The SHORT WAVE Magazine

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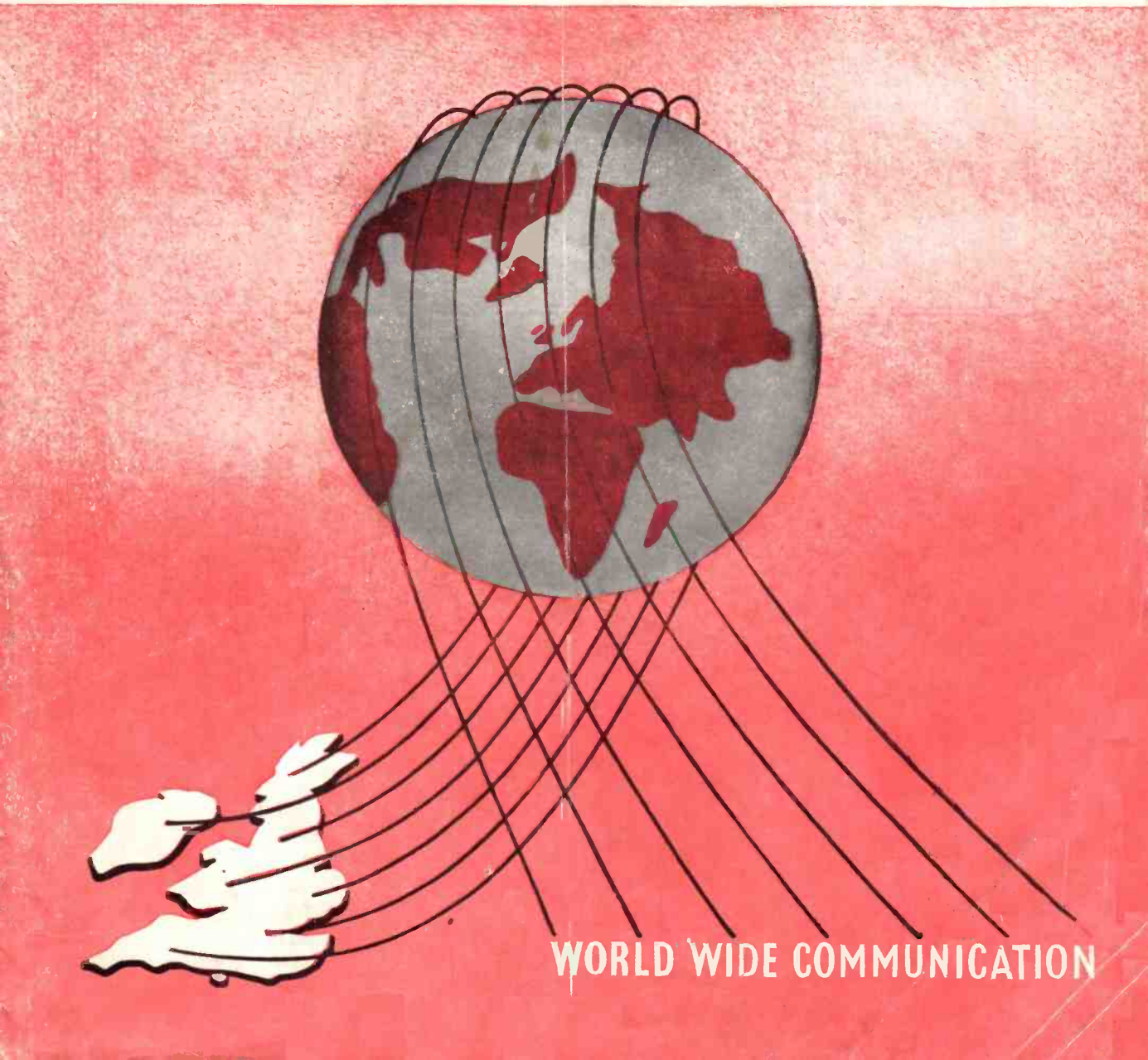
VOL. XIV OCTOBER, 1956 NUMBER 8



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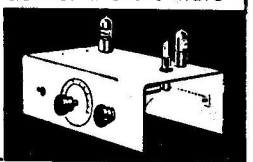

