{12}}{2\pi \times 465 \times 10^3 \times C}$$

$$\therefore\ C = \frac{10^{12}}{2\pi \times 465 \times 10^3 \times R}$$

Taking $2\pi = 6{\cdot}283$, and using values of R = 100Ω in multiples of 10 to R = 100000

A simple formula has been evolved, as follows:

(1) For IF (f) = 465 kc
(2) For IF (f) = 570 kc
(3) For IF (f) = 110 kc

(1) C in $\mu\mu$F $= \frac{10^6}{2{\cdot}922 \times R \text{ (ohms)}}$ for 465 kc.

(2) C in $\mu\mu$F $= \frac{10^6}{3{\cdot}581 \times R \text{ (ohms)}}$ for 570 kc.

(3) C in $\mu\mu$F $= \frac{10^6}{0{\cdot}69 \times R \text{ (ohms)}}$ for 110 kc.

Table I gives a list of preferred values for R and C for the three IF channels.

Figure 3 shows a set of graphs of the three series of C and R for the IF channels involved, from which any value of C and R to give 90° phase shift can be read off with reasonable accuracy.

TABLE 1

Preferred Values of C and R for Usual IF Channels

90° Phase-Shift Network

R Value in Ohms	C, Capacity in $\mu\mu$F		
	110 Kc	465 Kc	570 Kc
1000	1450	342·2	279·3
1500	966·3	228·1	186·1
1800	805·00	190·1	155·2
2000	724·6	171·1	139·6
2200	658·9	155·6	127·00
2700	538·6	126·8	103·4
3000	483·1	114·1	93·09
3300	439·1	103·7	84·59
3900	371·5	87·72	71·57
4000	362·3	85·53	69·84
4700	308·5	72·83	59·41
5000	289·8	68·44	55·86
5600	258·7	61·12	49·87
6000	241·5	57·02	46·54
6800	213·1	50·29	43·00
7000	207·00	48·9	39·89
8000	181·1	42·77	34·89
8200	176·8	41·74	34·06
9000	161·00	38·02	31·02
10000	145·00	34·22	27·93

For higher values of R ÷ 10, or values of 10.
For lower values of R × 10 or values of 10.

Practical Crystal Mixer VFO

FOR THE DX BANDS— FULL DESIGN DETAILS

Unquestionably, the most stable variable-frequency drive source for transmission on the HF bands is the crystal-mixer type of VFO, in which the variable element in the circuit can be kept on a low RF range. This article gives detailed information for the construction of an extremely stable VFO for the 14-21-28 mc bands; it should be built as a separate self-contained unit, to drive into a buffer stage (for high-power working) or a 50-watt RF amplifier.—Editor.

IT is in the matter of drift that the crystal-mixer VFO scores heavily. The crystal oscillator is of course inherently stable, but, by itself, inflexible. Its output can be mixed with a self-excited oscillator, designed to be extremely stable and operating at a comparatively low frequency. Any slight remaining drift is not then multiplied in the succeeding stages, as would be the case with a standard type of VFO using a low fundamental frequency, because the output is taken from the mixer at a relatively high frequency.

For example, in an ordinary VFO, a drift of 200 cycles on a fundamental frequency of 1600 kc would mean a total drift of 1600 cycles (1·6 kc) on 14 mc. But a drift of 200 cycles in a crystal-mixer VFO with the self-excited oscillator on, say, 1300 kc could give a resultant of only 400 cycles on 14 mc.

In practice, a further decided improvement in overall stability is brought about by allowing the oscillator to run continuously, instead of switching it off during listening periods, with consequent cooling of the valve and slight unavoidable change of frequency. Keying is also less likely to affect the quality of the signal, whilst break-in working is facilitated.

The main disadvantage of the crystal-mixer VFO is the low output obtained from the mixer stage and the consequent need of subsequent amplification. But from another angle, this process of using low power in the initial stages and amplifying at signal frequency reduces the strength of high-order harmonics and this can often be of definite benefit.

Choice of Frequencies

There are two main considerations when making the choice of fundamental oscillator frequencies — one is that harmonics of each separately do not fall within the amateur bands: the other that both frequencies are well removed from the "intermediate frequency" so that only the latter is passed on to the following stages.

In the circuit discussed here the "IF" is 7 mc and the self-excited oscillator operates over a range of 1300 or 1500 kc, at which frequencies a high degree of stability can be readily secured. The crystal is 5700 kc and the sum-frequency at the mixer anode is selected. It would be quite in order to use a crystal anywhere between 5300 and 5800 kc, as this would still permit the SEO being kept below the 1750 kc mark at which harmonics would, of course, come into the higher frequency amateur bands.

Circuit Details

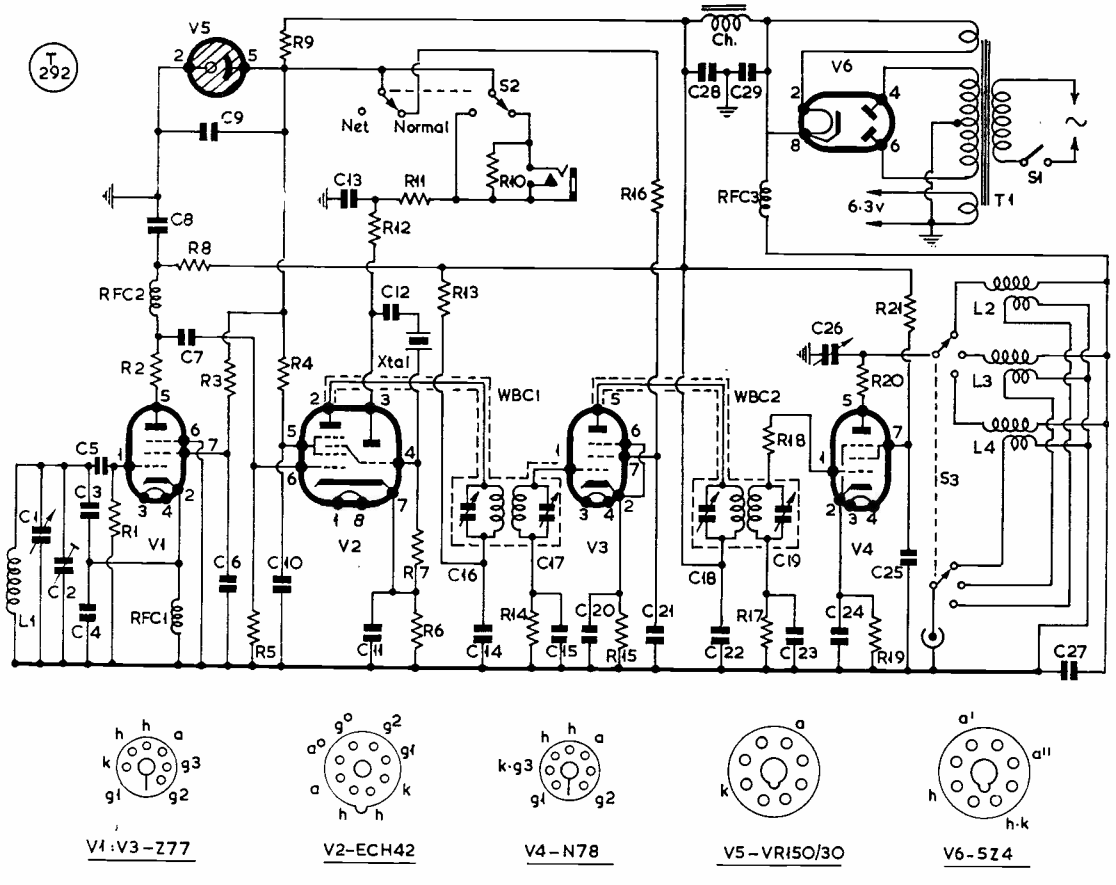
The first stage takes a G.E.C. Z77 valve in the variable frequency oscillator circuit, V1. Components of high quality should be used, with the coil L1 placed well away from any source of heat; it is also kept as far as possible away from metal masses.

It is a debatable point whether to use a separate valve for the crystal oscillator. There are certain advantages in so doing, but since a single triode-hexode can be employed to act both as oscillator and mixer, this method can be adopted to save putting in an additional valve.

There is, of course, bound to be a loss in the conversion and all one can do here is to choose a valve which will give a reasonable efficiency. The Mullard ECH42 performs well, but other similar types should prove equally satisfactory for V2. The oscillator works in the Pierce mode, which is simple, reliable and delivers ample output. It should be noted that the grid leak is returned to the cathode and not to chassis.

The output at 7 mc is not very much—incidentally, it can *not* be increased by applying higher RF voltages to the mixer valve, as this will simply bring about a greater harmonic content in the output at unwanted frequencies, with a possible diminution of amplitude of the wanted frequency.

A high-gain stage is now required and V3 is again a Z77 valve. Extremely good decoupling and screening of leads which would otherwise be exposed is necessary to prevent self-oscillation, whilst the valve itself should



Circuit of a variable frequency drive source using the principle of a crystal oscillator V2 mixing with a self-oscillator V1 tuning over a low range of frequencies, to give exceptionally stable VFO output on the desired bands. This particular unit is designed for the 14-21-28 mc bands, there being sufficient RF output available as it stands to drive a low-power PA from V4; for an RF amplifier running at more than about 50w., a buffer stage would be necessary. Since it is desirable to treat such a VFO as a separate unit, it should be self-powered and separately switched.

be fitted with a screening can. A wide-band coupler feeds into the Z77 grid and another passes on the amplified voltage to the output valve. (Details of the wide band couplers are given later.)

The output stage again calls for careful consideration. The valve must be of a type to make the most of the comparatively low input voltage available to give a reasonable output. The G.E.C. N78 chosen gives about two watts output at 14 mc as a doubler, about 1·25 watts as a trebler at 21 mc and about 0·7 watts at 28 mc. It is intended that the VFO be fed into a buffer amplifier—say an 807—on the main transmitter chassis, and the output, at least on 14 and 21 mc is adequate. (Admittedly, on 28 mc the drive is not as much as one would like, but at the present time a further stage of amplification to bring up the 28 mc output is hardly justified.) A 5763 valve tried in the output stage gave a worthwhile improvement.

The power supply utilises a transformer which happened to be on hand; it delivers only 250 volts smoothed HT and the anode of the N78 draws its current from the reservoir condenser C29 where the voltage is a little higher. Any slight ripple which may be present here will not affect the note, since the HT applied to the screen of the N78 and to the earlier stages is well smoothed. The intending constructor is advised to choose a mains transformer giving a full 300 volts smoothed HT, when an increase in RF output will result.

As described, the unit is intended chiefly for use on CW. The panel controls consist of AC on/off switch, main frequency dial, amplifier tuning, output band switch and key jack. There is also a "netting" switch S2 which, when in the net position, brings into operation only the first two valves.

Table of Values

Circuit of Crystal-Mixer VFO for HF bands

C1	= 100 $\mu\mu$F, var.	R6	= 220 ohms
C2	= 140 $\mu\mu$F, pre-set	R9	= 7,500 ohms 10 watt wirewound
C3, C4	= 880 $\mu\mu$F silvered mica	R10	= 180,000 ohms (*see text*)
C5, C7	= 100 $\mu\mu$F silvered mica (or ceramic)	R12	= 10,000 ohms
C6, C10, C11, C13, C27	= .002 μF moulded mica	R13, R16	= 470 ohms
		R15, R19	= 150 ohms
		R20	= 10 or 12 ohms
		R21	= 20,000 ohms (1 watt)
C8, C9, C14	= 0.1 μF metal-cased paper	RFC1	= 1.25 mH, Eddystone 1010
C12	= 200 $\mu\mu$F silvered mica	RFC2	= 2.5 mH, Eddystone 737
C15, C23	= 500 $\mu\mu$F moulded mica	RFC3	= 2.5 mH, rated 250 mA, Eddystone 1022
C16, C17, C18, C19	= 15/45 $\mu\mu$F ceramic trimmers	S1	= SPST, toggle
		S2	= DPCO, toggle
C20, C21, C24, C25	= .0022 μF Hi-K ceramic (T.C.C.)	S3	= Yaxley type ceramic, 2-pole, 3-way
C22	= .01 μF mica	Xtal	= FT-243 type, 5.3-5.8 mc (*see text*)
C26	= 27 $\mu\mu$F, var.		
C28, C29	= 32 or 50 μF Electrolytic 350/450v. wkg.	WBC1, WBC2	= (*see text*)
		L1-L4	= (*see text*)
R1, R14	= 47,000 ohms	V1, V3	= Z77, or 6AM6, 6F12
R2, R18	= 22 ohms	V2	= ECH42
R3	= 3,000 ohms	V4	= G.E.C. N78
R4, R8, R11	= 1,000 ohms	V5	= VR150/30
R5, R7 R17	= 100,000 ohms	V6	= 5Z4G, or similar

(*All resistors ½-watt carbon type except where otherwise specified*)

The key is in the HT feed to the crystal oscillator and, to improve operation, a high-value resistor R10 is placed across it; the value is too high to permit the valve to oscillate, but it has the effect of bringing the oscillator into action a fraction of a second quicker than without it, whilst the break also is not so abrupt. Individual experiment will probably be called for in selecting the value which suits a given crystal, according to its activity.

For telephony operation, either another switch can be fitted in parallel with the jack contacts or, alternatively, a lead can be made up which plugs into the jack and terminates in a " push-to-talk " type of switch. This would enable extremely rapid change-over to be made when operating on phone.

A ceramic Yaxley switch S3 brings in one or other of the three final coils L2-L4, each of which is provided with a low impedance output winding. This stage is fully tuned to secure maximum output, but constant re-tuning is not necessary when once set to the band in use.

Construction

The VFO can be built into a metal cabinet of a size which has become a standard in Amateur Radio work — it measures 16½" long, 8½" deep and 9¼" back to front. The front panel is separate from the cabinet and to this panel is firmly bolted an aluminium chassis measuring 12" by 8¾" by 3" deep.

The layout follows a logical sequence. The self-excited oscillator occupies one corner of the chassis, the valve being mounted horizontally about 2" above the chassis on a small aluminium bracket (made up from heavy gauge metal). Below it are the C3 and C4 fixed condensers. The coil is mounted on a U-shaped metal bracket, with sides 1¼" long, to keep it away from metal surfaces. By placing the coil on that side of the coupler away from the valve, the heat generated by the latter has little effect. The pre-set condenser C2 is below the chassis, with its spindle readily accessible for adjustment by a screwdriver blade. The main tuning condenser C1 is of the type having comparatively wide vane spacing; this condenser is two or three hole mounting, which means a little more work than with the single hole mounting type, but the trouble is well worth while. The bracket holding this condenser measures 2" wide and 2½" high, and the spindle is 1¼" above the chassis. An Eddystone full vision dial is fitted to the panel in alignment with C1. A lead has to be brought up through the chassis from the stator section of C2, but otherwise most of the wiring associated with V1 is above the chassis. The anode stopper R2 is close to the anode tag and the lead then passes through the chassis to the RF choke RFC2 mounted below. Use is made of tag strips wherever necessary to ensure firm support for the various components.

The mixer-cum-crystal oscillator valve V2 is mounted directly behind the SEO stage. Since the crystal is a permanent feature, it is clipped to the side of the chassis and connections made direct to the pins.

" Hot " leads associated with V3 and the two wide-band couplers are screened by slipping metal braiding over the insulation. If the second wide-band coupler WBC2 has to be mounted some distance from V3 the anode lead from the latter can be coaxial cable running up inside the WBC screening can. Instability here would affect the wide-band characteristics and will do no good at all, hence the use of physically small but electrically large Hi-K ceramic by-pass condensers — they are again used with the final valve.

The N78 output valve is well over towards the other side of the chassis and the coils, switch and tuning condenser associated with it form a compact group, enabling the wiring to be kept reasonably short. The tuning condenser is fixed directly on the panel, but it is

well to run a lead from the rotor tag to a chassis earthing point, rather than rely on a long and uncertain return path. The coaxial output socket can, of course, be of any type the constructor prefers. It is handy to have it on the front panel, leaving the rear clear except for the mains lead.

The stabiliser valve V5 and resistor R9 take up little room at the rear, and it is hardly necessary to go into details of fixing and wiring the power supply components.

Coils

To give the coverage specified, the oscillator coil L1 is wound with 40 turns of 28 gauge enamelled wire on a 1" diameter former (Eddystone 646). The winding is placed at the top of the former and fixing to the bracket is by means of a $1\frac{1}{4}$" 6BA screw running through two holes drilled low down on the former.

The three coils for the final stage are also wound on Eddystone 646 formers. L2 (28 mc) has five turns 20 gauge wire (18 gauge may be slightly better); L3 (21 mc) seven turns of the same wire; and L4 (14 mc) eleven turns. In each case, two turns are wound on below the main winding. It is well to find out by experiment the correct spacing for the output winding as there is a position which will give peak transfer, but generally a gap of $\frac{1}{8}$" between the two windings is about right.

Each coil is bolted to the chassis with a 6BA screw passing through the hole provided at the closed end of the former. As before, the windings are placed at the top of the formers. Those requiring the absolute maximum efficiency may consider lifting the formers away from the chassis, as with the SEO coil, and an alternative horizontal style of mounting also suggests itself, with the minimum of metal within the fields of the coils.

Where a greater coverage is required, a few additional turns should be wound on L1, when the capacity of C3 and C4 will call for some reduction.

Wide-Band Couplers

The major problem when building an exciter of this (and other) types, is the provision of suitable wind-band couplers. Several designs have been published in SHORT WAVE MAGAZINE —*see* in particular, May, 1960—and the reader is referred to these articles for alternative versions. One point is emphasised—whatever type is adopted, it must be fully screened.

The couplers used on the model are actually the IF transformers taken from a surplus R1124A receiver (made by Standard Telephones), the intermediate frequency for which is 7 mc. Further, it seems they were originally designed to give a fairly wide bandwidth, but not quite sufficient for the present purpose. The only modification found necessary was to remove one of the windings (the lower one for preference) and rewind it about $\frac{1}{4}$" closer to the other winding. Stagger tuning then gives just the right order of bandwidth.

To render identification easier and for the benefit of those wishing to make up similar transformers, details are as follows: Resin-bonded paper former $\frac{3}{4}$" diameter; each winding 30 turns 28 or 30 gauge enamelled occupying just over $\frac{1}{2}$"; original spacing between inner ends of coils 1", reduced to $\frac{3}{4}$". Top end of upper winding (black sleeving) to grid; other end (yellow/black) to grid leak and condenser; upper end of lower winding (red/blue) to HT; lower end (blue) to anode. Screening can is $3\frac{1}{2}$" long and $1\frac{5}{8}$" diameter. In the original transformers, the trimmer condensers are twin ceramic ones bolted to the top of the former.

Setting Up

The first thing to do is to check the operation and coverage of the self-excited oscillator. To do this, V2, V3 and V4 should be removed, leaving only V1 operative in the RF chain. Oscillation can be confirmed by noting a change of anode current when a "hot" point is touched. The coverage is measured by tuning in the signal on a receiver, which may be the station receiver if it covers medium waves, or else a domestic broadcast receiver.

After ensuring the first stage is performing properly, the second valve, the ECH42, is inserted and a check made to ascertain that the crystal is oscillating. Assuming all is well, a signal—and a very steady signal—should be found near 7000 kc. With C1 at full mesh, a final adjustment is made to C2 to bring the frequency exactly on to the 7000 kc mark. (A 100 kc crystal calibrator will help here, and will also enable the dial to be directly calibrated.)

Next, V3 and V4 are placed in position and a voltmeter, set to read 100 volts or more, is connected across R17. With C1 at not quite full mesh, one trimmer in each coupler is adjusted for a maximum reading on the voltmeter. Then C1 is moved to near minimum capacity and the other two trimmers adjusted. The final reading on the meter should be between 60 and 80 volts (perhaps more with a 300 volt supply) with only minor variations as C1 is swung over its full range. If the fluctua-

tions are considerable, fresh adjustments should be tried with the smaller trimmer condensers.

In a non-energised condition, V4 will draw something like 30 mA and the usual dip in anode current will be found when drive is applied and the output circuits L2-L4 tuned to resonance, the dip being greatest at 14 mc.

Operation

In actual use, the VFO is switched on, allowed to warm up for 10 or 15 minutes and thereafter it is left to run continuously during the time the station is on the air. Break-in operation is, of course, quite feasible as far as the VFO and the transmitter are concerned, although means should be devised for protecting the receiver whilst the transmitter is operative.

TVI Precautions

Screened wiring is used for the heater wiring, all circuits are well decoupled, the power levels are low, and the whole instrument is screened inside a metal cabinet, which should be separately and properly earthed. Hence harmonic radiation from the VFO itself is at a very low level. Where, in extreme cases, it is found necessary to take additional precautions, it is suggested that by-pass condensers be taken to chassis from the power input leads and from the jack terminals. Values of ·0005 or ·001 μF will be adequate, suitably rated.

Transistorised Audio Oscillator

FOR SSB TRANSMITTER ADJUSTMENT OR MORSE PRACTICE

J. E. CRONK (G3MEO)

DURING some recent experiments with SSB equipment the need for an audio sine-wave generator was felt. The requirement was for a small oscillator which could be plugged into equipment to simulate the microphone. In view of the low signal level involved it was decided that a battery-powered transistor oscillator would fill the bill.

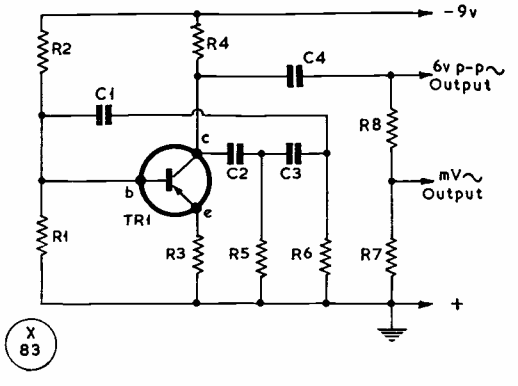


Fig. 1. Circuit of the audio oscillator, using a Mullard OC76 transistor. Values are: C1, C2, C3, C4, .01 μF; R1, 15,000 ohms; R2, 390,000 ohms; R3, 12 ohms; R4, R5, R6, 4,700 ohms; R7, 220 ohms; R8, 220,000 ohms. All resistors can be rated ½w. The values of R7, R8 may be changed to increase or decrease the low-level output, simulating a crystal microphone. With the values given the audio frequency will be about 1,000 cycles.

This little unit has proved so useful it was decided to describe it for those who may have a similar requirement. It is a type of unit that lends itself admirably to the printed circuit technique. It is small enough to allow a full-size drawing of the circuit board to be printed; so it is simply a matter of tracing the circuit on to the copper laminated board. The circuit is then painted on with cellulose paint, the unpainted area is etched away by using ferric chloride solution; a strong solution will complete the job in about two hours for the ·0015in. copper. The paint is then removed with cellulose thinners. A china or glass vessel should be used for the ferric chloride solution as it is corrosive. Remember to check before drilling that the holes marked are suitable for the components you are going to use.

The transistor leads may be left quite long when soldering into place so that they are not damaged by the heat. With transistor types other than the OC76 the circuit will probably not oscillate without changing component values; R1, R2 are fairly critical; R3 will affect the waveform. A 9-volt supply is required for

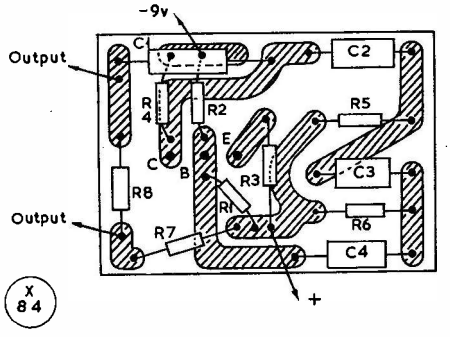
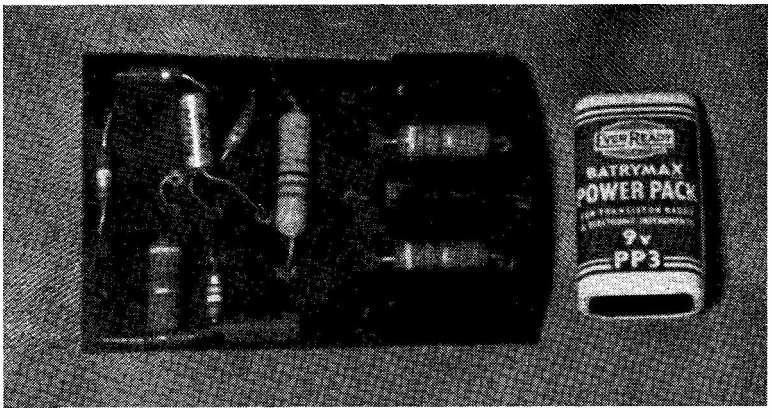


Fig. 2. Layout of the circuit of Fig. 1 on a home-made printed circuit board 3½ ins. by 2½ ins. Compare with photograph.

correct operation; an Ever-Ready type PP3 battery is a convenient size, and since only 1mA flows it will last.

With the resistance-capacity values given, the output audio frequency of this unit was found to be 926 cycles/per sec. The output voltage is 7 volts peak across a high impedance; resistors R7, R8 form a potential divider to reduce the level to about the same as that given by a crystal microphone — in this case 39 millivolts.

The oscillator can be fed into a low impedance by series connecting with the battery. And. of course, it can also be used as a Morse practice oscillator, keyed in the battery lead, if fed into an amplifier.



The transistorised audio oscillator constructed by G3MEO is on a home-made printed circuit board. Chemicals and laminated board for printed circuit work can be obtained in kit form.

The materials for making printed circuits may be obtained in a kit form, or the laminated copper board only, from the manufacturers: Formica Ltd., De-La-Rue House, 84/86, Regent Street, W.1. A kit, which contains the necessary chemicals and includes some laminated boards, is available from Proops, Ltd., 52 Tottenham Court Road, London, W.1.

AMERICA REVISITED

AMATEUR RADIO EXPERIENCES

R. F. G. Thurlow (G3WW)

Two years ago, the author had his first trip over to the States. He has just returned from another visit, this time as a member of the party of English lawyers attending the American Bar Association meetings. His experiences and impressions in the radio context are the subject of this article.— Editor.

YES, Bill French, W2AB, of Princeton, N.J., did get on SSB with "more than medium power" (*Short Wave Magazine*, October 1958, "Amateur Radio in New Jersey") and now has a Hallicrafter HT-32A driving a home-built grounded-grid one kilowatt Linear using a pair of 813's to the design of his neighbour, K2VBQ—who was also met on this year's visit and who had bright ideas on obtaining high voltage for SSB transmitters with a voltage-doubler circuit using small diode rectifiers.

Apart from a new three-band Cubical Quad and a 2-element 40-metre beam, W2AB still has his Collins 75A4—it hardly seems necessary to mention that American manufacturer's name since the lifting of the ban on radio imports last November. Collins receivers, in particular, were found in all but two stations visited, though it was disconcerting to notice the Heathkit Q-Multiplier added outboard to the 75S-1 and the new Drake 2A receivers to beat the QRM—not necessary with the Hammarlund HQ-170!

It was sad to find that in exactly two years how many friends, radio and otherwise, had moved out of the immediate district, but many of the 110 SSB contacts made since April, 1958, were met in person for the first time, including W2YFB, a regular contact in Princeton.

Incidentally, a tip-off that a QSL card marked "I am interested in aerial navigation aids" would work wonders, got the writer into the cockpit of both the Air France Boeing 707 and Trans-Canada Air Lines Super Constellation on the trip over; the space-saving radio layout used in aircraft might well be adopted by mounting the whole or part of our transmitters overhead.

Visit to Washington

The international lawyers visiting Washington D.C. were offered a tour round any of some 37 Federal Departments—my wife and I in the only time available in a seventeen-hour day (of temperatures of 105° - 120° in the sun) chose, naturally, the FBI and the FCC. Our host attorney, W3FMC, weakening towards SSB from his first love—1 kW of CW with an 85-foot telescoping three-section tower and many receivers, including an Eddystone 770R—said it would be a waste of time to visit the FCC, as it was only an office and the interesting Field Station was many miles away; but he would ask them to come to one of the three lunch parties he was giving for us to meet the local amateurs, several

of whom I had QSO'd. He was as good as his word and I had the great pleasure of meeting W3ASK, George Jacobs, the propagation expert for the V.O.A. system and *CQ*; K5PKK, attorney Ralph Churchill, of Dallas; John McCue, head of the FCC Amateur and Special Services division; Wm. Grenfell, W4GF, Chief of the FCC Amateur Section; while others in the party included Cdr. Paul H. Lee, USNR, W3JHR; Laurie Krauss, W3IXX; Owen J. McReynolds, K3GKU; John Moulton, W3ILD/M; and Robert Gooding, W3OII. I also met FCC Examiner Judge Basil Cooper, who seemed surprised that we over here had heard of the suspension of certain kilowatters! Sam Newman, W3HN, showed us round the Television/AM/FM Station, where he is engineer-in-charge.

Arriving back in Princeton after a six-hour bus journey from Washington, I was picked up by K2GMO, Robert Aingle, who with the secretary, K2QHL, Bob Tuttle, drove me to the meeting of the North Jersey DX Association at W2AGW's home at Harrington Park, N.J.—an avid CW man—to be the first G visitor they had had, where I was given a warm welcome by the twenty or so rabid DX'ers present. K2GMO got me home to bed at 2.30 a.m., and then drove off to his home, quite unconcerned at his 300-mile round trip just to get me to that meeting—this is just an example of the sort of hospitality to be found everywhere in the States, especially among the radio amateurs.

W4OEF/2, Kim Redlack, after showing me another 40-metre 2-element beam, drove me miles to "Radio Row" in Camden, N.J., and over the Delaware River to Philadelphia, where the new Hammarlund HX-500 SSB Transmitter at $695 was admired, but nowhere did current U.S.A. transmitters inspire much covetousness, except, perhaps, the compact Collins 32-S, if one disregards its separate power supply unit. Thence to the northern part of Philadelphia in heavy three- and four-line traffic for miles to visit W3HQO, who must be the most homesick English radio amateur in the United States, despite his long absence from Kidderminster—I think we cheered him up, judging from a later telephone conversation with another English exile, WA2EVH, in New York State.

Attendance at the garden party given by the Mayor and Mayoress of New York City to the English lawyers conveniently fitted in with a visit to the Cortland Street radio dealer district and dinner with W2RID, John Rider. Having sat through the hurricane "Donna" while in Princeton, it became quite clear that the photographs in *QST* of previous hurricanes were no exaggeration—in that town alone it took almost a week to clear up the mess and *debris*.

If your radio store is near a radio manufacturer's factory and you are out of stock of a component part urgently needed, you drive over to the factory and get it—that is how it came about that, through the good offices of Allen and Hurley, of Trenton, N.J., I was shown over (by special permission, as I was not an American citizen) the Bristol, N.J., factory of Barker & Williamson Inc., and there met W3EOZ and W3YXC.

Eugene A. Walter, Jnr., W2ZKQ (SSB, Collins equipped) and his XYL, of East Meadow, Long Island, with whom we spent a night, took us to a party given by the Straubens, K2HEA and K2MGE, of *CQ* SSB, where we met several amateurs, and next day again visited "Radio Row" in downtown, New York, and admired the possibility of amateur VHF operation from the top of the Empire State Building.

In the Adirondacks

Finally, the trek home *via* Montreal started when Dr. Walter Roberts, W2CHO (late of R.C.A.) and his wife drove us some 350 miles north to W2RNC's Camp Asulykit on Lake Placid, at the foot of Whiteface Mountain in the New York State Adirondack Mountains. "Far from the cry of the City," with the foliage rapidly taking on its fall colours, we spent the two most restful nights while in the States, and only just heard chipmunks running over the roof of our genuine log cabin. Brunson McCutchen, W2RNC, let us play with his Collins equipment and Cubical Quad, literally nestling in the forest, and his fibre-glass hulled jet speedboat on the lake, and took us to the top of Whiteface Mountain (4875 ft.), the scene of many VHF expeditions. His camp is only approachable by boat in the summer and by car in the winter over 38 inches of ice.

Then a journey of 117 miles to Montreal and home by DC7C to a partially fog-bound London Airport.

The month sped by far too quickly; many radio friends could not be visited in person because of the distances, although several were spoken to on the land line—while a "funeral parlour" and Sing Sing Prison, which were on our schedule, have still to be visited!

HIGHWAY ROBBERY

G3NQN (London, N.8) had his car stolen from outside his QTH one night recently. Three days later, it was found abandoned—with the /M gear, comprising Command receiver, home-built transmitter, vibrator unit and 6-volt battery stripped right out. *(From the Southgate, Finchley & District "Newsletter.")*

MAGAZINE TOP BAND CLUB CONTEST—MCC

This well-established annual inter-Club event, the fifteenth in the series, takes place on November 12-13 and 19-20, during 1700-2000 GMT daily for each of the four sessions. Though the main objective is for Club stations to work other Clubs, points can also be scored for non-Club contacts. Accordingly, those interested in Top Band working on CW (the event is confined to 160 metres, CW only) are invited to join in. The rules were given on p.438 of the October issue of SHORT WAVE MAGAZINE, rules (5) and (6) being those directly affecting non-Club operators. We shall welcome check logs from anyone working Club stations during MCC.

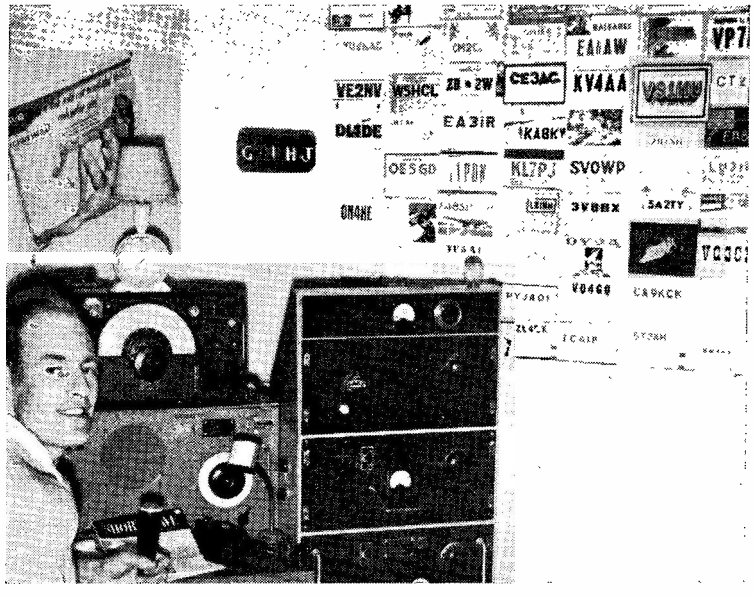
DX COMMENTARY

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

CONDITIONS have been just about normal for the time of year, except for a spectacular fade-out around October 6 and 7, which played real havoc with the HF bands and left them flattish for some days after. (This coincided with a great Aurora manifestation, which made the VHF boys very happy.) On the night of October 6 not even the commercials were getting through on the HF bands, and if the jammer network was on, it was only wasting juice.

Winter conditions should be with us very shortly, and there ought to be plenty of interest on all bands except, probably, Ten. It has been interesting to re-discover one of the phenomena of many years ago (before the sun-spot peak, that is!); we refer to the rapid changes in conditions during the early mornings. One morning is good only for VK and ZL; another for W6, 7, VE8, VE8 and KL7; and yet another (rarer, unfortunately) for the Pacific DX like KM6, KS6, KW6 and the exotics. This doesn't happen during years of high sun-spot activity, but we remember it well from 1952 or thereabouts, and now it's beginning to show up again.

There's a lot to choose from these days, what with the growth of interest in SSB (watch that section each month!), working ZC4 on Top Band, DX-peditions, MCC (for the Clubs) and the big world-wide Contests—don't forget the *CQ* DX Contest, CW Section, November 26 to 28. Furthermore, there's a very big mail this month, so we will cut the preamble and proceed.



G3LHJ

CALLS HEARD, WORKED and QSL'd

DX Gossip

The W4BPD/VQ9 expedition should have been going in a big way during the two weeks or so before you read this. If they are still on schedule, they should be in *Madagascar* on November 4; *Isles Glorieuses* (FB8) on the 5th; *Astove Island,* 6th-10th; *Aldabra Island* (VQ7), 7th-21st; *Comoros* (FB8), 22nd - 25th; *Tromelin Island,* November 29 to December 5. The above are subject to qualifications, such as "if new country is allowed" and "if the money doesn't run out"! We will hold the December dates until next issue.

The ZS6IF expedition to ZS9 is now timed for November 13 or thereabouts, for two or three weeks; meanwhile, ZS1OU and ZS1RM have already been active from ZS8 and have been worked by quite a few of the keener 'chasers.

Cyprus: It seems that two prefixes will eventually emanate from the island, since cards from the ZC4's are now marked "British Sovereign Area of Cyprus." If and when any of the nationals are licensed, they will almost certainly start off with a new prefix. *(Late Flash:* 9C4.)

MP4TAF is now VS9ADL, but after November 17 he will be a VS1. At present he is said to be operating the club station VS9AJW . . . FK8AS is talking of having another shot at Wallis Island (FW8) . . . The CR6CA expedition has been going strong, with CW and SSB operation from CR5MA (Sao Thomé).

VK3CX says he has heard ZL3VB (Chatham Island, of course) calling CQ and going unanswered! Where are the wolves? We have noticed from time to time that this happens—usually when the whole band is full of uninteresting stations all calling CQ.

MP4BDA, who holds so many other calls that his QTH is superfluous, has been on from MP4QAO and also from Basrah, Iraq, where he signed MP4BDA/P. From November 5 for two weeks he will be on SSB from DJØBF; and from November 24 to December 2 he is to be working CW and SSB from ZB2-land. Frequencies will be 14296, 21415, 28650 kc, and on 14 mc he will not answer calls on his own frequency—14306 kc for non-Americans and 14286 kc for W/K stations; on the other bands, his own frequency only. When Bryan returns to the Middle East in January he will be in either OD5, 9K2 or EP, with trips to YI, MP4B, MP4T, MP4M, MP4Q and possibly even 4W1 again. Behind all this travel is a KWM-1 and a dipole. Fellows like this are a whole DX Contest on their own!

VQ4GQ/VQ1SC writes to say that on the recent VQ1 trip they made over 3000 contacts in 80 countries, starting on September 23 and closing on October 1. With 50 watts, a 14 mc ground-plane and a dipole for 28 mc, they operated from the ironing-rooms on the roof of their hotel. QSL's are going out *via* W2CTN, but VQ4GQ will supply direct VQ1SC cards on receipt of IRC's.

DX Shorts

Danny Weil was due to be signing HC8VB in mid-October, and may still be there when you read this; Clipperton (FO8AN) is the next stop, scheduled for November 15; all future QSL's for the Yasme expeditions to go to W8EWS, *not* KV4AA... VU2RM says that VU2CQ is going to have another crack from AC5, late October or early November... CR10AL being called by W's on 21 mc... The "HM" prefix is now being used in Korea—HM1AD (Seoul), active on 14050 and 14100 kc CW. (Thanks to G2DC for this gen.)

Last month we quoted W6NTR as saying that FQ8HO was in the Central African Republic; he has written to say he was mistaken, and several others have pointed out that FQ8HO is in Tchad. FQ8HP is in the Republic of Middle Congo, however. We shall soft-pedal on all these new countries until the situation clears itself up; meanwhile, we (and many others) are beginning to favour the WPX scheme more and more, as opposed to the dreary business of sorting out so-called "countries."

For those who still have not worked Fernando de Noronha, PY7LJ (no suffix) is supposed to be on 21050 kc CW most days, 2000-2130 GMT... Zone 19 (UAØLA) will be on SSB shortly... Activity from Socorro is planned by XE1PCV/XE4 next January; meanwhile, XE6A has been worked by W's.

Awards in Brief

Some further gen. for the sheepskin hunter, but don't ask us for further details—there simply isn't the space available these days. "Mexico Award"—for contacts with 15 States and the Federal District (Mexico City), and contacts with 50 XE stations (including the above). "WAXE Award"—for 15 contacts with XE1, five with XE2 and five with XE3. Details of both from L.M.R.E., AC, P.O. Box 907, Mexico 1. Also from L.M.R.E. the "America Award," for contacts with 40 different countries in America (North and South) and with 20 XE stations. All awards are for two-way A1, two-way A3 or two-way SSB—no combinations allowed.

Vasteras Radio Club, Sweden, handles the WAV. Twenty contacts with Vasteras amateurs (for LA, OH, OZ or SM stations); ten for the rest of Europe; two for DX. The "Scandinavia Award"—European stations have to work 50 stations in each country—OZ, OH, LA and SM5, *plus* all SM districts, 1-7. The "100-SM5 Award" is for work-

FIVE BAND DX TABLE

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	DXCC
G3FXB	860	77	137	232	242	172	276
G2DC	850	90	124	249	218	169	277
G3FPQ	828	74	120	232	237	165	266
G5BZ	797	66	121	272	206	132	281
G3DO	701	25	51	253	191	181	280
GW3AHN	687	16	55	210	256	150	272
GI3IVJ	686	42	70	202	203	169	243
G3BHW	663	15	45	211	223	169	255
G3ABG	610	57	93	191	141	128	215
GI3NPP	552	28	58	154	190	122	221
G2YS	542	73	93	171	120	84	190
G3LET	538	41	123	192	127	55	212
G3IGW	493	51	83	118	123	128	176
G6VC	492	40	60	164	138	90	195
GM2DBX (Phone)	433	34	31	162	105	101	178
W6AM (Phone)	432	23	62	287	49	31	287
MP4BBW (Phone)	420	1	5	199	135	80	213
G3DQO	408	25	54	183	105	41	192
G3KMA	406	33	83	129	94	67	163
G3LHJ	403	19	40	117	149	78	183
G3NOF (Phone)	374	8	18	83	143	122	179
G8DI	361	38	69	110	79	65	140

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	DXCC
G3JUL	357	27	67	87	82	94	144
G2BLA	352	38	67	81	87	79	133
GB2SM	351	20	33	85	105	108	186
G3DNR	329	11	30	94	108	85	140
G3LKJ	320	8	20	50	118	124	158
G3WP	305	17	34	107	35	112	159
G3BHJ	304	8	29	47	145	75	168
G3GHE (Phone)	301	13	29	45	128	86	160
G2DHV	292	22	33	135	67	35	160
G2CWL	276	21	29	78	117	31	154
W3HQO	263	4	9	92	121	37	202
G3JVU	262	27	44	96	50	45	116
G4JA	244	36	52	83	56	17	127
G3NAC	242	17	39	70	81	35	115
G3JFF	238	20	57	109	43	9	116
G3NWT (Phone)	234	4	12	4	132	82	159
G3NFV	224	12	25	27	72	88	129
G3JJZ	197	26	43	89	30	9	110
G3LZF	182	11	20	54	48	49	118
G3IDG	179	15	20	45	52	47	82
GM3DNF	107	12	24	27	34	10	54

(Failure to report for three months entails removal from this Table. New claims can be made at any time)

ing 100 SM5 or SL5 stations; and the "100-SM Award" for working 100 SM stations. Details of all these from SM5WI, Vitmaragatan 2, Vasteras, Sweden.

Briefs

G6QB was put completely off the air by woodpeckers! However, activities were resumed after three days, this time with a metal sky-hook . . . Quote from an ON4 station: "My beam is facing away from you and I am receiving you on the backside." . . . And one from a W9: "My antenna is an inverted ground-plane." What puzzles us is, does the vertical wire go down into the ground, or are the radials high in the air?

Top Band DX

The winter tests are no longer to be known as the Trans-Atlantics, but as the "Worldwide 160-metre DX Tests." The "official" Sunday mornings will be December 4 and 18, January 8 and 22, February 5 and 19, and the sessions, as before, will start at 0500 GMT and finish at 0730 unless conditions are such that something is still happening. Further details later.

As W1BB's preliminary bulletin says, "These tests are sponsored by an active group of British and DX amateurs, in co-operation with W/VE stations particularly interested in working DX the hard way, on 160"!

Band conditions on One-Sixty are already showing an improvement; W2TR has been heard in England twice, and East Coast W's have been working the sixth district. Several new countries should be active this year, and judging by the big change in the HF bands, Top Band should be considerably better than it was last year. Meanwhile, please keep us informed of anything interesting in the DX line, and it will all go into W1BB's bulletins and records for the benefit of all parties. Stew himself tells us that W1BB should have an even better signal this year, as he is working on a new aerial at the Winthrop Yacht Club, entirely over salt tidewater, for his second station W1BB/1; he will be starting up in November.

Cyprus is not exactly local—our great circle Zone Map makes it 2000 miles as compared with just over 3000 for Boston, Mass.—and so it is quite an achievement to work ZC4 on Top Band with 10 watts. ZC4AK has provided a welcome opportunity, and has been worked during the month by G3NNF (Wantage), G3IGW (Halifax), G3NVO (Middlesbrough) and G3OGY (Salford). Congratulations to all these, particularly the last-named, who, of course, has only recently been licensed. G3NMZ (Luton) and SWL Peter Day (Sheffield) also heard ZC4AK; G3IGW reports him peaking at 589 (midnight on October 1), and they even tried phone, but didn't quite make it.

G3NNF worked several OK's on CW, and GI6TK on phone; G3NMZ collected GM3BHT/A (Kirkcudbright), GM3LZW/A (Ayr) and GW3NWR/A (Cardigan), among others. (G3IGW thinks he can now claim WAMC—Worked All Motor Cars!). G3NVO worked the foregoing as well as GM3MGI (Ross) and GM3AWF (West Lothian); and G3JVL (London, W.5) raised GM6RI and an OK; he, too, heard ZC4AK. G3NBT (Sidcup) thought conditions were probably very good, but was much troubled by QRN, very severe at times.

For those interested in Hunts. for their county scores, look out for G3MMH, from R.A.F. Wyton, just outside the town of Huntingdon itself.

The DX on SSB

Several of the CW devotees are appearing "up the top end" these days; and quite a few of the erstwhile AM enthusiasts have shed their carrier-waves. The only cloud on the horizon is that more and more of what we can only call "useless junk" appears in the top 50 kc of the 14 mc band — whiskers belonging to jammers, CW stations interminably calling someone and saying "QRU," and a kind of fruit-jelly thing that sweeps slowly down the band, wobbling its way as far as about 14280 kc, where it seems to stop and start all over again. All not terribly helpful, but the SSB boys manage a few QSO's in spite of it all.

MP4BBW (Awali) sends the usual terrific list, from which we extract only the nicest pieces because of space; MP4BDA/4QAO, who promises activity from ZB2 *(see* "DX Gossip") also checks in. Heard or worked on the band have been KM6, KW6, KS6, 9N, VQ9, ZK1, HV, M1, BV, FB8 and many other desirable pieces.

The lists which follow speak for themselves; no one worked it all, and it is rather interesting to note who missed what — mostly on account of operating hours, no

During the early part of September the Falkirk group staged a Top Band expedition into West Lothian. Here is an impression of the site, 1,000 ft. a.s.l., near Bathgate. Some 60 stations were worked and the trip was regarded as very good experience for the more recently-licensed members.

doubt. GW3AHN (Cardiff) is the latest recruit, with GI3IVJ (Belfast), G3DO (Sutton Coldfield) and G3NOF (Yeovil) all doing their stuff very nicely.

SSB DX WORKED

14 mc Band

G8KW: HS2A, KH6AHQ, 6AWS, KC4USV, KR6GF, KX6BQ, 6BU, VS1KD, VK9NT, WA6GMM/KG6, ZP6BB, 9N1GW.

MP4BBW: YN1TAT, 9N1SM, HC1FG, VQ9TED, 3V8CA, VR1D, KX6BQ, VP2AB, KC4AAC, VQ5FS, CR5CA, VS1KD, 9Q5US, 5PU, EQ2AT, HS2A.

MP4BDA: EQ2AT, OHØNC, W4BPD/M1, 9Q5YM, TI2HP, 3A2BW, VS4JT, AP2CR.

MP4QAO: TI2HP, HC1FG, 9Q5YM, AP2CR, UR2AR, KP4BM.

GI3IVJ: BV1USC, FB8CM, HS1B, KX6BQ, LX1SI, VQ5FS, VQ9TED, VU2NR, ZS3AD, 9N1SM, 9Q5US.

GW3AHN: KM6BO, KX6BQ, 9N1SM, VP2AB.