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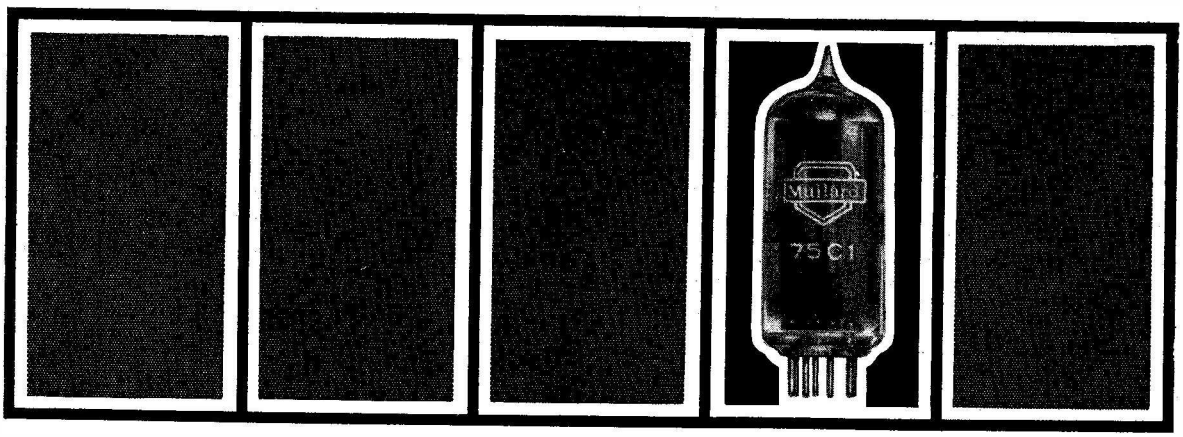

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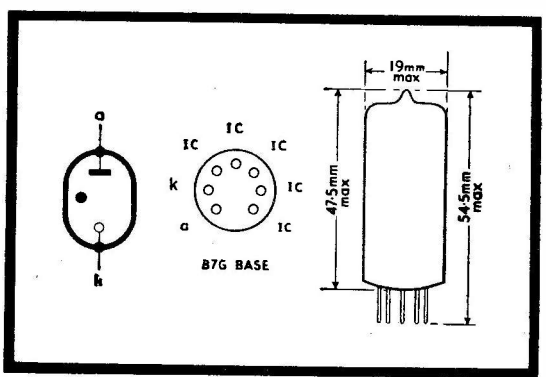

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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT WAVE Magazine

EDITORIAL

Probation

The question of what the rules should be for the aspirant to an Amateur Radio licence has been something of a problem for many years. It is once again coming into the field of discussion. There are those who hold that today's procedure tends to make it unreasonably difficult for the genuine experimenter to obtain a licence ; others consider that there should be much stricter control of probationers on the air. As a result of experience, opinion is tending to harden against the latest relaxations — permitting unrestricted operation at full power from the outset — and the obvious question now being asked is " Why the Morse test, anyway ? "

As we see it, one solution would be to re-introduce the old AA (" artificial aerial ") procedure, the licence being granted on easier terms than at present. Then, at the end of twelve months, it should be convertible into a full radiating permit on passing the Morse test, followed by a six months' compulsory period of CW-only before reaching the full maturity of unrestricted operation. This would graduate the aspiring amateur in easy stages, and would ensure that operators came on the air with tested apparatus they had some knowledge of using.

It is sometimes said that for many of the professionals now taking out amateur licences this probationary process would be unnecessary. But experience shows that a professional qualification does not necessarily guarantee any particular competence in the practice and techniques of Amateur Radio. Our sort of radio demands an all-round competence and the practical approach ; it is conducted in that peculiar atmosphere in which the keen schoolboy working from first principles and the specialist radionics engineer are on an equal footing and can meet on common ground. Indeed, this is " one of the things about " Amateur Radio !

Over the years, we have consistently advocated the principle of the AA Licence. Those who possess pre-war files of SHORT WAVE MAGAZINE *may care to look up the editorial pages for June* 1938, *November* 1938 *and July* 1939 *; they may agree that what was said then is broadly true for the situation we are in today. The only radical change called for is that whereas in pre-war years a licence was obtained by the vague process of " convincing the GPO that it was needed for experimental purposes " (and what stories were told to back that up !), nowadays the simple qualifying examination — with the exemptions as now agreed — is more appropriate, even for an AA Licence.*

Austin Forbes G6FO.

Conversion for the TA-12B Transmitter

BAND-SWITCHED ON SIX AMATEUR CHANNELS—CW AND PHONE—NBFM TELEPHONY—120 WATTS INPUT

PART I

R. T. TORRENS (GI3FWF)

This article discusses what is a large-scale conversion of the TA-12, designed to make the fullest use of all the potentialities of this compact and very well-built "surplus" item. We first discussed the TA-12 transmitter series in SHORT WAVE MAGAZINE *for December last year, since when some further material has appeared and many TA-12's have found their way into amateur hands. Our contributor has gone into the matter in considerable detail, and shows how the TA-12 can be fully modified to emerge as a 120-watt CW/Phone transmitter, band-switched over the whole amateur communication range, properly TVI-proofed. The second part of his article, dealing with the constructional details, will appear in a later issue.—Editor.*

ONE of the problems, when building a new transmitter, is the provision of a suitable case, panel and chassis. The Bendix TA-12B is certainly one very simple solution, providing as it does a beautiful table-model transmitter, weighing only 35lbs. and containing almost everything one could wish to include in a modern HF transmitter (power supply and modulator excluded). The components are of exceptionally fine quality and three of the four independent VFO's require only the addition of a suitable multiplier chain to provide operation on our six DX bands. (The fourth VFO operates on 300-600 kc.)