G3DO: EQ2AT, HV1CN, W4BPD/M1, KM6BO, KX6BQ, ZK1BS.

G3NOF: CR5MA, OD5CT, 5CV, VP2AB, VQ9TED, 9Q5US, KW6CL.

G6QB: CR5MA, CR9AH, KM6BJ, 6BO, KR6MA, KX6BQ, VS1JV, 9K2AM.

The DX on AM Phone

The 21 mc band still seems to carry most of the AM Phone DX, with SSB yielding little but W's. The reason for this is still a mystery, since the reverse holds good on 14 mc. Excellent lists are in from G3NOF, G3GHE (Reading), G3NWT (Sandiacre), G3FPQ (Elstead), G3LKJ (Torquay) and GI3NPP (Dungannon), mostly with the accent on 21 mc.

Some of them have also netted quite a few on 28 mc, but the going there gets harder and harder. G3BHJ (Norwich) on the latter band worked CR7EA, UA4IF, VS9AJW and YN1EDB; and G3LHJ (Newton Abbot) raised HH2CX, HP1AC, XE2DC, ZS8I. On 21 mc G3BHJ worked HC1FV, KL7FAY and TF5TP; G3LHJ weighed in with DU6MJ, KA2JG, VP8DW and ZS3R. (By the way, we fancy there was a nonsense perpetrated last month concerning these two rather similar call-signs, and we hope all is clean and clear this time.)

G3LKJ put the accent on 28 mc, where he had what he calls a "really exceptional contact" with W5NJM/Ø/Mobile, who was using only 10 watts to a base-loaded whip *and* in motion in a built-up area!

G3NWB, Bognor Regis, Sussex, obtained his licence in time to get on the air for his 70th birthday! Taking the local R.A.E. course run by G2JU, he passed the G.P.O. examinations and is now operating Top Band with a VFO 6AM6-6AM6-QVO4/7 transmitter (constructed with the help of the locals) and 6L6 modulator; the receiver is an R.107. A TCS-12 assembly is under modification for the 20-40-80 metre bands. Truly, it is never too late (or too soon) to start out in Amateur Radio, and we wish G3NWB many happy years on the air.

G3NWT had a number of long-path QSO's; for instance, he worked a CX whose beam was headed on ZL, while his own was shooting north. On another occasion he heard an F8 when his beam was facing north and, on switching south, the signals disappeared into the noise. There was no short-skip and the signal didn't sound like back-scatter.

G3NAC (Bourton-on-the-Water) reports curious experiences during the Aurora period, when he worked a G who was 100 miles south of him, with both beams pointing north (normal Auroral scatter, this, but none too common these days).

AM PHONE DX WORKED

28 mc Band

G3NOF: CR6AJ, 7FG, HH2CX, KG4AT, KZ5GM, 5HK, 5SB, OA4AI, PZ1BK, TI2OE, VP6AM, 6PV, VQ3PBD, XE2DO, ZS3R.

G3NWT: VQ8AV, 9M2EZ, VQ3PBD, 3HH, EP1AD, ZS8I, VKØPM, PY7LJ, XE2DO, 3CP, CO7SO.

G3LKJ: CR6DU, 7CK, CX3AA, ET3MA, HH2PL, HI8DGC, KZ5GM, OA1A, PZ1BK, TI2CMF, VP1BS, 6HR, 7BO, 8EM, VQ8AV, YV3BD, ZP5OG, ZS3B, ZS8I, 9M2GA.

21 mc Band

G3NWT: KS6AK, FK8AU, KG6AIY, KR6ID, 6IM, CR9AN, EP1AD, VKØPM, OR4TX, VP8CC, 8EI, 8EH, 8CX, FQ8AE, FB8CQ, VQ3PBD, VS1GZ, 1DW, 1KF, VP6PV, 6WR, 9Q5FW, 9M2EB, 2DX, 2GW, VP5AB, VS5GS, DU1AP.

G3GHE: BV1US, CR9AN, FQ8AX, FQ8HL, FR7ZD, KS6AK, OHØNC, VS6EJ, 6O2GM, 9Q7ZZ (Katanga).

G3DNR: EA6AY, 4X4IK, 9G1CC.

GI3NPP: CR9AN, EA6AY, FF7AG, 8CK, 8CN, KØTFP/KW6, KC4USA, PY7LJ, VP8FA.

G3FPQ: FF4AA, 7AG, FQ8AE, 8HL, FR7ZD, KS6AK, KC4USH, K6CQV/KS6, VR2's, UH8BN, 6O2GM.

G3NOF: CR9AN, FF7AG, JA1ACB, MP4BBA, 4BCI, VS9ADL, OHØNC, ZD2AMS, 9M2GW.

G3LKJ: HC5NW, VP4MM, PZ1BE, VU2BK, K4EA/KH6, KH6BPF, VS9AJW, VR2AS, KA2JL, ZS3L.

The DX on CW

CW remains the true "all-band" means of communication. Not one of our Phone reporters can muster up four bands, let alone five; and most of them stick to two. All the AM Phone reports cover 28 or 21 mc, and the SSB reports 14 mc . . . but the CW reports (not the signals!) spread all through the bands. There must be a moral in this somewhere.

Comments first, and then the actual DX worked, when it

justifies listing. And, while we are on this subject, please *do* comment on anything relevant, bearing in mind the title of this feature. It is far better for it to be a genuine forum for readers' opinions than for it to degenerate into a mere list of stations worked.

G2DC (Ringwood) is not only a staunch CW man—nearly 100 per cent—but also he never fails to make some interesting comments on goings-on. Of 28 mc, he says "there's life in the old dog yet"; of 21 mc, he remarks that it was *really* knocked out by the big fade-out; and of 14 mc, "short-skip QRM and shocking operating tactics still queer this band for me."

He adds that the morning of October 9 was quite good, with the band "nice and selective"—a good smattering of VK and ZL stations working on their contest. Then, suddenly, the whole band erupted and became a mass of T7 QRM—there was a WSEM Contest on, too!

G3LHJ says conditions seemed to be tailing off, but *Ten* actually peaked up, especially for the USA. G3LKJ worked quite a bit of DX, mostly on *21 mc*, which was good early in the month, especially for long-path VK and ZL signals.

G3DNR (Broadstairs) found it most enjoyable to hear CW DX coming in on *14 mc* around lunch-time, with European signals almost out of the picture; Asia and Far East, mostly, too.

G4JA (Baschurch) heard KØSLD/KW6 suddenly arrive out of the blue *(21 mc*, morning of October 13); he was very easy to work, and it took a little while before the European pile-up materialised. G4JA collected a 579 with his long-wire and 40 watts. Otherwise there was not much of interest except for VK and ZL on 14 and 21 mc, sometimes like locals.

G6VC (Northfleet) caught up on FB8XX after many hours of stalking, and also winkled out ZS7M (21 and 14 mc respectively). If UAØKAE is in Zone 19, then he has made WAZ (but we don't somehow think that he is . . . at least, none of the other UAØKA . . stations have been).

G3WP (Chelmsford) still sticks to *14 mc* CW, but didn't raise anything exciting this month; however, he collected OY2AB, LA2DE/P (Spitzbergen) and SVØWO (Crete), *plus* plenty of VK, ZL and similar DX. GM3DNF (Milltimber, Aberdeen) is now on from his third QTH (with his third prefix!) So far, the best he can do for an aerial is an "unknown length" of 32-gauge wire, 15 feet high at one end and 7 feet at the other! It shows a marked directivity to Africa. Bearing in mind this piece of wire, it was very creditable to work VU2RE, UF6, 4X4 and TF5TP on *14*; ZS's, VQ2MS, VP8CC and a VE4 on *21*; and VQ1HT, CR6AZ, ZD2JKO, ZC4 and UH8 on *28 mc!* Others who say they can't put up any sort of aerial might profit from this experience. Of course, the power helps . . . the input for these QSO's was 15 watts!! Nice going, 'DNF.

G3LPS (Blackburn) has Zone 23 in the bag, JT1KAB having

SHORT WAVE MAGAZINE DX CERTIFICATES

RULES

WNACA (Worked North American Call Areas)
Twenty-two cards to be submitted, for contacts with stations in ten U.S. Districts (W1-Ø); nine Canadian (VE1-8 with one 8 in Yukon, one in North West Territories); Alaska (KL7), Newfoundland (VO) and Labrador (VO). Contacts may have been on any bands, phone or CW. Operators in W, VE, VO or KL7 are *not* eligible for this Award (254 *WNACA Certificates issued to October*, 1960).

FBA (Four Band Award)
Cards to be submitted with confirmation of contacts with 20 different countries, *each* country to have been worked on four different bands. Any four bands will qualify, e.g. 160-80-40-20, or 80-40-20-10, or 160-40-20-15 — and so on. Entrant's own country may count as one of the 20 countries. (192 *FBA Certificates issued to October*, 1960).

WFE (Worked Far East)
Eighteen cards to be submitted for 18 different countries selected from among the following: C (China), C3 (Formosa), C9 (Manchuria), CR9 (Macao), CR10 (Timor), DU (Philippines), FI (French Indo-China), HL (Korea), HS (Siam), JA/KA (Japan), KR6 (Ryukyu Is.), PK1-2-3 (Java), PK4 (Sumatra), PK5 (Dutch Borneo), PK6 (Moluccas), UAØ (USSR in Zone 19), VS1 (Singapore), VS2 (Malaya), VS4 (British North Borneo), VS5 (Brunei), VS5 (Sarawak), VS6 (Hong Kong) and XZ (Burma). All or any bands count. (47 *WFE Certificates issued to October*, 1960).

WABC (Worked All British Counties)
Sixty cards required, from sixty counties of the British Isles, all to have been worked on the 160-metre band since January 1, 1952. Counties to be as shown in any standard atlas, *not* "administrative counties" such as the three Ridings of Yorkshire, East and West Sussex, County of Bristol, and so on. Isle of Wight counts as Hampshire — not separately. Isle of Man does score separately, as do all the Channel Islands. Scilly Isles also count separately. For London the L.C.C. area scores as one County. (222 *WABC Certificates issued to October*, 1960).

WBC (Worked British Counties)
Open only to claimants *outside* the United Kingdom and Eire. Cards required from 50 different counties of the British Isles, worked on any band 3.5 to 28 mc inclusive, phone or CW. The definition of U.K. counties is the same as for the WABC Certificate above. (182 *WBC Certificates issued to October*, 1960).

PRA (Polar Regions Award)
Claimants must be able to show cards as follows: (*a*) Arctic—QSL's from six of the areas Alaska, Canada, Finland, Greenland, Norway, USSR *all lying north of the Arctic Circle*. Jan Mayen and Spitzbergen (incl. Bear Is. and Hopen Is.) — making eight possibilities from which the six cards can be derived. Also (*b*) QSL's from any six of the following eight Antarctic areas: Antarctica, Falkland Is., Heard Is., South Georgia, South Orkneys, South Sandwich Is., South Shetlands and Macquarie Is. Cards must not be dated earlier than January 1st, 1955, and contact can be on any band, CW or phone. (*Award instituted September*, 1957. *Eleven issued*).

MDXA (Magazine DX Award)
To qualify for this Award it is necessary to have worked 3 continents, 15 countries on 160 metres; 5 continents, 40 countries on 80 metres; 6 continents, 80 countries on 40 metres; 6 continents, 180 countries on 20 metres; and 6 continents, 90 countries on 10 metres. (*Eight Awards issued*).

CONDITIONS

Claimants in the U.K. are required to send all cards in support, by registered post with a check list, when making their claims. Overseas claimants (only) may send either (*a*) A check list, without cards, duly certified by the Hq. of their national Amateur Radio Society, or (*b*) An uncertified check list, from which all or any cards may be called in for scrutiny by us. In no case will any Award be issued without proofs we consider to be good and satisfactory.

Claims, enclosing return postage (five IRC's in the case of overseas claimants) for all the above-mentioned Certificates should be addressed "DX Awards," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1

(Overseas Amateur Radio periodicals please copy)

obliged with an airmail QSL; he didn't start using *14 mc* until last February, and now scores 37 Zones, 100 countries; meanwhile, any signs of Zones, 6, 24 and 29 would be gratefully accepted.

VU2XG (Bombay), running 40 watts and a dipole, was getting 599 reports from W2 around midnight on September 18 and 19, when the band really was wide open *(21 mc)*. He is now also active on *7 mc*.

CW DX WORKED

14 mc Band

G2FFO: ZS7R, 3A2BW, FQ8HO, FP8BO, VS9OA, IC1IN, FQ8AG, I1IN/M1, W4BPD/M1, FB8XX, VQ1SC, VQ1HT, VQ8BC, ZS1RM/8, FO8AC.

G3LPS: OR4TZ, UAØ/AE, OX3UD, KP4VB, VQ1HT, ZD1AW, 1CM, VK, ZL, ZS.

G6VC: OR4TX, HC2VB, ZS7M, ZD2GUP.

G3JVL: DU1OR, 4S7EC, OR4TZ, OX3UD, 3DL, VP9QQ, EL4A, VU2XG, SVØWZ.

GI3NPP: CR5AE, FG7XC, W4BPD/M1, PY7LJ, VQ1HT, 1SC, ZS1RM/8.

G3NAC: CN9CK, AP4M, KX6BQ, UG6AV.

G3LHJ: DU7SV, VK1JE, VK5BP/8, VQ1SC.

G3GMK: W4BPD/M1, VQ8BC, UAØKAE, W6UNP/KH6, OHØNC, OX3UD, CN9CK, UT5CC.

G2DC: I1IN/M1, FQ8HO, SU1IM, HH2CB, HC2VB, FQ8AJ, VK1-7, ZS1-8.

21 mc Band

G3LHJ: ET3AZ, KØTFP/KW6, UAØGF.

G3NAC: FR7ZD, VQ2GD, VQ3HZ, UAØGF.

GI3NPP: CR5AE, HP1AC, KG4AO, KM6BI, W4BPD/M1, OR4TX, VP8CC, 8EG, VQ1SC, VR2AS.

G6VC: FB8XX, HK7ZT, ZS7R, UAØKAR, KV4CI/MM, 6O2GM.

G2FFO: KG4AB, VK9GK, VS9MB, YA1BW.

G2DC: FQ8HP, FB8XX, HC2VB, HH2CB, KR6DO, OR4RX, VU2RM, VP8CC, 8EG, VK9XK, VQ1SC, ZS1RM/ZS8, ZS3FF, ZS7R, 6O2AB, 6GM.

28 mc Band

GI3NPP: XEØNHD, ST2AR, VQ1HT, 7G1A.

Forty Metres

There is a chronic lack of interest in *Forty* these days — at least, among the DX-chasers. Our provocative paragraph on the subject, last month, was expected to bring forth the hot-under-the-collar brigade, but it didn't elicit one single squeak.

It seems that everyone is resigned to the fact that when its total width is 100 kc, this will cease to be a useful band for most purposes.

Meanwhile, that intrepid SWL, Peter Day, of Sheffield, has been covering it thoroughly, and his CW log shows JA1ANO, JA8FC, JA9AP, HC2VT, 3V8CA, KV4CI/MM, TF2WFF, 4X4JI, SVØWI (Crete), PY1-9, VK's and ZL's—as nice a listing of DX as one could wish for on a low HF band.

VU2XG writes to say that he is now active on Forty, which does not open up with him until after midnight. In four QSO's at the time of writing he had worked four countries—UH8, MP4, VK3 and G(3LET)—all on CW.

G2FQW (Worthing) continues his fascinating studies of the band on phone, and was very interested in the blackout of October 6. Even G's and local F stations were wiped out from 1130 until 1600 on that day. The "D" layer packed up completely, it seems—but around noon G2FQW managed to work GM8HP, HB9VS and I1HTN, all signals being S9. The following day conditions were back to normal but, of course, the upper HF bands were still completely freakish.

Miscellany

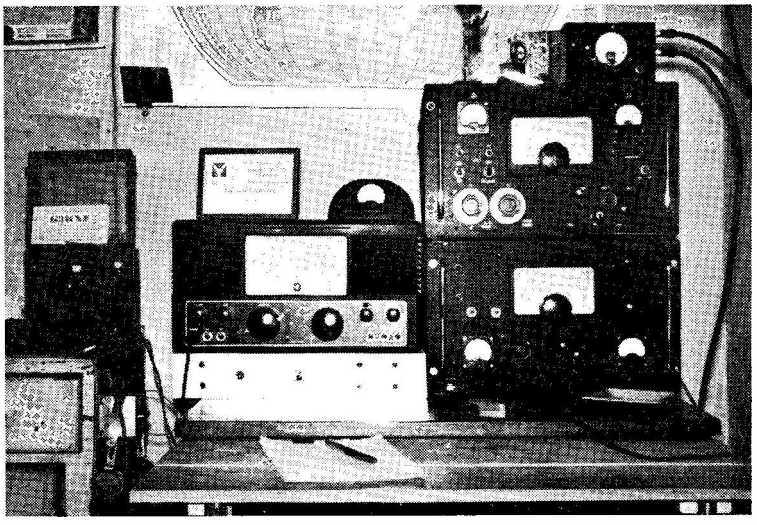
G3WW (March) arrived back from his W1-2-3 trip at the end of last month, and much regrets that he didn't hear a single G station while he was in the States. The main reason, he says, was that

WPX MARATHON

(Starting January 1, 1960)

CW Only		Phone Only	
G6VC	344	G3GHE	314
G8DI	328	MP4BBW *(SSB)*	301
G3JVL	293	G3DO *(SSB)*	239
VU2XG	256	G3LAS	219
G3LAS	249	GB2SM	186
G4JA	213	G3LHJ	177
G3JUL	200	G3BHJ	152
G8VG	194	G3MCN	145
G3LZF	178	G3NFV	125
G3LHJ	177	GM3NQB	107
G3WP	170	GM2DBX	92
G3DQO	157	G8VG	83
G3JVU	151	G2FQW	71
G3NWF	151	G3DNR	52
G3DNR	124	G6VC	50
G2BLA	120	G4JA	47
G2BP	112	G3NWF	47
G3MGL	108	G3MGL	17
G3JFF	103		
G3GMK	94		

(Stations not reporting for three consecutive months will be deleted)



G3KXF, Lancing, Sussex, was licensed in 1956 at Gillingham, Kent, and the main interest is chasing DX on CW. The gear, largely, home-constructed, includes a Type D Wavemeter and Eddystone S.640 receiver with an FL-8 audio filter. The transmitter consists of a Geloso 4/101 VFO into an 807, running 50-70 watts, and is operated CW only. A separate Top Band rig is available, in which the PA is a 6L6, modulated by 6L6's in Class-AB1. Up to date, the aerial has been a multi-band trap dipole, also used on 160 metres.

at the times he could listen any self-respecting married man should have been in bed! But he wants to thank the many G's who sent messages to him *via* the W's, and adds that he did meet W3HQO—"the most homesick Englishman in the USA."

W3HQO himself comments with pleasure on G3WW's visit, and continues his work for the "self-exiled community" over there. Last month we mentioned the ex-G net on Forty; now he says that they have started one on 28670 kc, with four members at present — K6CKM, K6PAK, WA6GLF and WA2EVH. The sked time is 1900 GMT—probably too late for us by now.

Ian Dufour (Banbury) reports that his friend ZS1AB is very keen on making contacts with Monmouth and Rutland; he is mainly on 28 mc, but now hopes to be active also on 21 and 14, with a four-element tri-band beam.

GM3DNF wants to know the significance of the words "Post-War" at the heading of the Five Band DX Table. Well, that table has been running for many years, and when it was started there was a considerable difference between "all-time" and "post-war" scores among some of the old-timers. We agree that it now has no significance at all, and shall be pleased to delete it. 3DNF himself is probably the only amateur to have entered the list three times, each with a different prefix —GW, G and GM.

DX — Late Flashes

The EQ2AT heard on 14 mc SSB is Frank of W2AYN, who formerly signed W2AYN/EP . . . 3V8CA, on SSB, is genuine, and by now you should find 3V8GB on 14 mc AM.

No news yet of a new prefix for Nigeria, but there is bound to be one soon. Some useful expeditions to the surrounding territories are hinted at. British Cameroons will be a separate country.

FL8ZA should be around in mid-December — it's Rundy of W3ZA, of course . . . CR6CA will be using the suffix EAØ when he operates from Annobon Island, a Spanish possession in the Gulf of Guinea, which will count for a DXCC country; so will CR5CA/CR5 from Ajuda Island.

YN1CAA and YN1TAT plan operation from San Andres Island towards the end of November. Their call will be HKØHCA—CW and SSB on 28, 21 and 14 mc by day, and 7 mc by night.

CEØAD, Easter Island, is said to be active on 14 mc CW, mostly early mornings; still quite a rare one . . . Marcus Islands—JA1ACB promises to have another go, probably in November.

From Ulan Bator, Mongolia—if you can find them—you now have a choice of JT1AB, JT1AC, JT1KAA, 1KAB and 1KAC! All are on 14 mc CW, with JT1AB working occasional phone (FM).

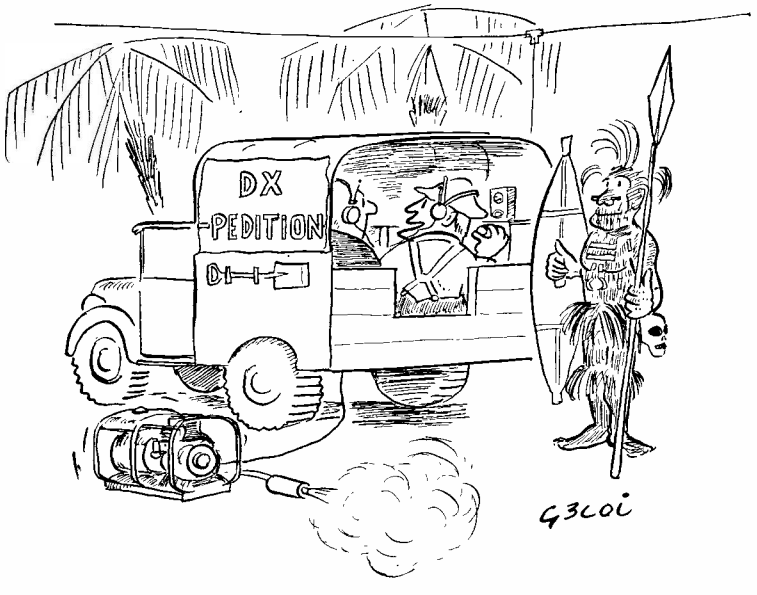
San Marino: Both I1IN and W4BPD were on from here during

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
G3JEQ	97	97
G6VC	96	96
G3APA	85	90
G3ABG	81	82
G3JVL	73	83
G3NFV	73	76
G3LHJ	71	77
G3FS (Phone)	69	72
G3MXJ	67	74
G2DF	67	73
G3NTI	66	68
G3NNO	64	82
G3NBT (Phone)	61	64
G3NVO	59	76
GM2HIK	59	69
G8VG	59	67
G3NJQ	53	54
G3NFF	50	55
G3JFF	47	59
G3NMZ (Phone)	45	55
G3OAG	44	54
G3LZF	34	56
G3NAA (Phone)	34	54
G3NNO (Phone)	32	52
G3NXQ	27	43
G3MXJ (Phone)	25	43
G3NOW (Phone)	23	36
G3ABG (Phone)	17	33
G3NPB (Phone)	14	35

(Failure to report for three months entails removal from this Table. New claims can be made at any time.)



". . . He says we'll never do any good with just a dipole . . ."

late September. To attract attention they put the "M1" before their calls instead of after. Not quite legit, perhaps, but certainly practical.

G3LMD (Birkdale, Lancs.), who is also VO1FB and FP8BD, reports on his visit to St. Pierre (Zone 5) during August 27-30; he had 291 QSO's, of which 238 were with W/K stations. All operation was on 20m., CW only, running 60w. with a dipole. In generally poor conditions, best DX was FY7YI, ZP5ET and VP2SL. Of the 53 non-U.S. contacts, about 18 were with Europeans—difficult to work through the barrage of W's. G3LMD also met FP8BO, who, in three weeks, had worked about 1,400 stations, mainly on 20m. G3LMD hopes to visit St. Pierre again next year—and will have some sort of highly directional aerial system to protect himself as far as possible from the pressure of American business!

Contests

Don't forget the CW half of the *CQ* Worldwide DX Contest (November 26-28). Rules were printed in full in our September issue, p.362. For the last few years the number of competing U.K. stations has been very small, being eclipsed by activity from OK, SM, SP and other European countries. We hope to see a bigger and better entry this year.

In this context, we note that W6NTR, of the *Western Radio Amateur,* has been conducting a poll among some of the USA DX Clubs concerning the ideal length of contests. All but one, apparently, approved of the 48-hour, one-session affair, although the vote for 24-hour contests was quite large. Chief of the reasonable arguments in favour of 48 hours was that if conditions turn out to be bad, there is a good chance of a workable stretch, whereas a 24-hour affair can quite well become a dead loss.

VK3CX voices the sentiment of most of the moderate contest-chasers when he says "Many fellows don't care how long a contest lasts, as they participate for only three or four hours—just long enough to get their feet wet."

Acknowledgments

For much of the news herein, our acknowledgments and thanks to the WGDXC *Bulletins,* W4KVX's *DX,* the *Western Radio Amateur,* the Polar Bears Radio Club's *DX'er* and our own many correspondents, who help to keep the news flowing.

That just about sums it up for another month. May we once more emphasise that word "Commentary" in the title of this piece and invite all readers to help us to justify it? We do *not* aim to make this feature an unending and boring list of call-signs worked, of records broken, of new countries worked or missed. Of far more interest to most of our readers is the kind of news that you pick up during a session on the air; strange things that happen on the bands or in the shack. If we all worked every bit of DX that we called, there would be no need for a DX Commentary—have you ever thought of that one?

So let us have everything in by the deadline, which is an early one — first post on **Friday, November 11.** Address it all to "DX Commentary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Until then, as ever, 73, Good Hunting and—BCNU.

REGULAR REQUIREMENT

Remember that we are always glad to see good, clear photographs of Amateur Radio interest for possible publication in SHORT WAVE MAGAZINE. Prints can be of any size, and should be accompanied by full descriptive notes. Payment (on publication) is made for those we can use.

AMATEUR RADIO EXHIBITION

This takes place during Wednesday, November 23, to Saturday, November 26, with the official opening by Brian Rix, G2DQU, at 12.30 on the Wednesday. At the moment of writing, some 24 stands have been booked by a representative body of firms and organisations directly engaged in the field of Amateur Radio, and once again the Royal Horticultural Society's Old Hall, Vincent Square, London, S.W.1—where the Exhibition is to be held, as last year—will be full of interest for the keen radio amateur and SWL. For those who do not know London very well, Vincent Square is near Victoria Station, and is about equal walking distance from St. James Park or Victoria Undergrounds. Alternatively, any bus along Victoria Street will take you near enough if you ask to be put off at the Army & Navy Stores; then turn down Artillery Row into Greycoat Place, and from there into Rochester Row, a short distance along which is Vincent Square, on the left. There is usually ample parking space round the streets nearby. The show will be open from 11.0 a.m. until 9.00 p.m. daily—to avoid the crowds, come in the morning if you can—and admission is 2s. We shall be on Stand 19 and, as in previous years, look forward to meeting many of our readers.

DX DEMONSTRATION BY G3CY

At a recent meeting of the Cambridge University Wireless Society, Prof. M. Ryle, F.R.S. (G3CY), Professor of Radio Astronomy at Cambridge and also president of the C.U.W.S., played back some recordings made on his radio telescope—from a noise source 500 million light years away. He estimated the power level at the source as something like 10^{33} kW—in other words, not QRP! The demonstration, and the fascinating details explained by G3CY, made a considerable impression on his audience.

SOME RECENT TRENDS

It is reported that our imports of Japanese-made transistors now far exceed the transistor exports by U.K. manufacturers. It is also clear from recent statistical surveys that while the sale of domestic TV receivers is going down, sound-only receiver sales are going up. And the number of nominal-capital companies being registered for local sound broadcasting on MF is still increasing—the total is already over 100. It looks as if almost every town of any size in the country could have its own BC station.

SWL

TUNING SSB SIGNALS, AND SOME DEFINITIONS—READERS' QUERIES AND OPINIONS—MORE SWL STATION DETAILS

NOW that so many of the world's amateur phone stations are changing over to SSB—with great benefit to themselves and the relief of the congestion on our bands—the SWL finds himself confronted with a new technique. The fully-equipped SWL *must*, of course, be able to take SSB reception in his stride; but far too often he shirks the issue as something too complex or difficult.

Let us examine the facts: First and foremost, you *can* copy SSB on your ordinary receiver, provided that it has a BFO (beat frequency oscillator, as normally used for CW reception). In fact one could say that the BFO is the only feature which is absolutely *essential*. Other features which are highly *desirable*, rather than essential, include the following: Good stability, mechanical and electrical; high selectivity; and reasonable tuning rate. The latter does not necessarily mean terrific bandspread, but at least implies a comfortable movement of the tuning knob per kilocycle of coverage.

Nearly all communications receivers *will* receive SSB, provided that the operator has the necessary know-how. Some of them have slight shortcomings which will need improving when you really begin to take the thing seriously. For instance, old models of the HRO (which have adequate bandspread) could do with a more stable oscillator; all models of the AR88 are excellent in this respect, but could do with a better bandspread (easily achieved by fitting a small 5:1 reduction to the main tuning knob).

Fundamentals

To explain the nature of SSB, it is simplest to imagine a carrier modulated with a steady 1000-cycle tone. On, say, 14300 kc this will confront your receiver with a 14300 kc carrier and two subsidiary "carriers," one on 14301 and one on 14299 kc. All three are unmodulated; but the outer ones will beat with the centre to give a 1000-cycle tone, if your receiver is broad enough to cover the spread (which it certainly will be). Now imagine the main carrier removed completely. To regain the 1000-cycle tone you will have to insert a carrier for yourself, by means of your BFO; and it must be on 14300 kc exactly, otherwise your modulation will come out at the wrong frequency. Next step, remove one side-band as well as the carrier, leaving only the one, single, *unmodulated* transmission (a pure CW transmission on 14301 kc, if we assume that the carrier and the lower side-band have been removed). With your BFO tuned to 14300, you will hear simply a 1000-cycle tone and nothing else. And if, instead of modulating his transmission with the original 1000-cycle note, the chap at the other end modulates it with a speech transmission, then that is what you will hear—when you make your BFO do the work formerly done by a carrier-wave supplied from the other end.

Here is another definition of SSB, which may help to clarify matters still further:

> "Think of SSB as a frequency-conversion process by which the voice spectrum of 300-3000 cycles in the audio range is converted up to a suitable RF channel of, say, 14,250,300-14,253,000, cycles (14·2503-14·2530 mc, in the 20-metre band) to facilitate radio transmission, and then converted back again to 300-3000 cycles at the receiving end—this without the need for a carrier-wave, a mirror-image side-band, or any other spurious signal."

Now you see the advantage of SSB. The man at the transmitter no longer has to use a large slice of his 150 watts just to provide a carrier-wave, which, as its name implies, does nothing more than "carry" the intelligence to you. No—he just transmits the intelligence and leaves you to supply the carrier yourself with a milliwatt or so from your BFO. Thus the whole of his 150 watts may now be put into the one side-band that he is transmitting, which will give it a punch comparable with that of a 500-watt signal transmitted on normal AM phone.

Practical Points

So your receiver needs, first and foremost, a BFO which can be swung right through the intermediate frequency of your receiver. If this is, say, 465 kc, a commonly used IF, the BFO should tune from at least 462-468 kc; most BFO's give a wider swing than this. Make sure that your BFO control does take the beat right down to zero and "up the other side." (Some appear to do this, but actually level off at zero and then tune back in the same direction, so that you can never really get a beat on either side of the signal. In such cases, adjust the slug or trimmer on the BFO can until the front control really does give the necessary frequency-sweep.)

Now adjust your receiver just as you do (or should) use it for CW reception. In other words, not much RF gain, lots of audio gain (possibly right up to maximum), BFO on, AVC off (this often works with the BFO on-off switch) and control the signal level solely with the RF gain. If you have a crystal filter, use it, peaking the signal carefully with the BFO setting until you can receive a really crisp and clean CW signal, many times stronger on one side of zero-beat than on the other. This is the CW condition to which all good receivers should measure up, and it is also the ideal state for copying SSB.

Next, on a CW signal, make sure that the BFO is so adjusted that the strongest beat appears to be on the low-frequency side of the signal, *i.e.*, that if you tune up the band from HF to LF end, you come to the strong half of the signal first. Though you might find this confusing, you are now equipped for receiving SSB transmissions on the *upper* side-band. The convention is that SSB on the HF bands uses the upper side-band, and on the LF bands (7, 3·5 and 1·8 mc) the lower.

If you now listen between 14300 and 14350 kc, or

between 21400 and 21450 kc, you should find many SSB transmissions to choose from, and you can settle down to practice tuning them in. As you flip through one quickly it will sound rather like the ghost of a CW signal, its pitch changing as you go through. Somewhere in the middle will be a position of absolute clarity and intelligibility; on either side it will turn into monkey-chatter.

If you give the receiver too much signal for the BFO output to cope with, you will find the transmission difficult or impossible to resolve; so keep the RF gain well down. Even then you will find that if one signal is much stronger than the average level of all the others, he will be difficult to tune without a further reduction of the RF gain. If your BFO is obviously too weak for the job, *i.e.*, will not give a strong enough local carrier, then you will have a slight mod. on your hands—to increase the degree of BFO injection by using tighter coupling in the appropriate place.

Note, too, that once you have set the BFO "on the nose"—preferably by producing that nice peaky CW signal at about 1500 or 2000-cycle beat—it should be *left alone* and all tuning carried out on the main tuning dial. Only if you switch from the HF to the LF bands will it be necessary to touch the BFO, and then only to swing it through zero and up to a corresponding pitch on the other side.

When to Listen

Generally speaking, if the DX bands are open, you are bound to find plenty of SSB transmissions at the high ends of 14 and 21 mc. If the ten-metre band is active, look around 28·6-28·7 mc; the latter is rather a matter of chance, but if you don't hear plenty of SSB on 14 and 21 mc, from the top (HF) ends down, then there's something wrong.

Likewise, at most times after about 1800 GMT, and at most times of day during the week-ends, you should find quite a little group of SSB operators around 3760-3800 kc (using, of course, lower sideband). Some of these have very strong signals over most of the U.K. and they form an invaluable practice pitch for newcomers to the mode. Incidentally, if you don't merely tune them in, but also listen to what they have to say, you can learn quite a lot—but don't believe everything you hear, by any means!

Once you can cope with this lot, have a real go on 14 mc when the Americans are coming through at full blast. This will give you plenty of practice at sorting them out, and also at being pretty quick to spot call-signs, since these boys don't go in for long-winded procedure. In fact some of them rarely mention a call-sign at all, so that anyone breaking into the net has to enquire who he's working!

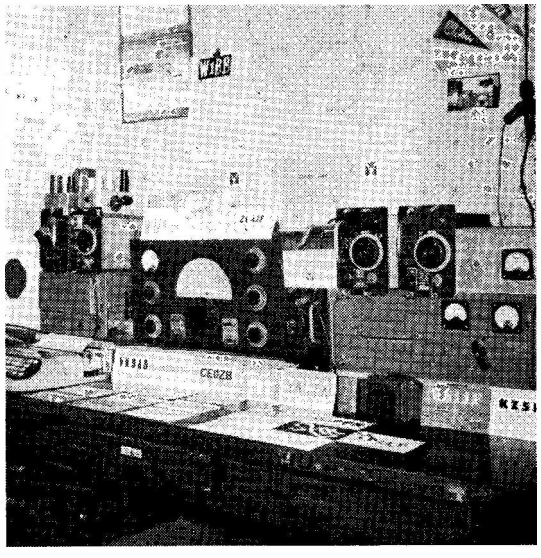
Stick to it until you think you are proficient, and you will then find that you derive very little pleasure from the AM part of the band, where everything is a mass of heterodyne whistles. Remember, to separate one SSB signal from another, aurally, you only have to separate out a clear voice from a lot of monkey-chatter, and adjacent stations do *not* beat with each other to produce a channel full of whistles.

DX-wise, you will not be starved. There are a few stations in the world who have already worked more than 200 countries on SSB, and more new countries are adding themselves to the list almost daily. Furthermore, all the DX-peditions now seem to equip themselves with SSB gear for the phone side of their operation, since it is not only more compact and portable, but gets out so much better. So get caught up with it now—sooner or later you will have to.

SWL FORUM

The compilers of this feature find readers' letters most stimulating, but they can be rather difficult to deal with in a concise manner because of the very wide variety of their contents. It might almost be said that they have little in common, since some express opinions about what they would like to see in this feature, others give news of DX heard, and others ask technical questions which cannot be properly answered in the space available. However, for the general interest we are always prepared to let readers speak for themselves, in the certain knowledge that what any particular SWL has to say will interest someone else.

A. J. Frey (Cambridge) says the article on Aerials was very useful, but he (and many others) wants to know what a "G5RV" looks like. Basically, it is a wire of 102 feet (or 51 feet in the half-size version) fed at the centre with 600-ohm open wire line 34 feet long, to the bottom of which is connected a length



One of the best known of British DX listeners is SWL Peter Day, 28 Oxford Street, Sheffield, who is always able to show an interesting log of stations heard on both CW and phone. Though his equipment is quite modest, he has cards from 251 countries. The main receiver is an Eddystone 358, slightly modified with a 6AC7 RF stage; this is used with an RF-25 unit for 10-15 metres; an RF-24 for 10-15-20 metres; and an RF-26 for 6 metres, on which band he has logged a great deal of DX. An RF-27 unit can be used as a two-stage pre-amplifier on 40 metres. Another receiver is a 3-valve straight, for 15 metres. All DX is immediately typed into the log, and some stations are taped on a Brennell Mk. IV recorder.

SWL STATION DETAILS

QTH	RECEIVER(s)	AERIAL(s)	OTHER APPARATUS
J. M. Smith (Grimsby)	358X, R.208, RF-26, R.1392D	67-ft., centre-fed; 6-metre dipole; 4-metre dipole	
S. L. Bleaney (Toddington)	S.20R	25-ft. wire	
R. E. Dickens (Banstead)	Ultra Super-het, modified for 160 and 80 metres; O-V-1	134-ft.	
M. T. Bland (Oakham)	CR.100	66-ft.	
H. F. Bottomley (Halifax)	R.1475, RF-24	Long wire and indoor dipole	
J. G. (Isleworth)	Transistor super for 160 and 80	G5RV with 600-ohm feeder	
G. D. Pendrick (Derby)	TCS-12, R.208, 4-valve Berec (mobile)	67-ft. and dipole	2-watt amplifier
E. J. Kelly (Edinburgh)	358X and Q-Multiplier	"Piece of wire" and 50 mc dipole	RF-24, RF-26, ATU, 'scope
V. W. Stewart (Edinburgh)	CR.100 and Minimitter converter	G5RV and 21 mc dipole	Q-Multiplier, Crystal calibrator, wavemeter
A. Coles (Sheffield)	HRO, R.1155	67-ft. wire, 21-mc dipole, Mosley V3-JR	
C. M. Parry (Tonyrefail)	S.840A	66-ft. indoor	
(Mrs.) S. Suddens (Whitton)	Eddystone S.740, VR-55R	132-ft. wire	
J. Farrar (Penzance)	Minimitter MR-44	Dipoles for 14, 21, 28 mc; Wire for 7 and 3.5 mc.	Tape recorder
G. V. Moss (Greenhithe)	Geloso 207 and CR.100	Mosley V-3-JR, 28 mc dipole, 12-ft. whip	Tape recorder, ATU
A. J. Frey (Cambridge)	R.107, RF-26	14 mc dipole, 67-ft. wire	Wavemeter
D. Stables (Selby)	358X, RF-27	130-ft. wire	19-Set, Crystal Calibrator
R. Dickens (Banstead)	BC superhet and all-band converter; 1-V-1	250-ft. wire, 66-ft. wire.	
H. M. Davison (Ashtead)	Pye Rees-Mace Marine, 1-V-0	Indoor 40-ft.	2-valve amplifier
G. E. Myers (Felixstowe)	R.1155L, modified, RF-24, RF-26's	Dipoles for 28, 21, 14, 7 mc. G5RV, and 75-ft. wire	
N. D. Gordon (Swansea)	National HRO	Dipoles for 28 14 mc, long wire	Tape recorder
A. V. Sofiano (Sutton Coldfield)	R.107	66-ft. wire	ATU, Q-Multiplier, RF-24 with crystal
G. M. Holt (Eastwood)	HRO-MX, commercial 6-valve super	G5RV, dipole for 21 mc, 3-el. beam for 28 mc	ATU
I. K. Gurney (Chalfont St. Peter)	8-valve super, O-V-1, RF-24	12-ft. indoor, V-beam, 90-ft. wire	ATU
Pete Kavaleski (Hancock, Mich.)	SX-100, NC-109, Zenith all-wave, home-built VHF	100-ft. wire, 5-el. rotary beam, VHF dipole, ½-wave doublet	DB-22a pre-selector, Scope, tape recorders
P. J. Baxter (Willesden)	Minimitter MR-44, converter feeding Pye receiver	Dipole	Globe-King 1-valver

Note: This list is additional to those published in January, March and July. Further such lists will appear from time to time.

of 72-ohm coax. This gives a reasonable, but not perfect, match on three bands. He would also like some modification details for the various surplus receivers now available, and finally would much like a transistor portable for 28, 21 and 14 mc.

J. Wooden (Kingston), a high scorer in both the CW and Phone ladders, says he has been gratified to see how many AR88's and Eddystone 888A's there are in use, and more so to realise that his R.107/RF-24 combination can hold its own with them. (This proves, among other things, that the operator is as important as the gear!) He is very disappointed, as we are ourselves, at the small amount of interest shown in CW reception.

C. N. Rafarel (Poole) wants us to hurry up with the promised article on receiving SSB . . . he will find it herewith. And he quotes an advertisement from a French magazine for an all-transistor receiver in an overseas model covering medium waves and three short-wave bands (13-27 metres, 26-54 metres and 52-100 metres). This sounds very interesting, and would surely be an ideal mobile receiver for SWL's. But we have no more information on this one, so please don't write and ask where it can be obtained.

R. E. Dickens (Banstead) became interested in radio at the age of nine (he has now reached the ripe old age of fourteen) and has just caught up with the amateur side of the hobby. The 40-metre band was tuned in one week-end, by accident, and on the wrong channel! He has now converted a BC receiver to cover One-Sixty, and this has become his favourite band. He asks whether we can't run an "HABC" Table (Heard All British Counties), since the HF men have their HPX affair.

P. Wooding (Ewell) is sixteen, and covers the bands with a home-built four-valve super, an ATU, and a pre-amp. for the HF bands. He is an SSB enthusiast and has heard 102 prefixes on that mode, but he agrees with our comment about the disregard for the correct use of call-signs on SSB. Further, he wants us to give some hints on learning CW,

HPX LADDER

(Starting January 1, 1960)

Qualifying Score — 100

SWL	PREFIXES
PHONE ONLY	
Bob Griffiths (Ventor)	436
J. Wooden (Kingston)	414
H. G. Shaw (Heswall)	404
A. W. Nielson (Glasgow)	362
C. N. Rafarel (Poole)	359
B. Otter (Lincoln)	349
J. E. Kennedy (Widnes)	345
G. V. Moss (Greenhithe)	343
D. Evans (Denton)	337
C. D. Barr (Harrow Weald)	305
B. M. Crook (Abingdon)	287
M. T. Bland (Oakham)	284
P. Wooding (Ewell)	260
G. E. Myers (Felixstowe)	253
M. H. Davies (Narberth)	241
R. M. Nixon (Liverpool)	231
J. Farrar (Penzance)	217
A. Griffiths (Solihull)	215
N. D. Gordon (Swansea)	212
D. Quigley (Cowes)	194
P. G. Martin (Durham)	181
A. J. Frey (Cambridge)	168
I. K. Gurney (Chalfont St. Peter)	166
D. Bell (Woodthorpe)	155
D. F. Catherwood (Huyton)	151
C. J. Smith (Huddersfield)	132
M. Higgens (Sutton Coldfield)	131
H. M. Davison (Ashtead)	122
D. Hanson (Whitehaven)	115
P. Wooding (Ewell) (*SSB only*)	102
CW ONLY	
J. Wooden (Kingston)	243
C. J. Thomas (Cyprus)	235
P. Day (Sheffield) (*7 mc only*)	189

(Note: Listing includes only those reporting for this issue. To keep on the Ladder, claims should be made for each appearance).

which we will most certainly do in an early instalment.

Dave Quigley (Ventnor) and others query the present set-up in West Africa, with the new FF4, FF7 and FF8 call-signs. All we can say at the moment is that things are too chaotic to sort out properly. There have been 22 new States formed in Africa since 1951, all of them recognised by the ARRL for DXCC purposes! The former FF8 and FQ8 territories now include such countries as Mauritania, Mali, Niger, Chad, Ivory Coast, Upper Volta, Dahomey, Cameroun, Central African Republic, Gabon and Congo, and it may well be that all of them will acquire their own prefix in due course. Meanwhile, log anything heard and try to get the QTH, since the same prefix may cover many countries. Anyone signing "FF" or "FQ" is therefore worth logging.

Modifications

Peter Day (Sheffield) writes to tell us of the many alterations he has made since his station was described, some time back. The 358X is still his main receiver, but the RF stage has been changed to a 6AC7 and well screened; converters and pre-amps are also used. An RF-27 is used for 7 mc, an RF-24 for the HF bands, and an RF-25 for 28 and 21 mc. The aerial farm now includes separate dipoles for 7, 14, 21, 28, 50, 70 and 144 mc! CW reception is still one of his main interests, and 117 countries have been logged on 7 mc. Weak CW reception, as SWL Day says, needs "careful tuning of both Rx and ears"; too many people are discouraged by a smear of QRM over the band, when the cultivation of "selective ears" will enable one to copy weak signals right through it. It's just the matter of separating out one noise from another, and is rather easier than listening to one conversation in a room full of people. *(See* photograph, p.479.)

SWL • • • • • •

continued

David Hanson (Whitehaven) writes of the difficulties of an SWL in Cumberland. His QTH is hemmed in by hills on all sides, transmitting amateurs are very scarce, and (hardest of all, perhaps) there are no surplus stores within 60 miles! He would welcome correspondence from any other SWL's in Cumberland, and, in particular, the loan of an S.640 manual. (David Hanson, 26 Tomlin Avenue, Mirehouse, Whitehaven).

SWL Overseas

Pete Kavaleski (Hancock, Michigan) has tape-correspondents not only in the U.K., but also in many other parts of the world; he has now acquired a new portable tape recorder, transistorised and battery-operated. So in future he can cope with three speeds—1⅞, 3¾ and 7½ inches per second. He wants to thank all his U.K. friends and to assure

L. H. Adams, 7 Chestnut Avenue, Grays, Essex, describes himself as an "old timer SWL." He started in 1921 and confines himself still to amateur band reception; he is also a tape-exchange enthusiast. The receiver is an Eddystone 680X which, says SWL Adams, he finds very good, particularly if used with the correct aerials; he has dipoles for 10 and 15 metres and listens specially for ZL's and VK's on these bands.

SWL • • • • • •

continued

them that he will tape or write to them shortly.

On this same subject, *Pete Linsley (Cleethorpes)* writes that he often tapes interesting QSO's on his home-made recorder. He started up in 1958 with a 0-V-0, which grew into a 1-V-2; now it has been joined by an SX-38, Command Rx, R.208 and finally a BC-348!

Heard on the Bands

Listeners who have sent in lists of Calls Heard are asked to note that we cannot possibly reproduce columns of DX stations logged. They are so many these days that mere lists mean nothing at all. However, details of anything *unusually* interesting, *odd*, or *puzzling* are always news which we will gladly print. Likewise, outstanding reception on 7 and 3·5 mc still makes news.

For instance, *H. G. Shaw (Heswall)* was puzzled by IE1SMO, whom he logged as Vulcano Island, Indian Ocean. (That was nearly right, but the location is in the Mediterranean!) It was I1SMO paying a visit to a piece of rock off the north-east coast of Sicily.

And *Melville Davies (Narberth)* heard a station on 14 mc SSB signing MZKY, who stated that this was an international call-sign. Probably a maritime mobile using the ship's call!

Referring to the LF bands, *Alwyn Richards (Aberdare)* sends a list of prefixes heard on 7 mc, which includes HH, HK, HP, KP4, M1, MP4, PX, ZS and 5A, all on phone.

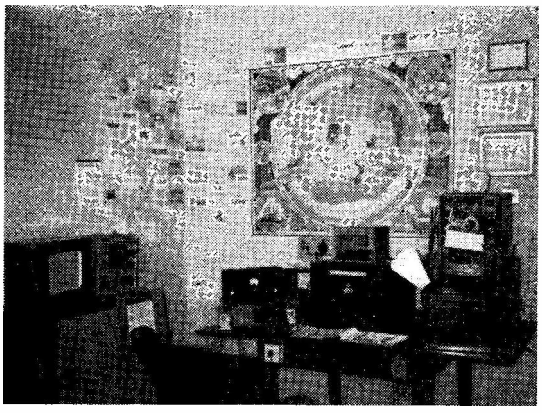
E. T. Clarke (Mansfield) checks in for the first time with a good list of DX, mostly on 21 mc. Best were VS5GS, XW8AL, AP2AD and JA1ACB.

Peter Ashley (South Croydon) is another listener with an interest in tape recording; he is in tape contact with four ISWL members in the USA and others from Canada, South Africa, Cyprus and Sweden. On a recent visit to the latter country he contacted SM5CR, 6BDS, 7CZD and Arne Skoog, who is the DX editor of *Sweden Calling DX-ers*, broadcast by Sverige Radio on Mondays. He was shown round the studios of the latter station, and wants to thank all the SM's for their great hospitality.

D. Elkington (Peterlee) is a brand-new SWL whose listening is done on an almost entirely rebuilt 19-Set. He has made such a good job of the mods. that he can even receive SSB with ease, and much enjoys listening to the 3·8 mc SSB nets.

The Club Contest

The attention of those (rather few!) SWL's interested in contest operating on CW is drawn to our Magazine Club Contest (MCC), which starts on Saturday, November 12—*see* rules in full on p.438 of the October issue of SHORT WAVE MAGAZINE. For those who do read Morse, this is always an interesting event to follow. And if any SWL's can put in check logs, we shall be glad to credit them.

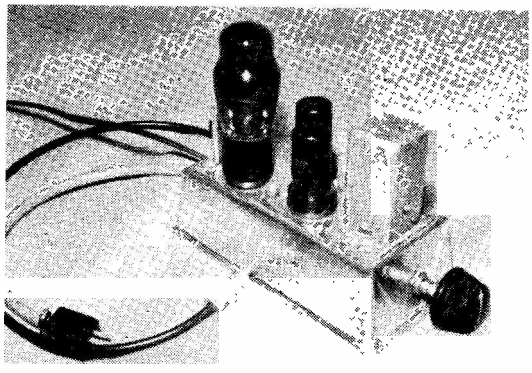


SWL V. Stewart, 2 South Oxford Street, Edinburgh, 8, runs a CR-100 with a Minimitter amateur band converter and Q-Multiplier. Aerials are a 50 ft. wire and a dipole for 21 mc. Other equipment includes a crystal calibrator, heterodyne wavemeter, Morse practice oscillator and an Eddystone O-V-1 type of receiver. SWL Stewart's scoring stands at 124 countries heard in 32 zones — but he finds a local contact just as interesting to listen to as DX.

We are often asked: "Is there a Club in my district?" The answer can usually be found by going through the Club Secretary QTH list in any three or four recent issues of the *Magazine*. The keen SWL will find membership of the local Club both useful and interesting, particularly if he aspires to a transmitting licence.

Finally ——

Closing date for the next appearance of "SWL." in the January 1961 issue (sounds a long way off!) is November 30. Address your mail to: "SWL." c/o The Editor, *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And don't leave it till the last moment; every month we get a few letters that are too late. So 73, and a Happy Christmas to all who follow this feature!



When G3NHL, Cambridge, wanted a chassis for a 3-stage speech amplifier, he used a kitchen baking-tray, 7½ ins. by 4 ins. by 2 ins. deep. He suggests this as a possible solution for many small chassis problems.

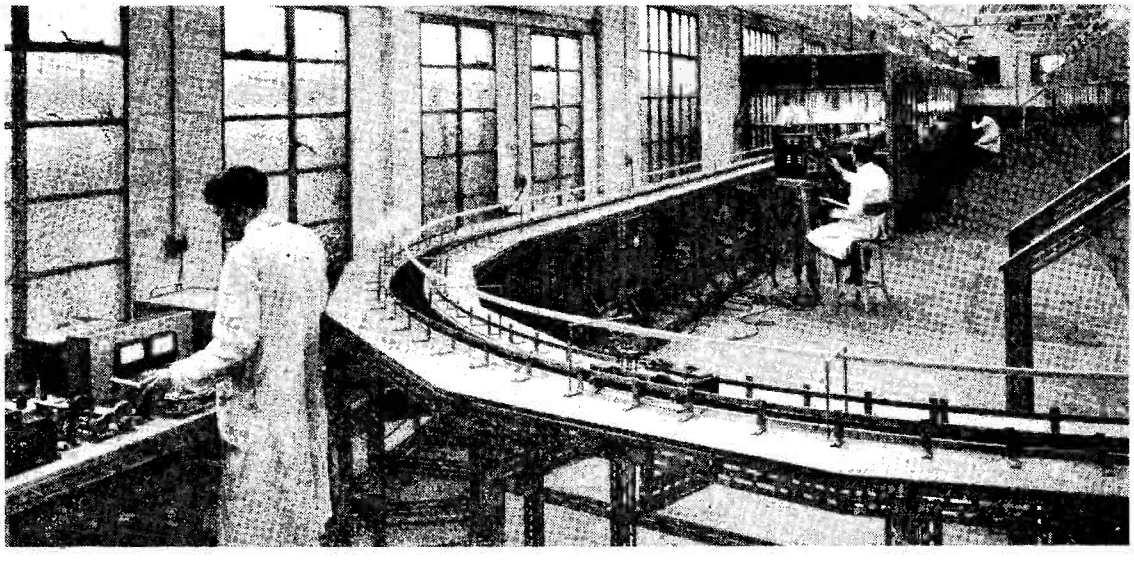
REPORT OF THE RADIO RESEARCH BOARD

The Report of the Radio Research Board for 1959 is now out and, as usual, it is a most interesting compilation—covering the radio aspects of the international geophysical year (IGY) as seen from the Board's station at Slough; the participation in space research; the work that has been done on radio measurements and standards; a discussion on further investigation into the ionosphere; and the research undertaken on semi-conductors and microwave ferrites.

Incidentally, this is the last Report to be presented by the late Director of Radio Research, Dr. R. L. Smith-Rose, C.B.E., D.Sc., who retires from the Board after 12 years' distinguished service. He now becomes president of the International Scientific Radio Union, a very important body dealing with all aspects of radio research on an international basis. The next meeting of the U.R.S.I. will be in 1963, at Tokyo.

The Report mentioned here is entitled *Radio Research 1959*, is published by the Department of Scientific and Industrial Research, and is obtainable from the Stationery Office, York House, Kingsway, London, W.C.2 (and branches, or through any bookseller) at 3s. 4d. post free.

The pantograph trolley for the BICC "model railway" is 12 ins. long and carries a small HF transmitter (for feeding measurements back to the control point) which is capacity coupled to the receiving aerial by the plates shown under the trolley—see below.



In connection with the British Railways electrification scheme, involving overhead supply at 25,000 volts AC, British Insulated Callender's Cables, Ltd. have set up a new laboratory designed for scale-model research. On a track of more than 300 ft., a trolley 12 ins. long can be run at simulated speeds up to 100 m.p.h., this trolley being used as a vehicle for the pantograph ("collector arm" mechanism) and the instrumentation for making the tests. The problem is to achieve a pantograph design that will ensure absolutely uniform current collection from the static overhead system, with the contact pressure continually changing. The measurements made on the pantograph trolley are fed back to oscilloscopes and recording cameras by an HF transmitter; this is continuously close-coupled into the receiver by means of flat plates, under the trolley, spanning the receiver aerial, which is carried on the track supporting structure. We may hope that this BICC effort will ensure that the new British Railways electric trains will not be hurtling through the countryside with the overhead collector fizzing and spluttering at 25 kV, radiating QRM through the whole radio spectrum!

VHF BANDS

A. J. DEVON

Great Aurora Opening, October 6/7, 1500-0200 GMT—

15 Countries Identified on Two—

GM/SP and GW/OK "Firsts" Recorded—

Reconsidering the Zone Plan—

Tabular Matter Up-to-Date—

THE big news this month is of the great Aurora opening over October 6-7, from mid-afternoon on the 6th till about 0200 (GMT) on the 7th. Oh, you missed it? Pity—it was probably one of the biggest Aurora opportunities we have yet had, with something like 15 countries either heard, workable or identified!

How do people get to know about an Aurora opening? Well, it's not done just by sniffing the evening air. Either they are in the habit of taking a regular turn round the band to see what's cooking (even if they don't transmit); or they see the signs from what may be happening on Band III TV (or Band II FM); or they know that this time of year is the Aurora season and it is simply a matter of watching for a significant change in conditions on the HF bands; or they work on the presumption that during the Auroral season manifestations can reasonably be expected in cycles of about 27 days. And, of course, there are the public-spirited types who, when they know that Aurora conditions obtain, pass the word by ringing up their friends on the land-line.

It was this latter mode—a phone call from GM3FYB—that brought on GM3EGW late in the evening of the 6th, to give him the opportunity to work both HB9RG and SP3GZ, the latter being the GM/SP "First" for two metres; for the record, this very fine QSO took place at 0110 GMT on October 7. Congratulations to GM3EGW (Dunfermline) on two outstanding contacts. He worked only ten DX stations in all under Ar conditions, as most of his time was spent stalking the HB/SP quarry; OK1BVN was also tried, but lost in QSB as the Auroral condition faded down.

For GW2HIY (Holyhead, in the county of Anglesey), the party started at 1700 on the 6th, though he had already had an Ar contact with GM3GUI on the evening of the 4th. During the 6/7th, GW2HIY worked 9 stations in 7 countries, the outstanding QSO's being ON4CP, DL6SS, DL9ARA and OK2VCG—and here another "First," the GW/OK, at 1755 on October 6. So congratulations to him, too. In addition to his worked-list, GW2HIY heard another 25 DX stations, in eight countries, the best being HB9RG, SM7YO and SP3GZ.

A particularly interesting Ar report from G6XA (Leamington), who worked six GM's and heard three more, but was unable to find a single EU station, though he could hear them being called! Several G's and GW's were coming in with typical Ar notes, and GI3GXP was also heard.

As might be expected, an impressive report from G5YV (Leeds): Harold heard no less than 51 stations in 13 countries, the most interesting signals being HB9RG, LA9T, OK2LG, OK2VCG, OZ3NH, SM7ZN and SP3GZ, with three more SM's, ten DL's and eight GM's also mentioned; of this lot, G5YV worked seven stations in the DX category, between 2230 and 0145 on the 6/7th.

PAØFB (The Hague) turns in a very interesting account of the proceedings as seen from his end. To start with, he did *not* receive the HB9, LA or OK stations at all, though he heard them being called; his loggings comprise 21 EDX stations, of which the best were probably OZ3NH, SM7ZN, a DM2, and GM3EGW, GM3FGJ and GM4HR, the rest being DL's, G's and a few local PA's (who, says PAØFB, did not appear to be getting any contacts). His own QSO's were with GM2FHH and GI3GXP, the latter his 16thC for Countries Worked; PAØFB remarks that he has been waiting to get into GI for a long time, and had hoped also to find EI and GD stations on.

A big log also from SP3GZ (Wolsztyn)—received *via* PAØFB—showing 36 stations heard in eight countries, 27S having been worked in 6C; SP3GZ's UK contacts were with G3CCH and GM3EGW only, GM3BDA being heard; most of his QSO's were with DJ/DL or SM, but he also worked LA4RD, LA4VC, OZ3NH and OZ5BK—and he heard UR2BU being called by some unknown station. SP3GZ was on from 1500 GMT on the 6th until 0145 on the 7th; his last station heard was PAØCML; and he makes the distance for his GM3EGW contact 1,341 km., or 831 miles.

G6NB (Brill) had good Ar contacts with OK1EH, OK2VCG and OK1VDM, as well as DL and GM stations; EDX heard included DL7VR, HB9RG and SP3GZ, and also, under a GM, a signal that could have been OH1NL. The OK QSO's put Bill up to 18C in Countries.

The results obtained in OK, digested by OK2VCG and passed to us through G3HBW, show that OK1VDM heard GM2FHH and GM3BDA; that OK2VCG himself tried hard to raise GI3GXP; and that the OK2VCG/GW2HIY contact measures 1,541 km., or 955 miles. The additional UK stations worked by OK2VCG were G3HBW, G3KEQ, G5YV, G6NB and G6ZP. The other Czech

stations on were OK1DE and OK2TU who, though they worked or heard some nice EDX, do not mention any G's.

For Arnold, G3HBW himself, the best DX contact was with OK2VCG, his old sparring partner on the meteor-schedule ploy; he also spent a lot of time after HB9RG, coming in strongly, and badly wanted for a new country; had Arnold succeeded, it would have put him into the hot seat in Countries Worked.

Louis of G3EHY (Banwell, Som.) says that though the GM's were good signals—he worked five of them, also GI3GXP—the only EU's received were DL3SS and ON4CP, who kept going back to OK and SP. For him, the opening was "selective," in that the GM's were by far the best DX offering. Nat of G3IOO (Oswestry) got in with GM and DL, and heard SP3GZ.

Pattern of The Opening

All Ar reports are at one in describing how the main directivity changed as the opening progressed, from NE to North and then back again to NE—even for PA0FB the best direction for the GM's was NNE, rather than NNW, as might have been expected.

From a study of all the reports, it seems that Scandinavia and the north-east EU's had the best of it, and it also looks as if, in the U.K., all that West Country stations could have expected was good signals from GM on an NNE beam heading.

It is also quite evident that for persistence and what might be called the "coefficient of reflection"—the opening lasted the best part of 12 hours and produced signal paths covering practically the whole of Northern Europe—this was one of the most interesting and exciting Auroral manifestations we have yet had on the two-metre band.

As regards activity, while it is true the band was crowded and many potential DX contacts were lost, the U.K. station participation was really not very high. It was a Thursday evening, the glass was

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH Only

Worked	Station
79	G5YV (787)
77	G6NB
76	G3CCH
74	EI2W
70	G5MA, G6XM
69	G3HBW
68	G3BW, G3GHO
67	G3KEQ
66	G3BLP (840), G3IUD (302), *G5BD*
65	G3EHY, GM3EGW (276)
63	G2FJR (542)
62	G3FAN (760)
60	G2OI (402), G3IOO, G3DMU
59	G4SA
58	G8OU
57	G8SB, G3HAZ (535)
56	G2CIW (242), G3WW (770), G5DS (654), G6XA
55	G2HDZ (495), G2HIF, G3JWQ (517), G5BM, GW5MQ
54	G8VZ
53	G2AJ (519), G3LHA (387), G4CI
52	G2NH, G3FZL, G6RH, G6XX, GW2ADZ
51	G5ML
50	G3ABA, G3GSE (518)
48	G3FIH, G3KPT*, G6TA (487)
47	G3DKF, G5WP
46	G4HT (476), G5BY, *G6YU*
45	G2AHP (647), G2DVD (362), G2XC, G3BJQ, G3GFD, G5JU, G6GN
44	G3BK, G3DVK (282), G3NBQ (218), G8DA
43	G2DDD, G2FCL (322), G3BA, G3BNC, G3COJ, G3DLU*, G3HWJ, G3KHA (262), G3KQF, *G3KUH*, G3WS, G4RO, G5DF
42	G2HOP, G3DO, G3IER, G6CI (220)
41	G2CZS (282), G2FQP, G3GSO
40	G3AYC, G3CGQ, G3MPS, G5MR (366), G8KL

(Continued)

Worked	Station
39	G2IQ, G3CO, G3GBO (434), G3LTF, G3VM, G8IL (325)
38	G3APY, G3CKQ, G3HTY, G8VN (190)
37	G3FNW, G2FZU (180), G3DLU, G3LAR (435), G3MAX, GC3EBK (260), GW3ATM, GW3MFY
36	G2DCI (155), G3CXD, G3DLU*, G3IIT, G6CB (312), G8DR (354), G8IP
35	G3FYY (235), G3HCU (224), G4LX
34	G3AEP, G8IC, GM3DIQ
33	G3LTN, G3FUR, G3HHY (125)
32	G3HIL, G3JAM (311), G8QY, G8VR, GC2FZC
31	G3HXO, G3KPT (180), G5RP
30	G2AHY, G3FRY, G3GOP (208), G3GVF (129), G3IOE, G3IRA, G3KEF (110), G5NF, GW8UH
29	G2CVV, G3AGS, G3AKU, G3FIJ (194)
28	G3ICO, G3ITF, G3OBD, G4JJ/A, G8DL, GM3BDA
27	G3CVO (231), G3DAH, G3HWR (276), G3ISA (160), G3JGY, G3LTF/A, G6GR, G8NM, GI3GQB, GW3GWA
26	G2BRR, G3CFR (125), G3MED, G3SM (211), G3YH, G4MR (189)
25	G3JHM, G3JMA, G3JXN (220), G5SK, G6PJ
24	G3FD, G3FEX (226), G3FXG, G3FXR, G3OBB
23	G3CWW (260), G3HSD, G3NNK, G5PY
22	G2DRA, G3AGR (135), G3ASG (150), G3BPM, G5AM
21	G2AOL (110), G3BDQ, G3DVQ, G3IWJ, G6XY
20	G3EYV
19	G2HDR, G3GCX, G5LQ (176)
18	G3DBP, GC2CNC
17	G3EGG
16	G3FRE, G3MLS
15	G3IWA
14	G2DHV, G3CYY, G3MHD

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

* New QTH

low, the weather shocking and only detective work (as already outlined) would have suggested that Ar conditions might have developed. The low level of activity from around Birmingham is put down to the fact that Thursday 6th was the night of the Midland Amateur Radio Society's AGM! No doubt the same sort of reason accounts for many other absentees, as Thursday is a popular night of the week for group meetings.

Reports Generally

G3IOE (Newcastle) says that he is "still around"—and still at a very unfavourable QTH for VHF —but has been working some GDX on the openings, and has also improved the gear; the PA now takes a QQVO6-40A, running 120w. in the coiled Lecher-line tank arrangement — *see* SHORT WAVE MAGAZINE, September 1958, p.349—on 145·8 mc. G3IOE remarks that the level of local two-metre activity is now such that there should be no difficulty in working Northumberland.

G3JGY (Tamworth) steps up in the All-Time, and has in hand a new PA stage to take a 4X500A in a coax tank layout; the new converter is to be CC, with RF and g.g. stages in front. G3OBD (Poole) reports moves in the Tables, as does G3NAE (Bournemouth).

G3CO (Dartford) is on again more regularly, with a Tx rebuilt partly to the circuit by G3CGQ in the September 1958 *Magazine*; he is now getting 50w. into the PA, nearly double the previous input, one gratifying result of which has been that he was able to take full advantage of the improved conditions during September; contacts included a good QSO with G5QA (Exeter), and the regular schedule with G3LOK (Cowes) is about to be resumed; this path is not an easy one, and has shown very wide variations in signal level, from zero to S9. Locals, mentioned as active by G3CO, are G5SD and G8VR.

Though Johnnie of G3BLP (Selsdon, Sy.) missed out on the Ar opportunities, he is now pretty active again and has raised some nice GDX, including GW2HIY for Anglesey—he is also able to show no less than 840 different stations worked on the two-metre band, counting since the beginning; this puts him well out in front in that particular category. It is interesting to note that he has accounted for 158 new stations in just under a year.

G3KYU (Shrewsbury) writes to report himself as ready to give Shropshire, having recently started up on two metres, with a dozen or so stations worked so far; his Tx runs 25w. to an 832, plate-and-screen modulated by a pair of 6L6's, the beam is an Eddystone 4-ele (the knock-down kit assembly Stratton's do) and the converter, to the G2UJ design, now works well after some doctoring by G2HIF. GW3MFY (Bridgend) gained five new counties from his Ar operations, and moves in both Tables. G3OBB (Christchurch) continues to make progress—but G3OBD is managing to keep ahead of him! G3NNK (Romford) did well during the September tropo. openings, and has heard GC2FZC; of the 34S worked during the period, he gives G3KAG for Derby and G6XT for Yorks, as his best; we think another nice one was G6ZP in Malvern, right across England.

G6XA (Leamington) did well to work G3BW (Whitehaven, for Cumbs.) on October 16, when tropo. conditions were quite good and bringing in some GDX; he also heard G3ILD, from Co. Durham, with a nice 569 CW signal, around 2300 GMT.

GM3EGW (Dunfermline), in a very comprehensive report, says that he is now running 80w. to a QQVO6-40, and is trying to find a converter that will improve on his old neutralised 6J6 job. As regards conditions generally, this year there have been no really useful tropo. openings for the

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1960

Starting Figure, 14

From Home QTH Only

Worked	Station
50	G3HBW
40	G3JWQ, G6GN, G6XA
35	G3KPT
33	G2CIW
28	G3MPS, GW3MFY
26	G3KQF
25	G3HS
23	G2CVV, G3NAE, G3OBD
20	G3GSO, G3OBB
15	G3NNK, G5QA, GW3ATM

This Annual Counties Worked Table opened on September 1st, 1960, and will close on August 31st, 1961. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. QSL cards or other proofs are not required when making claims. The first claim should be a list of counties with the stations worked for them. Thereafter, counties may be claimed as they accrue.

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

18	G3HBW (DL, EI, F, G, GC, GD, GI, GM, GW, LA, LX, OE, OK, ON, OZ, PA, SM, SP)
18	G5YV, G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OK, ON, OZ, PA, SM, SP)
17	ON4BZ, (DL, EI, F, G, GC, GI, GM, GW, HB, LA, LX, ON, OZ, PA, SM, SP, 9S4)
17	G3CCH
16	G3GHO, G3KEQ, G5MA, PA0FB
15	G2XV, G3FZL, G4MW, G6XM, GM3EGW
14	G2FJR, G2HDZ, G3AYC, G3FAN, G3HAZ, G3IOO, G3JWQ, G3WS, *G5BD*, G6LI, G8OU
13	G3BLP, G3DMU, G3DVK, *G3GPT*, G3KPT, G5DS, G6XX
12	EI2W, F8MX, G2HIF, G3EHY, G3GFD, G3GHI, G3LTF, G3WW, G5CP, G5ML, G6RH, G6XA, G8VZ
11	G2AJ, G2CIW, G2CZS, G3ABA, G3CO, G3JZN, *G3KUH*, G3LHA, G4RO, G4SA, G5UD, OK1VR
10	G2AHP, G2FQP, G2HOP, G3BDQ, G3BK, G3BNC, G3DLU, G3GSE, G3GSO, G3JAM, G3KQF, G3MED, G5MR, G8IC, GW5MQ
9	G2DVD, G2FCL, G3DKF, G3FIJ, G3FUR, G3IUD, G4LX, G8DR, G8GP, GC3EBK, GM3DIQ
8	G2DDD, G2XC, G3AEP, G3AGS, G3BOC, G3EKX, G3GBO, G3HCU, G3HWJ, G3KHA, G3MPS, G3VM, G5BM, G5BY, G8SB, GC2FZC, GW3ATM

GM's; on the other hand, some 350-mile DX has been possible and, with GM3EGW, the best of the northerly G's is now G3ILD, whose SSB is regularly resolved. GM3EGW is also fitted out for 4 metres, but says activity on that band is low—his best so far is GM5VG, who has also worked GM3FYB.

Four Metres

Talking of 70 mc brings us back to G3EHY (Banwell, Som.), who is a keen 4-metre operator — so much so, that he has now worked no less than 20C on that band. He is very much hoping that those now on Four will keep to it through the winter, as it should be a useful and interesting band for U.K. coverage; Louis lists seven more stations as having started up recently on 70 mc, including G2OI from Manchester. G3EHY himself is on regularly every Sunday morning, 0930-1200 clock time, and finds he can work all round the country.

G2CIW (Birmingham) is not a 4-metre man, but is regularly there on both other VHF bands; he caught the tropo. opening on September 26, with GM2FHH in Aberdeen and G2FO (Co. Durham) worked, and GM3DIQ heard. Things are still too quiet on 70 cm, but Jack says that he and G3HBW can always QSO under any sort of conditions.

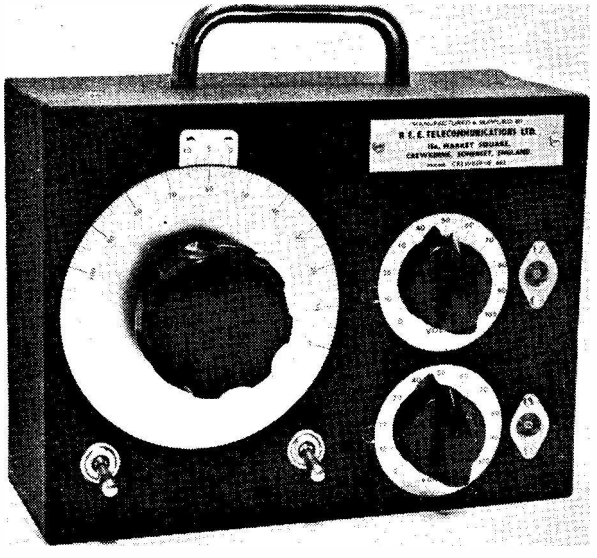
Reporting in, and for operations on 430 mc, too, is G3OAT/T, of Bluntisham, Hunts. He is on most Saturdays, 6.30-10.0 p.m., and week-day evenings after 9.0 p.m. On the ATV side, he is regularly *taking pictures* from G2WJ/T, G3KKD/T and G3NOX/T! G3OAT/T says that at present his 70-cm. Rx is much better than the Tx, but as he will shortly have a 40-ele stack for 430 mc, with a 60w. transmitter to be loaned by G3KKD/T, he hopes to make himself heard. As other 70 cm. operators may be interested in arranging schedules, the QTH is Fl.-Lt. M. Bryett, R.A.F., Nobles Farm, Bluntisham, Hunts.

Comments out of Context

"I do not spend very much time on the air these days owing to pressure of work, which also keeps me well occupied at week-ends" (G5YV) . . . "I can get going on FSK/RTTY on two metres now; my RTTY freq. will be near the high end of the band; PAØVHF will also be on in the near future" (PAØFB) . . . "Having now completed two years as vice-captain and then captain of the local Golf Club, I felt that I should mark my new freedom by sending you a line" (G3IOO) . . . "G3HBW is remarkably consistent in getting into my shack" (GM3EGW) . . . "Have worked about 150 stations to date, but only cards from 40 odd; cannot complain, though, as it is usually 18 months before I send cards!" (GW2HIY) . . . "As is usual with every Aurora, I missed the one on 6 Oct., hearing about it the following day" (G3NNK) . . . "I lost my Quad in high winds, but I now have it up again and don't think I missed much DX" (G3NAE) . . . "As usual, I missed the auroral opening on the 6th, which I heard described later as the best of its kind for ten years; I take some comfort from the knowledge that many other regular occupants of the 2-metre band also missed out on this" (G3CO) . . . "I have just finished wringing out the log book to see if any more counties would drop out, but no luck" (G3OBB) . . . "After about four years on 160 metres, I finally got the VHF gear working; unless there is more activity on two metres, I shall spend most of my time back on 160" (G3KYU) . . . "Surely *VHF Bands* should be written for the average operator and not for the 'professional amateur' with the facilities of Jodrell Bank and Malvern behind him" (SWL Tomlin).

More TTx Results

The new transistor-transmitter rig at G6NB (Brill) is doing very well, as many two-metre operators will know. Running 50 milliwatts to a pair of T.1832 transistors in a push-pull grounded-base RF amplifier, the line-up is OC170 osc. tripler, 12-36 mc, OC170 doubler to 72 mc, OC170 doubler



The new R.E.E. "Telecomm" VHF Signal Generator, in the Model B version, covers 100-150 mc, and is fully transistorised. The modulation is variable, and a 9-position attenuator gives a 90 dB change in output signal level from the minimum of approximately 1 microvolt. Tuning is by a slow-motion dial and the cabinet size is 8 ins. by 6 ins. by 3 ins. Other models are available covering 40-70 mc (Model A) and 70-72 mc with 85-87 mc (Model C). Other VHF ranges can be provided to special order.

to 144 mc, into the T.1832's in the PA, modulated by an OC72.

With this transmitter, on 144·61 mc, he has knocked off 24 counties, with GW8NP (Cardiff) worked on CW and G5TZ (I.o.W.) on phone. G6NB proposes that a small slice of the band (he suggests 50 kc) be set aside for two-metre TTx working, to find out what can be done with real QRP. This is certainly an idea worth pursuing—as is the one put forward last month by G3KQF, anent SSB working.

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
33	G2XV
28	G3HBW
27	G3JWQ, G3KEQ, G5YV
26	G6NF, GW2ADZ
23	G3BKQ, G6NB
21	G3IOO
20	G3HAZ
19	G2CIW
17	G3KPT
16	G2DDD, G3LHA, G3MED
15	G4RO
14	G2HDZ, G3FAN
13	G3MPS
12	*G5BD*
11	G3AYC, G3LTF
10	G2OI, G3IRW, G6XA
9	G5DS
7	G2HDY, G3JHM
6	G3JMA, G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G5ML
4	G3JGY

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

Band Planning

Both these proposals would involve a major reorganisation of the band-planning at present in force (and not being observed by all two-metre operators). However, as the band is supposed to become exclusive w.e.f. May 1st next year, it would seem that now is the time to look at the problem of reorganising it.

In view of the fact that the great majority of EU stations work in the LF area, and there would be almost insuperable difficulties in getting the Continentals to move in any wholesale fashion (even if they could be persuaded to accept a band-plan) it would appear that the approach least painful for the majority of VHF operators (U.K. and European) would be to put the SSB boys in the last 25 kc at the HF end, and the QRP protagonists (max DC input to final stage 2 watts) in the next 50 kc below, *i.e.* 145·975-146·000 mc for SSB, because they should not require much bandwidth by virtue of the system, and 145·925-145·975 mc for QRP. This would leave more than enough of the band to be parcelled out on a Zone basis.

In fact, as we all know, the only people who would have to move would be those running SSB and any others wishing to operate QRP. Under good tropospheric or Aurora conditions, this degree of channelling would probably not be sufficient—that is to say, the band-width of the average two-metre receiving set-up is such that there could be mutual QRM between the two band areas. However, under the Ar conditions that obtained during the October 6/7 opening, QRP would be no use, anyway, nor is phone working (even on SSB) particularly effective. So it is only under particularly good tropo. conditions that any real difficulties would arise. But, even then, those who wanted to work EDX would have to go LF in the band, *i.e.* get into their Zone areas, in order to work the GDX and the EU's not interested in QRP or SSB.

As regards Rx selectivity, it should be remembered that the channelling laid down for commercial mobile (AM) radio in the 170 mc band is 25 kc, to become effective from January next. So far as we are concerned on 144 mc, the QRP/SSB band areas as now proposed could be doubled without causing any particular pain or grief to anybody.

On this theme, it might be mentioned here that the VHF Zone or Band Plan, as originally conceived by G3CYY and modified by G2XC (then conducting "VHF Bands") was first published, years ago, on the initiative of the Editor of SHORT WAVE MAGAZINE—who, incidentally, is also the originator of the whole idea of working the U.K. by counties, not only on VHF but also on the other bands (for the *Magazine* WABC and WBC Awards). It is just as well that from time to time the record should be kept straight on these simple facts!

The Tabular Matter

Except only for the new "Firsts" (which have been taken into the appropriate Table) the tabular matter as shown this time is, as far as your A.J.D. can get it, right up-to-date. Since its last appearance in September, more than 30 movements have been taken into the All-Time, and the other three Tables between them show about 20 changes.

Owing to the space required for the tabular matter, we are now unable, generally, to show all the VHF tables together in the same issue. The intention is, while keeping all Tables running and up-to-date, to publish the big ones—All-Time Counties and the "Firsts" listings—only from time to time as opportunity offers.

To Conclude ——

That seems to bring us to the end of it for this month — and another very interesting period it has been, with just the sort of happenings that make VHF so much worth while. The next offering being due on December 2, please get all your news cleared to A.J.D. by **November 16 certain,** addressed A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. So, till then, *73 de A.J.D.*

MAKING THE MOST OF METERS—3

VOLTMETERS — EXTENDING THE RANGE — CALIBRATION ACCURACY — ELECTROSTATIC TYPES

J. R. Bradshaw

THE previous two articles in this series—*see* SHORT WAVE MAGAZINE, August, September, 1960 —examined the milliameter and the techniques of its use. A logical development of the current-measuring instrument is the voltmeter which, although no longer pre-eminent as a test instrument for complex modern circuits does, nevertheless, combine effectiveness with an operational simplicity rarely found in other test equipment, particularly when the results obtained are translated correctly and intelligently into circuit information.

Adapting the Milliameter

The conversion of the milliameter to read voltage is seen from Ohm's Law, where V = IR or, translating the equation into practical meter quantities:

Desired Voltage Range = FSD Current in mA *x* Series Resistance in kilohms.

Hence any milliameter can be converted for use as a voltmeter by the addition of a series resistor. This series resistor will include the meter resistance *Rm* if it is greater than 1% of the calculated value of the series resistance, the general formula being $R_{ser} = (R + Rm)$, as in Fig. 1, *Rm* being neglected only if it is negligible when compared to the series resistance.

A numerical example will explain: If a 0-1 mA meter with an internal resistance of 50 ohms is to be converted into a voltmeter to read a maximum of 1-volt, then

$$R_{ser} = (R + Rm) \text{ kilohm} = \frac{\text{Maximum voltage}}{\text{Meter FSD (mA)}} = \frac{1}{1}$$

= 1 kilohm (1,000 ohms)

In this case neglecting the 50-ohm meter resistance would result in 5% meter error, so R_{ser} will consist of an added resistor of 950 ohms, plus the meter resistance.

However, if the meter range is to be extended to

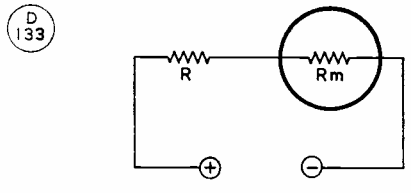


Fig. 1. Basic circuit of a voltmeter — see text.

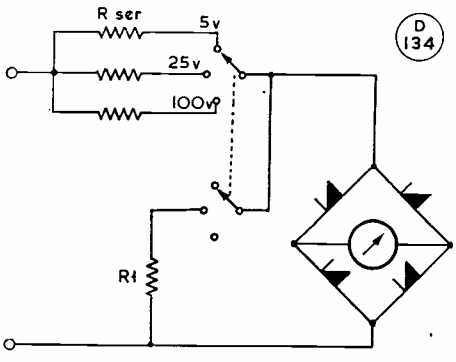


Fig. 2. Circuit arrangement of a rectifier voltmeter to read over the same scale for different ranges.

read 100 volts maximum, then

$$R_{ser} = \frac{100}{1} = 100 \text{ kilohms}$$

and, as 50 ohms is negligible compared with 100,000 ohms, the meter resistance can be safely neglected without introducing any significant error into the calibration.

When making up meter multipliers it is best to use the basic scale of the milliameter to read equivalent volts, or a decimal multiplication thereof, *e.g.*, x10, x100, x1000, and so on, thereby facilitating the readings by using the original scale, and so avoiding the need for recalibration.

Rectifier Voltmeters

Rectifier milliameters which are to be converted into AC voltmeters require additional consideration, since the impedance that the rectifier "sees" when looking towards the voltmeter terminals must be constant on all ranges if the convenience of a single scale is desired; the simplest way of accomplishing this is shown in Fig 2, where the product of R1 and R_{ser} in parallel, is constant.

$$\text{Impedance} = \frac{R1R_{ser}}{R1 + R_{ser}}$$

and as R_{ser} is decreased, R1 must be increased proportionally, the lowest voltage range requiring that R1 actually be an open circuit. Above 50 volts the arrangement in Fig. 2 can be abandoned for a simple series resistor, since higher voltages demand resistors that are so large that variations in the meter circuit resistance (due to the rectifier) introduces negligible error, and under these conditions the calibration is substantially linear.

Accuracy of Calibration

As the voltmeter is basically a milliameter movement the inherent meter characteristics considered in Part I of this series (p.299, August issue) will also apply to all voltage measurements, for voltmeter accuracy cannot be better than that of the basic movement.

Moving-*iron* instruments find their main application as low-sensitivity voltmeters for measuring AC,

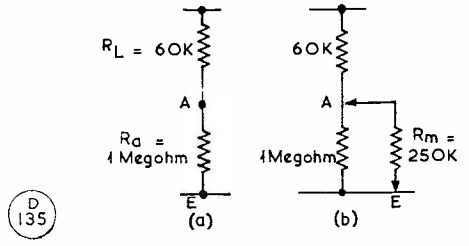


Fig. 3. The significance of the (A) and (B) arrangements is explained in the text.

usually of mains frequency; the moving-*coil* meter has the widest application as high-sensitivity single and multi-range voltmeters measuring both DC and AC—the latter by employing a rectifier.

An introduced source of inaccuracy can be the series resistor, which controls the accuracy of the meter when used as a voltmeter. Extreme care must therefore be exercised over the choice of series resistors for this purpose.

Wirewound resistors, of 1% accuracy, are undoubtedly best for the purpose, but they suffer from the disadvantages of being rather large and cannot normally be obtained in values above 100 kilohms.

Of the composition resistors, only cracked carbon types which meet the Grade 1 Specification Test Conditions are suitable; these are manufactured to close test limits, are available to 1% accuracy, and show a negligible resistance variation throughout their lifetime of use.

Grade 2 resistors, on the other hand, seldom have a guaranteed accuracy better than 5%, the actual resistance varying considerably during use. It should be noted that the Specification Test Limits for these resistors permit this wide variation; such resistors are not in any case intended for close tolerance applications, such as metering circuits.

Resistor Rating

Any resistors selected for metering must have a power dissipation large enough to enable them to be used for full-scale measurement over a lengthy period without heating, particularly if the resistor is to be incarcerated in a small, portable meter case with little or no ventilation. Composition resistors must never even run warm during use, because any temperature change due to heating can upset reading accuracy by permanently affecting the resistor value.

The power rating can be determined from $W = V^2/R$ or, in meter terminology:

$$\text{Wattage dissipation} = \frac{(\text{Maximum voltage})^2}{\text{Series resistance}}$$

so that the wattage dissipation in the 100,000 ohms resistor specified in the previous numerical example will be:

$$W = \frac{V^2}{R} = \frac{100^2}{100{,}000} = \frac{10{,}000}{100{,}000} = \frac{1}{10}\text{th watt}$$

This is the dissipation at full deflection; a safety factor of at least five times is desirable, so the resistor rating should be at least ½-watt.

Voltmeter Sensitivity

Ideally, when a voltmeter is shunted across a circuit, it should measure circuit voltage without disturbing the circuit in any way, but the finite resistance path of the meter *does* draw current, so altering circuit operation, be it ever so slightly, by placing an additional load on it.

This additional current must be as small as possible at all times, necessitating a high ohms-per-volt sensitivity in the voltmeter; this sensitivity depends on the FSD current of the milliameter movement which, as has been shown, determines the series resistance required for every volt that is to be measured at full deflection, and even the reasonably high sensitivity of a 1-mA movement (1,000 ohms per volt) introduces inaccuracies in high resistance circuits. The ideal sensitivity is 20,000 ohms per volt (50 microamps FSD basic movement). In general, voltmetres with a sensitivity of less than 1,000 ohms per volt cannot be used in radio work for reliable measurements.

Good servicing sheets, for receivers and other apparatus, usually state the sensitivity of the voltmeter used to measure specimen voltages quoted in the servicing data and if the sensitivity of the voltmeter subsequently used to check the circuits is higher or lower than that quoted, the observed voltages will be higher or lower accordingly, due to a factor not always appreciated by meter users.

For example, if a valve has an internal resistance of one megohm, and the anode voltage is checked on the 250-volt range of a 1,000 o.p.v. meter, then connecting the meter between anode and earth will shunt the valve resistance with a meter resistance of 250 kilohms.

This will not matter if the anode is directly connected to a low impedance HT supply which can readily give the additional meter current but if, as is usually the case, there is resistance in the anode circuit such as a load, decoupling resistor or smoothing choke, then the increased current will result in an increased voltage drop across such components.

In the case of a valve the exact effect is complicated by biassing arrangements but a simple illustration will show the effect: If, for example, the resistance in the anode circuit totalled 60,000 ohms, then the circuit of Fig 3a would obtain and the *fraction* of the HT voltage normally existing betwen A(anode) and

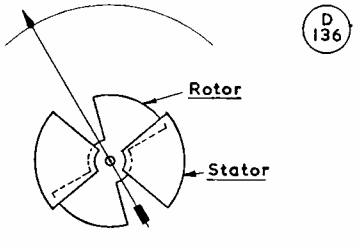


Fig. 4. Basic principle of the electrostatic voltmeter, normally used for continuous high-voltage readings.

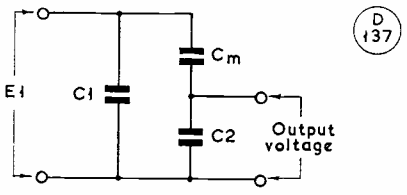


Fig. 5. An attenuator arrangement for the electrostatic voltmeter.

E(earth) would be

$$V_a = \frac{\text{Anode resistance}}{\text{Total circuit resistance}} \text{ which is } = \frac{Ra}{R_a + R_L} \text{ and, numerically, } = \frac{1{,}000{,}000}{1{,}000{,}000 + 60{,}000} = 0{\cdot}944 \text{ of the HT line.}$$

Now, if a 1,000 o.p.v. meter is connected between A and E with a total series resistance of 250 kilohms, the circuit becomes as Fig. 3b, Ra changing to Ra shunted by Rm :

$$= \frac{RaRm}{Ra + Rm}$$ (the formula for two resistors in parallel) and, if this replaces Ra in the previous equation:

$$Va = \frac{\frac{RaRm}{Ra + Rm}}{\frac{RaRm}{Ra + Rm} + R_L} = \frac{200{,}000}{200{,}000 + 60{,}000} = 0{\cdot}77$$

of the HT line voltage.

So placing the voltmeter across the anode circuit reduces the voltage at that point by 17% and, if the voltage between A and E is normally 200 volts, the voltmeter will read 166 volts—the actual voltage between A and E when the meter is connected. This is a voltage change quite large enough to persuade an unenlightened user that the circuit is faulty!

With a load resistance greater than 60,000 ohms, the voltage drop caused by connecting the meter will, of course, be even greater ; but if a meter of 20,000 ohms per volt were employed, the load shunted across the anode circuit would be 5 megohms and the circuit voltage would only be slightly affected.

It is possible to reduce the adverse effects of low-sensitivity voltmeter loading by using the highest practicable range consistent with accuracy. The voltage reading will then appear at the lower end of the scale, but as the FSD voltage will be comparatively high, then the series resistance of the meter will also be far higher than if the voltmeter were used on its correct range (when the observed voltage will be near the FSD value). This is both simple and effective, but the real solution is a highly sensitive basic movement which will provide a high o.p.v. sensitivity.

Electrostatic Voltmeters

This type of voltmeter is not fundamentally a milliameter, relying on the directly applied potential for operation. It draws no direct current and only a small alternating current, functioning with complete accuracy well into the radio frequencies, when it draws current from the circuit under test in proportion to its (capacitive) reactance.

The meter consists of two sets of vanes shaped almost like a tuning capacitor (Fig. 4) ; one set is fixed (the stator) whilst the dial pointer is connected to the other set, which is free to rotate (the rotor).

When voltage is applied across the plates, an electrostatic field is set up across them and the rotor plates are attracted by the stator, meshing into them to a degree proportional to the voltage producing the field.

The main disadvantage with this meter is that it is relatively insensitive to low voltages, its use being confined almost exclusively to the measurement of HT or EHT voltages, although laboratory models are available which will measure as low as 50 volts with a reasonable degree of accuracy.

Calibration is substantially linear, and would be completely so but for the slight opposing torque controlling the meter movement and inherent in the mounting friction, resulting in cramping at the lower end of the scale.

The voltmeter range itself is not readily extended, these meters being employed mainly as single-range meters for monitoring HT lines and similar circuits ; but AC voltage readings can be multiplied by the somewhat artificial method of employing a capacitive attenuator in the voltage line to drop the voltage to, say, one-half or one-tenth of the actual voltage so that the meter can read it ; multiplication being afterwards applied to obtain the actual circuit volts.

A capacitive attenuator is shown in Fig. 5 and if C2 is very much larger than Cm, then the output voltage $= E1\frac{Cm}{C2}$. C1 is unimportant and is quite often only the stray wiring capacity of Cm to earth.

Attenuation at DC is not possible because of the high voltages normally involved and the excessive power consumption of any resistive attenuator which would be practicable.

(To be continued)

NET FOR G3O's

We are asked by J. M. Nisbet, G3OGO, 57 Haling Park Road, South Croydon, Surrey, to say that a Sunday-evening Top Band net (1800 GMT, 1970 kc) has been established for recently-licensed stations (G3OAA *et seq.)* in the Surrey area. All G3O.. operators who can are invited to join in, as the net provides an excellent channel for discussing their ideas and problems. More distant G3O's wishing to break in can have a listening period arranged for them by getting in touch with G3OGO at the address given above.

THE RADIO AMATEURS' EXAMINATION – 1960

HIGHEST-EVER ENTRY BUT PASS-RATE STILL TOO LOW

By courtesy of the Director, City & Guilds of London Institute, we are able to discuss the details of the May, 1960, R.A.E. The figures in the table of results for the last three years tell their own story —many more candidates coming forward, but the pass-rate not improving. This is not as it should be. The pass-rate for a comparatively simple examination of this kind should never be less than 70%. If it is, then we must try to find out why.

The question paper itself is fair and reasonable, and ample time is allowed to deal with eight straightforward questions—if you know the answers. From the Examiner's Report it is clear that the failures were due to *(a)* Under-rating the importance of Part I, and *(b)* Inadequate preparation. The first can be remedied by a thorough study of the Post Office regulations governing the issue of AT station licences, and the second demands more application on the part of candidates—which really means taking the R.A.E. more seriously.

A Reader's Experience

It happens that we have just had a letter from a not-so-young reader who took this year's R.A.E. (the paper shown here) and this is what he says:

> " A word of encouragement and advice may be helpful to those thinking of taking the R.A.E. After having for some years toyed with the idea of becoming a licensed radio amateur, I decided to attempt it this May. At 54 years of age I made it, and got my licence yesterday. *(He was writing to send us his call-sign/address for " New QTH's."—Ed.).* What a lot I have missed through long indecision. Such an undertaking cannot be attempted without a plan of action. Since some of your readers may be interested, may I outline mine: (1) Be determined to make the attempt, *this year.* (2) Join the local Club and/or enrol for night school, *right now.* (3) However irksome the reading, *do your daily stint.* (4) Endeavour to know P.O. regulations, *by heart.* (5) Obtain the old exam. papers and *practise on them.* (6) Try to cultivate the friendship of at least *one local amateur.* (7) Ply him with questions and he will help you to *elucidate the text books.* (8) Buy, borrow or otherwise acquire all the *reading matter* you can about Amateur Radio."
>
> " I should stress the importance of knowing G.P.O. regulations; these are vital, and appear as the first two questions in Part I, which must be passed. They cover several sheets of foolscap; as a memory-aid, and practice in writing, *précis* them until you have reduced them to about $1\frac{1}{2}$ pages. The economy in words will pay dividends when you come to take the Examination, and is useful exercise. Part II contains eight questions, of which six must be attempted. If you are weak on maths., you can avoid the two mathematical questions, as I did, and still have every chance of success."

All of which can be accounted Good Advice. From the figures in the table, we see that as the result of this year's R.A.E., 735 candidates — the highest number yet—become eligible to go forward to the privilege of a U.K. amateur transmitting licence. Most of these will still have to take, and pass, the Morse Test before they get their call-signs.

> *Editorial Note:* The Post Office regulations governing the issue of a British AT station licence can be obtained on application to: Radio Services Dept., G.P.O. Headquarters, St. Martin's-le-Grand, London, E.C.1. Ask also for the pamphlet, *How to Become a Radio Amateur.* R.A.E. question papers, price 6d. each, for the last three years can be obtained from: Sales Section, City & Guilds of London Institute, 76 Portland Place, London, W.1, on quoting " Radio Amateurs' Examination, Subject No. 55." For general reading, we recommend the ARRL *Radio Amateur's Handbook* (see p.434 October issue), obtainable from us at 34s. post free.

55.—RADIO AMATEURS' EXAMINATION, 1960

Friday, 6th May, 6.30 to 9.30 p.m.

Eight questions in all are to be attempted: Both questions in Part 1 (which are compulsory) and six others from Part II. Failure in either part will carry with it failure in the examination as a whole.

Part 1

Both questions must be attempted in this part.

1. What conditions are laid down by the amateur transmitting licence as regards
   (a) the avoidance of interference with other amateur stations and any other wireless telegraphy
   and *(b)* the control and measurement of the frequency of transmissions? *(15 marks)*
2. Explain what is meant by over-modulation of a radio-telephony transmitter. What are the indications that a transmitter is being over-modulated, and what are the effects of over-modulation on:
   (a) the transmission from the station concerned
   and *(b)* transmissions from stations transmitting on adjacent channels? *(15 marks)*

Part 2

Six questions only to be attempted in this part.

3. Draw a circuit diagram of the power amplifier stage of a transmitter for use in the amateur bands between 3 Mc/s and 30 Mc/s. Sketch the layout of the tank circuit and describe the construction of the coils and capacitors of which it is composed. *(10 marks)*
4. What are the factors which limit the flow of anode current in a thermionic valve? Explain how the anode current in a triode valve is controlled by the potential of the grid with respect to the cathode. *(10 marks)*
5. Describe two methods of coupling a circuit carrying alternating current at radio frequency with another similar circuit. Illustrate your answer with practical examples. *(10 marks)*
6. Describe and explain a method of modulation suitable for use in an amateur telephony transmitter. *(10 marks)*
7. A coil whose inductance is 10 henries is connected in series with a capacitor of 10 microfarad across a 240 volt, 50 c/s a.c. supply. What is the potential difference between the terminals of:
   (a) the inductor
   and *(b)* the capacitor?
   (Disregard any resistance of the coil) *(10 marks)*
8. Describe the propagation of electro-magnetic waves from a simple vertical aerial.
9. Draw a block diagram of a complete transmitter capable of transmitting c.w. or telephony in the 14, 21 and 28 Mc/s. bands. Explain the functions of each stage of the equipment. *(10 marks)*
10. Describe with the aid of diagrams a power unit suitable for supplying anode and heater power to a receiver. Explain the need for smoothing of the anode supply. *(10 marks)*

EXAMINER'S REPORT

55 — RADIO AMATEURS' EXAMINATION, MAY 1960

Home Candidates	1960		1959		1958	
Total	1,274		1,102		716	
Passed	699	54.9%	657	59.6%	518	72.3%
Failed	575	45.1%	445	40.4%	198	27.7%
Overseas Candidates						
Total	59		29		5	
Passed	36	61%	18	62.1%	3	60%
Failed	23	39%	11	37.9%	2	40%

General Comment:

Although the majority of failures were the result of a general inadequacy in all questions attempted, there were an appreciable number who failed in Part I only.

Many candidates who failed did so because of inadequate and superficial treatment of the questions. Diagrams and definitions alone are insufficient when descriptions and explanations are asked for.

The following comments are made on individual questions:—

Question 1. Far too many candidates failed to give sufficient attention to a study of the licence conditions.

Question 2. Generally quite well done. A number of candidates treated the question too lightly, giving only very brief and inadequate notes. Some confusion evidenced as to the practical effects of over-modulation on a transmission.

Question 3. The circuit diagrams were generally well done, but many candidates omitted to sketch the layout, and descriptions of the coils and capacitors were too brief.

Question 4. Comparatively few candidates were able to give a simple description of the action of the control grid in a triode.

Question 5. Too many candidates merely quoted two practical examples.

Question 6. Quite well done by most candidates. The main cause of criticism was superficial treatment.

Question 7. The chief causes of difficulty were: *(a)* Use of long and involved methods of calculation and: *(b)* failure to appreciate the method of calculating the total impedance in an AC circuit. Many candidates had no difficulty with this question.

Question 8 This question seemed to cause most difficulty. In general, the treatment was weak and only a comparatively small number of candidates gave good answers.

Question 9. Generally well done, but in many cases insufficient detail was shown on the block diagram and the notes were too brief.

Question 10. Generally well done.

"FEEDING THE TOP BAND DIPOLE"

It has been pointed out by G3IBB, author of this article in our October issue, that he made a slight arithmetical error on p.410—a quarter-wave on 80m. is, of course, 67 feet, and not as given. The comments apply to the 7 and 14 mc bands for a height of 33 ft. This does not in any way invalidate his main argument, which is that if a half-wave aerial can be got out for Top Band, it is better to use a folded dipole at any practicable height (in the amateur context) and to feed it with low-impedance line to get a reasonable match, as explained in the article.

ALL DONE BY MIRRORS

We are accustomed to thinking of satellite recording and tracking as being done by complicated VHF radio circuits. The Raytheon Co., of Bedford, Mass., have now produced what they call an "electronic-optical device" which works by reflected light. Intended primarily to check tumbling—the random movement of a space vehicle about its own axes—the receiver is a 6-in. mirror. This locks on to the light reflected by the target — in this case the aluminised balloon satellite *Echo I*. Having locked on, every movement and change in the reflected light is transferred electronically to a recording head which gives an immediate plot of course, bearing and height, also indicating any tumbling movement. Because of the very short wavelength of light, exceptionally high plotting accuracy is achieved, of the order of a fraction of a mile on *Echo I*, travelling at 18,000 m.p.h. at a height of nearly 1,000 miles. The whole equipment takes up less than 8 cu. ft. of space, and so can be flown over cloud cover if there is no clear optical path between ground and target; however, in many parts of the world where the device would be used when the *Echo* satellite programme is fully developed, the lack of a clear path would be the exception. A very important advantage of this Raytheon Tracker is that, by virtue of being essentially a ground-based and operated system, no radio transmission of any sort, apart from reflected light, is required between target and ground.

NEW QTH's

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

GM3NZN, T. A. Greig, 74 Balgray Avenue, Shortlees, Kilmarnock, Ayrshire.

G3OFB, I. L. Whitworth, 101 Malmesbury Road, Shirley, Southampton, Hants.

G3OFJ, G. P. Mitchell, 38 Royston Avenue, Wallington, Surrey. *(Tel.: Wallington 5099.)*

G3OGD, A. Frost, 20 Bevan Avenue, Talke Pitts, Talke, Staffs.

G3OHH, R. A. Hargreaves, Wych Cottage, Adlington, nr. Macclesfield, Cheshire.

G3OHK, H. Cole, 25 Causeway Road, Seaton, Workington, Cumberland.

G3OHL, D. S. White, 14 Clepstone Avenue, Linthorpe, Middlesbrough, Yorkshire.

G3OHX, I. Jackson, 4 The Croft, Whittingham, Alnwick, Northumberland.

G3OIB, K. A. J. Younger, B.Sc., Read Grammar School, Drax, Selby, Yorkshire.

G3OIB/A, K. A. J. Younger, B.Sc., 39 Regents Way, Higher Bebington, Wirral, Cheshire.

G3OIL, M. Wills, 27 Blackwater Road, Newport, Isle of Wight.

G3OIL/A, M. Wills, St. Peter's College, Saltley, Birmingham, 8.

GW3OIN, J. G. Nicholas, 15 Hafod Road, Prestatyn, Flintshire.

G3OJE, M. D. Bass, B.Sc., 42 Clevedon Road, London, S.E.20.

G3OJM, C. E. Mahoney, 57 Grammar School Road, Hull, E. Yorkshire.

G3OJS, H. L. Braham, 25 Chiltern Road, Newbury Park, Ilford, Essex. *(Tel.: Seven Kings 0197.)*

G3OJV, P. W. Waters, 6 Walden Way, Hornchurch, Essex.

G3OJY, A. M. Laidler, Pondside, Sandy Lane, Churt, nr. Farnham, Surrey.

G3OJZ, B. R. Todd-White, 11 Broadfield Way, Buckhurst Hill, Essex.

G3OKD, Z. J. Nilski, 278 Woodborough Road, Nottingham. *(Tel.: Nottingham 61616.)*

G3OKF, J. S. Fitz-Patrick, 9 North Linkside Road, Woolton, Liverpool, Lancs.

G3OKG, R. J. Shepherdson, The Hollins, Grosmont, Whitby, Yorkshire. *(Tel.: Grosmont 227.)*

G3OKH, G. E. Hillman, 504 Chester Road, Castle Bromwich, Birmingham.

G3OKI, H. E. Ibbotson, 4 Toms Hill, Aldbury, Tring, Herts. *(Tel.: Aldbury Common 219.)*

G3OKM, J. R. Mitchell, 37 Joslin Road, Honiton, Devon.

G3OKQ, J. H. R. Russell, Greenfingers, Oyster Lane, Byfleet, Surrey.

G3OKS, S. R. Smithies, 4 Sunnycliffe, Lightcliffe, Halifax, Yorkshire.

G3OKX, J. W. Roberts, 34 Preston Avenue, Alfreton, Derbyshire.

G3OKY, D. A. G. Vincent, 22 Upper Elmers End Road, Beckenham, Kent.

G3OKZ, H. Tonge, 25 Gawsworth Road, Sale Moor, Sale, Cheshire.

CHANGE OF ADDRESS

G2UW, A. J. S. Wilson, 48 Tower Road, Boston, Lincs.

G2YH, C. E. Hobden, 62 Hinton Wood Avenue, Highcliffe-on-Sea, Hants. *(Tel.: Highcliffe 2488.)*

G3BG, N. M. Button, 43 Richmond Avenue, Breaston, Derby. *(Tel.: Draycott 288.)*

GM3DOD, A. M. Murray, 165 Eldon Street, Greenock, Renfrewshire.

G3DYH, S. J. Reynolds, Jessfield, Chittleburn Hill, Brixton, Plymouth, Devon.

G3ETY, G. H. Lang, 5 Coldstream Avenue, Higher Blackley, Manchester, Lancs. *(Re-issue.)*

G3EUP, W. T. Dodd, Salando, Canterbury Road West, Ramsgate, Kent.

GM3FFQ, W. Donaldson, 42 Kirk Brae, Kincardine-on-Forth, by Alloa, Clackmannanshire.

GM3GJB, W. A. Macfarlan, 49 Shannon Drive, Falkirk, Stirlingshire.

G3HA, H. Crowther, 120 Huddersfield Road, Odsal, Bradford, 6.

GM3HNE, G. Campbell, 252 Neilston Road, Paisley, Renfrewshire.

G3INW, A. Davies *(ex-GW3INW)*, 26 Temple House, Cheetham Hill Road, Cheetham, Manchester, 8.

GM3JDR, D. Robertson, Golspie Tower Farm, Golspie, Sutherland.

G3JVI, N. E. Jones, The Stag Inn, Hatfield Heath, Bishops Stortford, Herts.

G3KQL, J. L. Weatherley, 66 Ferrier Road, Elm Green, Stevenage, Herts.

G3KXU, T. A. Cousens, 117 Morris Street, Swindon, Wilts.

G3LPN, J. P. Hunt, Warwick Glen, Portsmouth Road, Camberley, Surrey.

G3LXP, D. E. Purchase, 68 Hughenden Road, St. Albans, Herts.

G3MDN, H. D. Jackson, The Lilacs, Elms Green, Leominster, Herefordshire.

GW3MPP, G. C. Price, The School House, 19 Hereford Road, Abergavenny, Mon. *(Tel.: Abergavenny 913.)*

G3NHM, R. S. W. Manns, 142 Dudley Road, Winson Green, Birmingham, 18.

G3NJH, S. A. Scott, B.Sc., 17 Chaucer Close, Uplands Park Estate, Fareham, Hants.

G3NQX, W. H. Brown, Sunnymount, Gib Lane, Houghton, nr. Preston, Lancs.

GM3NRB, N. H. Kempt, Broomcraig, Cove, Dunbartonshire. *(Tel.: Kilcreggan 3238.)*

G3NRO, P. Gill, 21 Waterside, Willesborough, Ashford, Kent.

G3NSZ, D. Roberts, 18 Alexandra Drive, Rock Ferry, Cheshire.

GW3OAZ, J. Akehurst *(ex-G3OAZ)*, 106 Llanmiloe Estate, Pendine, Carms.

THE OTHER MAN'S STATION

G3BST

THE radio room at G3BST—J. B. Tuke, 12 Lovatt Drive, Bletchley, Bucks.—consists of a converted coal shed, measuring only six feet by four. The equipment has been arranged so that operating and routine maintenance can be carried out as easily as possible—as there is literally not room enough to swing the proverbial pussy!

The layout shown in the photograph is that mounted on the main bench fixed along one side of the "room." This consists of (left to right) a Type-3 teleprinter, a Q5'er and BC-348 receiver with the frequency meter on top, a VLF converter for reception of facsimile signals around 106 kc, a TA-12 transmitter, in front of which stands an electronic keyer unit; then, at the far end of the bench, an experimental grounded-grid PA stage, with a facsimile receiver on the table at right, with power supply units beneath. Due to the small space, one photograph cannot show all the equipment; mounted on a small shelf above the operating position is the RTTY converter (described in the March-April, 1960, issues of SHORT WAVE MAGAZINE), an oscilloscope, an audio generator and loudspeaker. Power supply for the transmitting equipment is kept under the bench. All other items have their own power supplies, and a switchboard connects mains to any or all as required. A magnetic cut-out removes AC from all equipment in the event of overload (or for maintenance), though lighting, heating and an outlet for a soldering iron remains "on" at all times.

Since the receiver output may be required for RTTY, facsimile, phones or loudspeaker, and the oscilloscope and/or audio generator may also be required at the same time for monitoring or alignment purposes, a twenty-way jack field is fitted, connection between the various pieces of equipment being made by patch-cords.

The transmitter consists of a TA-12 used as a drive unit, working into a 35T grounded grid amplifier as PA. Input is around 130 watts and operation is restricted to CW and RTTY. The frequency range is 21 to 3·5 mc, though the station is not used above 7 mc, as G3BST has no interest in the higher frequencies.

The aerial is a 33-foot vertical wire, fed directly by coax buried in the garden. For operation on 7 mc, the aerial is a natural quarter-wave, and for 3·5 mc a large loading inductance is connected between the foot of the aerial and the coax. The coax terminates in a relay at the station end, so that it is connected either to the receiver or to the aerial tuning unit which is fed from the grounded grid amplifier through a low-pass filter.

Main interests at G3BST are 7 mc CW in general and DX when there is any, and RTTY. For the latter, the TA-12 is reactance modulated, and any shift from 200 c/s to 1·5 kc can be employed.

A serious side-line is the reception of broadcast meteorological charts on the facsimile receiver and, in this connection, radio and the second hobby of meteorology combine. It is intended to carry out facsimile transmission also, and authority has been obtained from the G.P.O. for experiments at VHF.

Although the development of new equipment is always under review, the main object of the station is *communication* rather than experimental work.

First licensed in 1947 and operating for some years as a GM in the Hebrides, G3BST does not boast of a single "sheepskin." Countries confirmed on 7 mc alone total about 85. It is eventually hoped to make a DXCC on that band, but there are so many interesting side-lines to Amateur Radio that to restrict operation to country-chasing pure and simple seems a waste of time!

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for December issue: November 11)

(Address all reports for this feature to "Club Secretary")

STAND by for **MCC**: November 12/13 and 19/20. The number of Clubs taking part increases every year, and there seems little doubt that the 1960 total will be yet another record.

In the October issue, p.439, we published identification numbers up to C.81; and herewith is the list of further numbers allotted to Clubs since then:—

C.82 Lincoln
C.83 Leven
C.84 Morecambe
C.85 RAF Little Rissington
C.86 Kingston
C.87 South Birmingham
C.88 Purley
C.89 Blackwood, Mon.
C.90 Reigate
C.91 Brentwood
C.92 Newbury

There will probably be others, which we shall be unable to publish in advance, but Clubs making late application, with a stamped addressed envelope, will be notified by return. The Rules for the event were published on p.438 of the October issue.

Blackwood exhibited at the Blackwood (Mon.) "Autumn Fayre," with GW3CJR/A housed in two large ridge tents and a 275-foot long wire supported at the far end by a gasholder, as well as a dipole for Forty and Fifteen. Home-built equipment was on show, and the public were so interested that the station had to be roped off from them! Well done, Blackwood.

Bradford have had talks on Transistors, TV Circuitry and one of the recent FP8 "DX-peditions" (recorded talk and colour slides by W1PFA). On November 8 they visit Tinshill TV Radio Link, and on the 22nd G3KEP will be talking on Modulation. The **British Two-Call Club** is still enrolling new members; their president is DL2YU, vice-president G6UT and secretary G2DHV. **Crystal Palace** held a debate in October—"Can AM phone survive on the DX bands?"—and on November 19 they will hear about Communications and the East African Safari from G3GWD/VQ4CW. **Hastings** hold their AGM on November 8, after which they will hear the third and final talk in the series on SSB, by G3BDQ (on the 22nd).

Newbury meet on November 25 for a talk and discussion on Aerials. The October meeting was a Junk Sale. Their chairman and his son recently acquired their licences on the same day, and are now signing G3OJF and G3OJK respectively, and already busy on Top Band.

North Kent meet on November 10, when Messrs. Jason Electronic Design, Ltd., will be showing and describing some of their test equipment. Next meetings are on November 24 and December 8. All meetings at the Congregational Hall, Bexleyheath (near the Clock Tower), 8 p.m. **Queens College** (Taunton) run an SWL station, with a 45ft. vertical aerial leading up to the School Tower; they have a small but enthusiastic group of members.

Scarborough meet at Chapman's Yard every Thursday, 7 p.m., and a full programme has been arranged, with talks on a variety of radio subjects. **Slade** hold their AGM on November 18, and on December 2 they will have a lecture-demonstration on "Sound Effects" by Mr. D. Brown, of the Birmingham Tape Recording and Audio Club. They visit the Hobbies Exhibition, on November 26, by the Midland Red Motorway Express.

Wirral are expecting several new call-signs on the air, many of them belonging to their younger members. They held their AGM on October 7 and are now in full cry with their winter session. **Wolverhampton** held their AGM some while back and elected their new officers—*see* list for new secretary's QTH.

Spen Valley visit the BBC Studios, Leeds, on November 9; and the 23rd is booked for a talk on FM Receivers. December 7 is the date for a Film Show. **Halifax** have an informal evening on November 15, and on December 6 G3IGW will be talking on "Where, When, and What to Look For." **Mitcham** have a Junk Sale on November 4, and on the 18th a lecture/demonstration of Collins gear, presented by G3MSS. December 2 is a non-radio night with a talk called "Round and About with a Camera," by G3OCA.

Wyton (R.A.F.) is becoming quite active, covering all bands from G3MMH. Local amateurs and SWL's who would like to make contact and visit the club (where they will be very welcome) are invited to get in touch with the officer i/c, G3OAT/T—*see* panel.

Liverpool have meetings every Tuesday evening throughout November, with the Constructional Contest on the 8th; a Junk Sale on the 15th; the 22nd is an Open Night, and on the 29th there is to be a talk by G3LRB and G3KYX on Safety in the Shack, covering regulations and the medical aspect.

On November 29, **Dorking** have a film show at the Star and Garter, 7.30 for 8.00 p.m.; the programme will be of "technical and general interest," and ladies and visitors are invited.

Cheltenham report that their SWL's are enthusiastic about the R.A.E. Evening Classes, for which enrol-

ment is still possible ; G3MOE has opened a course of Morse instruction. Meanwhile G3GPW's activity has moved indoors for the coming season, and they will be taking part in MCC. Meetings are at St. Mark's Community Centre, Wednesdays from 7.30 p.m.

Clifton continue to meet every Friday, 8 p.m., at 225 New Cross Road, S.E.14, and the Clubrooms are also open on Wednesday evenings and Sunday mornings ; at this latter time G3GHN is operating on Two Metres.

Peterborough are holding their winter meetings on the first Friday, 7.15 p.m., at the Technical College. At their October meeting G3FJK gave a talk on UHF techniques, G3GCK brought along his commercial transmitter and G3KPO showed members his teleprinter.

Reading reports good attendances at meetings, for talks by VQ1WVR, ZD2BRG and G2DX—the latter on Early Days in Amateur Radio. There were 27 applications for the R.A.E. course at the local Technical Institute, which should mean a few more call-signs in and around the area. Offers of lectures and demonstrations for the winter period would be appreciated by the secretary.

Southgate have recently heard talks by G3HRH on Aerials, and by Standard Telephones on Use and Manufacture of Crystals ; they report a new menace in the form of the theft of all the mobile gear from G3NQN's car—including the battery ! On October 12 they visited the Edgware Club, and on the 15th held their own Annual Dinner. Judging for the G6QM Trophy takes place on November 10, probably followed by a Junk Sale.

Stoke-on-Trent recently activated GB3SOT from a Hobbies Exhibition in Burslem, putting their Lord Mayor on the air and handling a steady flow of QSO's on three bands. They meet every Monday and Thursday, at the Clubroom at the rear of the Cottage Inn, Oakhill. Lectures on Thursdays will include the G8KW Aerial, a Mobile Tx for Top Band, SSB Transmitters and other kindred subjects. Meanwhile North Staffs. Technical College is running an R.A.E. Course on Mondays, 6.30-9 p.m.—full details from G3COY, the secretary.

Sutton & Cheam meet on the third Tuesday at The Harrow, High Street, Cheam. Recent events have included a Junk Sale and a talk on SSB by G3HQX. Work is also on hand for the annual Constructional Contest.

Acton, Brentford & Chiswick meet on November 15 for a general discussion and a Junk Sale, 7.30 p.m. at 66 High Road, Chiswick, W.4. **Chester** have a Bring-and-Buy Sale on November 8, and on the 15th a discussion on RAEN ; December 6 is their Net Night. All meetings at the Old Bishop's Palace, Chester.

Chiltern meets at the British Legion Club, High Wycombe, at 8 p.m. on the last Thursday of the month. New members are very welcome, the only qualification being an interest in *any* aspect of radio. On October 27 the subject is D-F, by Mr. E. Mollart. A class of ten is attending the R.A.E. course under the tuition of G3INZ.

South Shields held their AGM and elected G3KZZ chairman and G3NCL secretary. The coming year's activity was discussed, and meetings are to be held on the last Wednesday of the month for lectures, film shows and so on. The normal Club meeting takes place every Friday from 6.30 p.m. onwards, at Trinity House, Laygate Lane.

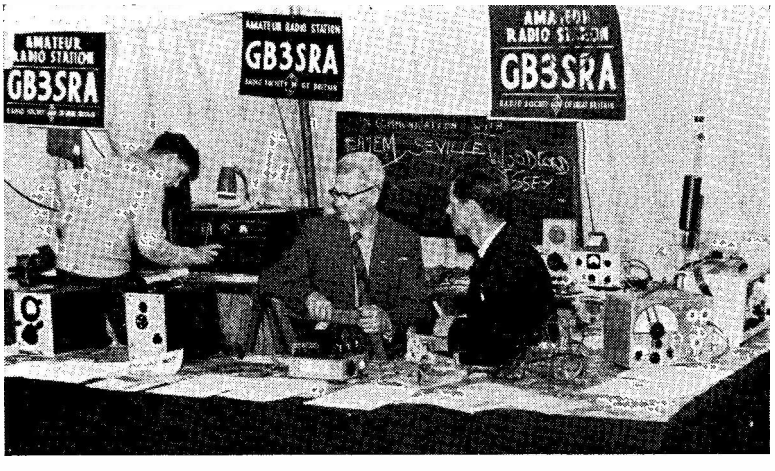
South Yorkshire reports seven passes in R.A.E., all now working hard on Morse ; transmissions are radiated every Sunday, 0930, on 1980 kc for this purpose ; a new class has been formed at the Technical College for next year's R.A.E., and is well supported.

Torbay reports that recent meetings have included a full discussion on TVI, a talk on the Club's D-F receiver and aerial (to be built in the winter months) and a Junk Sale that raised over £6. At the November meeting G3LKH will talk on The Cubical Quad and TVI.

Cornish met at Falmouth on October 5 and held

THE FIFTEENTH MCC

First session Saturday, 12th. Rules in full p.438 October issue. Allocation of Club Identification Numbers on p.439 October. Additional entrants p.496 opposite. Call " CQ MCC." Get time-check before start of each session. Accurate log-keeping and snappy, contest-style operating will be essential. All logs must be received by December 1st certain.



For the Wood Green Summer Show, September 9-10, the Southgate & Finchley group had two stations in action, signing GB3SRA. One was on 10-80 metres, with a home-built 25w. transmitter and AR88D receiver, and the other on Top Band, using a 4-watt Tx and modified Command receiver. This gear was loaned by G3MBL. Two aerials were erected, one for the HF bands and the other a half-wave on 160 metres. Good results were obtained under poor conditions, 150 contacts being made in 19 countries, with all the U.K. workable after dark on Top Band. In the foreground are, left to right, G3MXQ and G3MWG.

a lengthy discussion on " emergency working " with 26 members present. Their next meeting was also in Falmouth and was arranged for November 2.

Manchester have moved into new headquarters at the King George VI Club, North Road, Moston, where they are running a Morse group and technical instruction for R.A.E.; a new activity at the Wednesday meetings is that of servicing receivers for the Blind and Elder Citizens, in conjunction with the WVS—a very worth-while undertaking. They hope to have a Club station on the air soon, and the future programme includes a Junk Sale on November 9, and a General Meeting on the 16th ; on the 23rd there will be a lecture.

Civil Service Radio Society have made a good start, with increased attendances ; GB2SM has entered for the *CQ* Contest, and their Contests Committee is planning other entries. On December 6 there will be a Stereo, Hi-Fi demonstration by Messrs. Whiteley —6 p.m. at the Science Museum, but please contact the hon. secretary (*see* panel) first if you are a non-member. Further lectures—VHF Technique, Radio Control of Models, GPO Ship-to-Shore Circuits, and a visit to a Coastal Radio Station, which should be very interesting.

Crawley will meet on November 24 for a Film Show given by Mr. H. J. P. Lees ; visitors welcome at the Brewery Shades, High Street, Crawley. **East Kent** held a General Meeting in September and decided on running a Junk Sale, visiting the Hobbies Exhibition and holding their annual Christmas " Bun Feast." R.A.E. courses and Morse instruction at the Club, Tuesdays, 7.30 p.m.-9 p.m.

Harrow will be holding a Junk Sale on November 4 ; on the 18th G3MLS will talk on Stabilised Power Supplies. November 11 and 25 are Practical Nights. All meetings at Roxeth Manor Secondary School, Eastcote Lane, South Harrow, Fridays at 8 p.m. A Top-Band net is held before the meetings.

Reigate visited Gatwick Airport on October 8, when a large party of members, wives and friends was shown round. Five members were awaiting the R.A.E. results, and the Club is looking for permanent premises. At the Tower, Redhill, on November 19, there is a talk on Aerials for the SWL. The date for the Annual Dinner is February 11 next.

Nottingham will be seeing a film, " Humanity in Action," on November 8, and on the 15th the subject is Aerials. The 22nd is an Open Night and the 29th a Junk Sale. Four of the Club's six entrants for R.A.E. passed, and two already have their calls. Classes continue on Thursdays, under G3LXL.

Names and Addresses of Club Secretaries reporting in this issue :

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
BLACKWOOD: P. M. Fulton, GW3MMU, 36 Sunnybank Road, Blackwood, Mon.
BRADFORD: M. Powell, G3NNO, 28 Gledhow Avenue, Roundhay, Leeds 8.
BRITISH TWO-CALL CLUB: G. V. Haylock, G2DHV, 28 Longlands Road, Sidcup, Kent.
CHELTENHAM: J. H. Moxey, G3MOE, 11 Westbury Road, Leckhampton, Cheltenham.
CHILTERN: C. Simpson, 2 Mead Street, High Wycombe.
CIVIL SERVICE: G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CORNISH: W. J. Gilbert, 7 Poltair Road, Penryn.
CRAWLEY: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DORKING: J. Greenwell, G3AEZ, Wigmore Lodge, Beare Green, Dorking.
EAST KENT: D. Williams, G3MDO, Llandogo, Bridge, Canterbury.
HALIFAX: A. Robinson, G3MDW, 7 Upper Brockholes, Ogden, Halifax.
HARROW: S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
HASTINGS: W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea.
I.H.H.C.: M. Allenden, G3LTZ, 16 Grovefields Avenue, Frimley, Aldershot.
LIVERPOOL: H. James, G3MCN, 448 East Prescot Road, Knotty Ash, Liverpool, 14.
MITCHAM: M. Pharaoh, G3LCH, 1 Madeira Road, Mitcham.
NEWBURY: J. A. Gale, G3LLK, Wild Hedges, Crookham Common, Newbury.
NORTH KENT: D. W. Wooderson, G3HKX, 75 Mount Road, Bexleyheath.
NOTTINGHAM: E. C. Weatherall, 16 Avebury Close, Clifton, Nottingham.
PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye.
R.A.I.B.C.: W. E. Harris, G3DPH, 4 Glanville Place, Kesgrave, Ipswich.
READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
SCARBOROUGH: P. Briscombe, G8KU, Roseacre, Irton, Scarborough.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTHGATE: A. G. Edwards, G3MBL, 244 Ballards Lane, North Finchley, N.12.
SOUTH SHIELDS: R. Ray, G3NCL, 16 Holystone Avenue, Gosforth, Newcastle-on-Tyne.
SOUTH YORKSHIRE: W. Farrar, G3ESP, 2a Highbury Avenue, Bessacarr, Doncaster.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
STOKE-ON-TRENT: W. J. Reynolds, G3COY, 90 Princes Road, Hartshill, Stoke-on-Trent.
SUTTON & CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
TORBAY: G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.
WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington.
WOLVERHAMPTON: J. Rickwood, 738 Stafford Road, Fordhouses, Wolverhampton.
WYTON (R.A.F.): F.Lt. M. J. A. Bryett, G3OAT/T, Nobles Farm, Bluntisham, Hunts.

NOTICE TO ALL HONORARY SECRETARIES

Appearance in this space is free to those Clubs who care to make use of it for publicity and the reporting of their activities. Hon. secretaries are asked to ensure that their reports, addressed " Club Secretary," Short Wave Magazine, 55 Victoria Street, London, S.W.1, reach us by the date given each month at the head of the " Clubs " article. It is impossible to write in late reports, received after we close for press. All reports must include the name and QTH of the hon. secretary, for publication in the address panel. Photographs to illustrate the feature are welcomed, and payment is made for those we can use.

CLUB PUBLICATIONS RECEIVED

We acknowledge, with thanks, the receipt of the following Club Publications: **Southgate** (*Newsletter, October*); **Mitcham** (*Newsletter, October*); **Wolverhampton** (*News Sheet, October*); **Wirral** (*Newsletter, Vol. 13, No. 5*); **Hastings** (*Natter-Net Notes No. 12*); **Crystal Palace** (*Newsletter No. 56*); **North Kent** (*Newsletter No. 38*); **Reigate** (*Newsletter No. 7*); **R.A.I.B.C.** (*Radial, Vol. 6, No. 8*); **I.H.H.C.** (*Circular Letter, September/October*). **A.R.M.S.** (*Newsletter No. 12, October*).

SMALL ADVERTISEMENTS

(" SITUATIONS " AND " TRADE ")

9d. per word, minimum charge 12/-. No series discount: all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

TRADE

QSL's and Logs by Minerva. The best there are.— Samples from Minerva Press, 2 New Road, Brentwood, Essex.

WANTED FOR CASH: Good clean communication receivers and SSB equipment. Please state price. — Short Wave (Hull) Radio, 30/32 Princes Avenue, Hull. *(Tel. 18953.)*

QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST. PROMPT DELIVERY. SAMPLES. — ATKINSON BROS., PRINTERS, LOOE, CORNWALL.

"TELECOMM" 2-metre transmitters, receivers, converters and mobile Tx/Rx's ; also transistor DC power converters.—R.E.E. Telecommunications, Ltd., 15a, Market Square, Crewkerne, Somerset.

AVO's Meters and Bridges No. 7's and 40's, as new, £6 15s. (p. & p. extra). Meters, all to 10 mc, £4. Valve Voltmeters, £4. EF80's, PCF-80's, 5s. each. Trans. 6 to 12v. 3 amp, 6s. 6d.—Electrical Development Rentals, 133, Church Street, Paddock, Huddersfield.

HALLICRAFTER'S Receivers, S-36A, 27 mc-145 mc ; S-27CA, 125 mc-220 mc ; Eddystone 358X, 40 kc-32 mc (new, boxed), £16 10s. TCS-12, 1·5 mc-12 mc, £8 10s.; AR88, £40 ; Collins ARR-15, 1·5 mc-18·5 mc (new, boxed), £35. Plus p/p ; s.a.e. list.— R. V. Wright, 4a, Nepal Avenue, Atherton, Manchester.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

FOR SALE: *Short Wave Magazine,* Vol. XV, Nos. 3, 4, 5, 7, 9 ; Vol. XVI, Nos. 1-12 except 7 ; Vol. XVII, Nos. 1-12 except 5, 6. RSGB *Bulletin,* Vol. 33, 1, 3, 5, 7, 8, 10, 11, 12 ; Vol. 34, 1-12 except 4 ; Vol. 35, 1-12 ; 1s. 3d. each, plus postage. — Livermore, 7 Porth Parade, Porth, Newquay, Cornwall.

SALE: Exchange Leitz Valoy 35 mm. enlarger (Leica). WANTED: Panda Cub, condition immaterial, or similar equipment.—Knights, 16 Clyde Street, Grimsby.

SIDEBANDERS: You are invited to join the " SINGLE SIDEBAND AMATEUR RADIO ASSOCIATION." Official publication, *The Sidebander,* issued to members. Annual fees, $3 or 24s. Application forms and sample copies available from British representative: Ted Hayes, G3KHE, 19 Monmouth Drive, Sutton Coldfield, Warwickshire.

WANTED: Z-Match Unit ; BC-221 or LM ; Beam Antenna ; HRO less coils and power pack.—Stead, 2 Cliff Road Gardens, Leeds, 6.

SMALL ADVERTISEMENTS, READERS—*continued*

SHORT WAVE MAGAZINES, 1946 to 1960, 10 volumes complete, 70s.; 48 others, £1. Sixty *Short Wave Listener*, 25s.; 43 *QST*, 1951/55, 25s.; RSGB *Bulletin*, volumes 30/31, 33/35 complete, 20s.; 17 others, 5s. Or £7 the lot.—Brock, 98 Dora Road, Wimbledon, S.W.19. *(WIM 3869.)*

GOING QRT—changing QTH: 150-watt 22-valve relay controlled luxury Tx with self-contained electronic keyer, Antennamatch, ATU, etc. Demonstration by appointment in Surrey. £60 (less than half components value) for quick sale, or part-exchange early Empire stamp collection. Ful details and photo.—Box No. 2358, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Mains transformer, 580-0-580v. 250 mA, 6·3v. and 5v. heaters, 30s. WANTED: Mains Transformer 750-0-750v. 250 mA, preferably with 5v. 2A. heaters. Also DT2 Driver trans.—Pinnock, 19 Fountains Road, Luton, Beds.

EDDYSTONE Short Wave Radio Model 840a (1958), new, £55; perfect condition; asking £35 (no offers).—*GLADSTONE 3723.*

VFO—EXCITER Unit wanted for 813 Tx; must be clean, cheap, and working.—Details, with s.a.e., please: Box No. 2359, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: 6AM6's, 2s. 6d. each; 813 (new), plus two bases, £1. New GU1 rectifiers, £1 pair. Meters: 250 μA, 3 in. square, scaled "0-150 peak volts," also 2·5 mA, 4½ ins. square, scaled "0-6 kV.," £1 each. Eddystone Bug, £2. Variable condenser, 500 $\mu\mu$F, 1kV., 10s., o.n.o. on any item.—A. R. Williams, 3 Crescent Road, Great Baddow, Chelmsford, Essex.

WANTED: 7 mc crystals, ¾ in. pin spacing. FOR SALE: Top Band and 3·5 mc crystals.—Garner, Barbon, Aigburth Hall Road, Liverpool, 19.

SALE: 80/40/20/15/10-metre HRO, bandspread coil packs, £2 each. — G3BPE, 35 Bladindon Drive, Bexley, Kent.

AR88D, all new valves just fitted; also spare valves to go with it. £40. Also BC-221, £12. —G3GDQ, 162 High Cross Road, Tottenham, N.17 *(TOT. 9324.)*

WANTED: Collins KWM2 Transceiver, preferably complete with mains power pack and mobile transistor power pack; or any other good commercial or amateur mobile transmitter and receiver covering 80/10 metres with power input minimum 50 watts.—Full details, price, to Box No. 2360, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: R.E.E. communications 2-metre transceiver, complete with mobile power pack; good working order, in present mobile use; cost £85; sale, £30. Also AR88D, £45; AR88LF, £35; BC-221 with p/pack and chart, £20; Geloso G209 receiver, £50. Numerous mobile p/packs and other gear. Send s.a.e. for list. WANTED: 80/10-metre mobile transceiver; willing part-exchange or what-have-you. — G5ZT, Burnbank, Goosewell Hill, Eggbuckland, Plymouth, Devon.

HRO IF Line-up, xtal filter, BFO (both brand-new) and two IF transformers; the lot, 45s.—Kershaw, 76 Bradsnaw Brow, Bolton, Lancs.

WANTED: DST-100 Manual. Also wanted: Command Receiver, Top Band.—R. Overton Larty, Windyridge, Sidestrand, Cromer, Norfolk.

SMALL ADVERTISEMENTS, READERS—*continued*

AR77E with handbook, £20; BC-221 with charts, £18 o.n.o.?—E. Buckmaster, 24 Longfields, Longmeadow, Stevenage, Herts.

FOR SALE: Mint Eddystone 888A with matching S-meter, speaker and mounting blocks, £85 or near offer? Mint Collins KWM-1 SSB Transceiver with AC power supply, step-down trans. DX Adaptor, xtals to cover all of 14/21/28 mc bands, set of spare valves and hand microphone. Offers? 4X150A's. £2 each, brand-new.—Box No. 2361, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Collins 32V3 transmitter, as new, and Telerex 20-metre beam; highest offer.—Box No. 2362, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

COMPLETE AMATEUR Tx/Rx rig, Collins TCS series, 100w. CW, 50w. AM, with HT power pack (no LT), £24 o.n.o.?—*Tel.: Weymouth 1832.*

AR88D, £45; Kupfrian (U.S.A.) transistorised 12v. mobile power supply, 100w. at 500/250v. DC; size 2½ in. x 3½ in. x 4 in.; cost £24; unused; £15. Eddystone S-meter, 90s. Genuine AR88 S-meter, 55s. G4ZU Coax Minibeam, new, £12. Small 10/15-metre phone Tx with AC power supply complete, £15.—G3KAT, 80 Endsor Street, Moss Side, Manchester, 16.

SALE: National HRO-60, complete manual, matching speaker, xtal calibrator, 5 coils with bandspread, including special 21 mc B/S coil, 230/110 volt operation. No reasonable offer refused. Delivered London area, radius 20 miles.—Box No. 2363, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Panda PR1120v. transmitter, good condition, needs slight wiring attention, £40; buyer collects or delivered London/Surrey area. Mosley TA-33JR 3-ele/beam, little used, good shape, £10 (carriage extra).—Box No. 2363, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MINIMITTER Mobile Tx, control unit, 160m. whip, ARC5 Rx. 12v. power pack, £20, or exchange w.h.y.?—G3NQX, Sunnymount, Gib Lane, Hoghton, Nr. Preston, Lancs.

PLEASE can you help? Instruction and Alignment Manual wanted for HRO-MX; buy if possible; all costs refunded.—Wood, Windrush, Hail Weston, Hunts.

CREED 8B Teleprinter, silencing cover, 230v. motorsprocket, feed carriage (Page), £23. Leak TL12 plus and Vairislope 111 Preamp., £22.—Rigby, Melbrook, Branch Road, Mellorbrook, Blackburn, Lancs.

HAND WINDING MACHINE by ETA Tool Co., with Veeder counter and feeds, suitable most gauges and any coverings 47 to 24 gauge, £9 10s. Set Morse records, 8 parts, speed 78, 30s. Valves: 805 (2), 25s. each. 80-ohm. 150-watt non-inductive resistors (3), 8s. each. 22ft. galvanized tubular tower with telescopic mast to 35ft.; 10/15 Minibeam, heavy geared motor, selsyns, indicator with remote control panel, transformers, £20. Power unit RA34F 210-250v. in outputs 1100v. at 350 mA, 12v. AC at 14·25 amps., 12v. DC at 2·4 amps., thermostatically-controlled delay switches and ventilating fan, metered, instruction book and connecting leads, £8 10s.; weight, over 1 cwt. Last two items buyer collects; s.a.e., please.—GW3FVI. 76 Ewenny Road, Bridgend, Glam.

SMALL ADVERTISEMENTS, READERS—*continued*

ZENITH TRANSOCEANIC, good condition, £10; PCR 3-23 mc to 550 kc, internal power pack and speaker, £10 o.n.o.?—Sanre, 109 Orebank, Cardenden-Fife, Scotland.

PANDA PR120V, in excellent condition, £55. International rack-mounting power packs (2) giving 1500 or 1250v. at 250 mA with half-power primary switching, GU50's, ample smoothing, swinging chokes, HT voltmeter; also 450v. supply with separate bias unit. All 240v. AC, built to professional standards; the two, £7 10s. (buyer collects). BC-221 built into TU5B cabinet with monitor speaker and stabilised power pack, amateur band calibration chart, in first-class condition, £15.—Corbett, 17 Tudor Avenue, Bebington, Cheshire.

MINIMITTER MR-44 Receiver, new condition, little used; surplus to requirements. Bargain at £45 (carriage paid).—Box No. 2364, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

"TELECOMM" 14-valve 2-metre d/s/h comm. Rx, BFO, xtal cal., built-in AC supply; a few hours' use only; cost £70; accept £50 (or exchange for high-grade HF Rx).—Box No. 2365, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

840A, working order; 10 Mullard ECC35; £30 (carriage paid England; elsewhere £1).—Box No. 2366, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Excellent R.A.E. Correspondence Course, mint condition; cost £10. Offers?—Box No. 2367, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: VHF Converter with continuous coverage from about 20 mc to 250 mc, such as Labgear RV2; suitable for use with CR-100 or National 1-10 Receiver; must be 230v. AC and in perfect or mint condition.—Roberts, 244 City Way, Rochester, Kent.

R107 FOR SALE, excellent condition, £10, with manual. WANTED: CR-100 manual, main and vernier dials, and IFT can.—Albans, 17 Fern Road, Cropwell-Bishop, Notts.

ARMY 36 Tx in transit case, with modulator and power pack, £10 10s. TCS-12, less power pack, £5 10s. (Above delivered 50-mile radius.) Labgear W.B. Multiplier, £2 10s.—Jones, 45 Urban Gardens, Wellington, Salop.

WANTED by VQ2TV: AR88D fitted with S-meter. Best price paid for receiver certified in good working order. Despatch to VQ2 can be arranged through London agents.—Airmail offers to: P.O. Box 667, Bancroft, Northern Rhodesia.

BC-312, modified 6v. heaters, less power supply, £12. Cossor double-beam 'scope, Type 339A, re-enamelled case and panel, scruffy interior, but works, £10. BC-221AH, less case, with blank calibration book, £10. G8KW Aerial Traps, with diagram, 30s.; Dynamotor, 12v. in, 400v. at 200 mA out, 30s.; Command Rx Dynamotor, 12v., £1; another, similar but filtered, 25s. Mobile antenna, 3ft. Minimitter base and mount, home-brew C/L coil, chromed telescopic top (160m.), 35s.—G3HCM, 321 Tile Hill Lane, Coventry.

WANTED: HRO Senior, preferably with band-spread coils; must be in excellent condition.—Particulars and price to: Jones, 33 High Street, Treorchy, Rhondda, Glam.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Eddystone S.504 or similar Rx, by student; good condition not essential, as will re-align, re-spray, etc., but preferably working at present.—Details, price, to Box No. 2368, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: ZC1, modified for mains, fitted pre-amp., xtal mike, phones; also 68T Tx/Rx, complete with phones. Both in good working order. Lot, £13 10s. (plus carriage).—Box No. 2369, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Latest GM3BQA Triband Quad, new, unused; also American bug key. Offers?—G3LCI, 9 Eastcroft Road, Wallasey, Cheshire.

SALE: R1155 with p/pack, having internal speaker and audio stage, £12 10s. Really good condition. Buyer collects. — Berry, 4 Falcon Road, Bingley, Yorks. *(Tel. 4376.)*

TABLE-TOP 120w. Ph/CW Tx with four power units. Prefer buyer to operate Tx before collecting. Offers around £20 welcomed.—G3HWU, 114 Carr Street, Marsh, Huddersfield.

BALDINA 35mm. 2·8 Lens in light value Compur with built-in light meter; enlarger, r/finder, flash and all processing equipment. Exchange for best Receiver offered (value £45).—Further details from: G3GXQ, 4 Dawlish Avenue, Leeds, 9.

BC-348 Rx, ex. condition, £11. WANTED: Auto-change record player.—G3JIC, 21 The Grove, Windle, St. Helens, Lancs.

FOR SALE: K.W. Vanguard, first-class condition and running order; black crackle case; £45 or offer? (delivered). Going QRO and SSB.—G3GQK, 7 Leopold Close, Eaton, Norwich.

R107. excellent condition, S-meter, diagram; owner left home; £8 o.n.o.? (carr. extra).—W. Basham, Haven Bungalow, Langley Burrell, Chippenham, Wiltshire.

COMMAND Tx, 3-4 mc, and Q5'er; both new, crackle finish; £4 each. S.27 tuning gang and drive, 10s. each; AR88LF and BFO transformers, 5s. each; CR-100 mains plugs, 2s. 6d.; QQVO3-20A, 30s.; 5763, 6AG7, 7s. 6d.—Box No. 2370, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

2-METRE Converter; Withers Electronics, IF 28-30 mc, brand-new, unused, £9. Western Electric VHF Converters, 95-250 mc, 6J4 RF, IF output 30 mc, new, £6 (plus carriage). WANTED: HRO Senior in original and mint condition; also HRO Manual and 1·7-4·0 mc B/S coil.—Box No. 2371, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

LG. 300 150w. Transmitter, in mint condition, £55, complete with power units. This transmitter has worked DXCC and WAS on phone and CW. Owner going SSB.—Further particulars from Graham, GM3MYJ, 31 High Street, Wick, Caithness.

WANTED: Manual for 1938 Super Skyrider; also quantity of new 6K7 metal valves, cheap.—G3EHY, Knightcott, Banwell, Weston-super-Mare, Somerset.

NO MONOPOLY list prices: Amateur prices for Amateurs: 813's, 47s. 6d.; QQVO6/40, 37s. 6d.; new, boxed, post paid. Other types available. State your valve requirements. — G3LSD, Collingwood House, Stoke Damerel, Plymouth, Devon.

SALE: 160-80m. Tx, separate highly stable VFO, miniature valves used throughout, 2/254M's in PA, £20 o.n.o.? Also 80-10m. Tx, Geloso 4/102 drive unit, 2/254M's in PA, £20. Both Tx's are less modulator and HV power supplies. All other supplies are *in situ*. Both are built in Eddystone cabinets and are engineered and wired to a high standard. Buyer collects. Please drop me a line when intending to call.—Ives, 30 Blossom Waye, Heston, Middx.

HALLICRAFTERS Dual Diversity Rx in excellent order. This *de-luxe* Communications Receiver with smooth bandspread is being offered at the give-away price of £45. Sideband receiving adaptor, £10; 100 kc and 5 kc Multivibrator, 100 kc and optional 5 kc check points, £6 10s.; s.a.e.—Mortimer, 51 Townhead Road, Dore, Sheffield.

Printed by The Courier Printing Co. Ltd., Tunbridge Wells, for the Proprietors and Publishers, The Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. The *Short Wave Magazine* is obtainable abroad through the following : Continental Publishers & Distributors, Ltd., William Dawson & Son, Ltd. ; AUSTRALIA AND NEW ZEALAND—Gordon & Gotch, Ltd. ; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. *November* 1960.