Unmodified

In its original form the Bendix TA 12-B is a channel switching transmitter covering four bands, each with its own VFO and independent tank circuit. The PA consists of a pair of 807's in parallel driven by a single 807 doubler. VE3GG explains, in a very interesting and informative article appearing in the March issue of SHORT WAVE MAGAZINE, how the transmitter can be operated unmodified on 80 metres and on part of the 40-metre band, with full input at 750 volts HT. However, some of the transmitters available in this country appear to be adjusted for about 400 volts HT for the PA, and it is probably worth checking the value of screen resistors fitted to the 807's before applying full HT.

Conversion

The idea behind the present conversion is to retain the operating convenience of channel switching by increasing the number of channels to six and allotting an amateur band to each channel. Also to use the original valves and operate the first 807 as a straight Class-B amplifier on all bands, thereby requiring very little RF power in the multiplier stages. The 600-metre tank inductance is removed and a two-wafer ceramic tank selector switch is fitted in its place. Three new tank inductances, with three associated Eddystone tuning condensers, are fitted for 20, 15 and 10 metres respectively. The three original tanks are rearranged to comply with amateur standards and operate on Forty, Eighty and One-Sixty metres respectively.

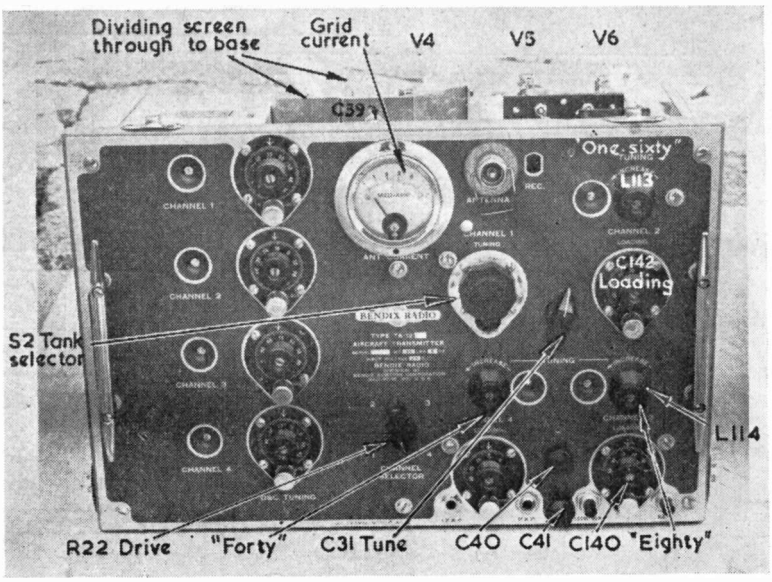
With the addition of three miniature valves and suitable wide-band coupler transformers, the transmitter will switch over the six bands and light up a 60-watt lamp load on each, without any tuning or loading adjustment. It is, however, necessary on 160 metres to reduce power. The original motor driven channel selector switch is removed and built into the aerial coupler unit so that automatic selection of aerial and correct coupler is provided for each band. The output from the pi-network tank circuits is adjusted to match into 50-70 ohms and is coupled *via* co-axial cable to the Send-Receive switch, low pass filter, the automatic co-axial switch in the aerial coupler unit and finally the tuned link, or screened link, coupled to the appropriate aerial inductance. A half-wave filter is sometimes used on 20 instead of the low-pass filter, in order to attenuate any possible 28 mc harmonic. The half wave filter is described in the *Radio Handbook* (fourteenth edition) and the low-pass filter is from an article by GM3IAZ in SHORT WAVE MAGAZINE, February, 1954. The performance of this filter is quite exceptional.

Modulation

AM is by a pair of 807's to plate and screen of the PA. There is more than ample drive on all bands and the necessary 9 mA for this type of modulation is quite easily obtained

with the drive control turned well down (R22). About ·1 mA drive seems satisfactory for One-Sixty as, in this case, the grid leak is 66,000 ohms. Probably a certain amount of caution is indicated on 40 and 80 metres as the tank condenser vane spacing cannot have much in reserve, although the writer has experienced no trouble with 600 volts HT and full modulation. On all other bands there is ample spacing.

NBFM is by a modified edition of the very interesting little unit introduced to readers by G2NS (SHORT WAVE MAGAZINE, October, 1954) and originated by G8DL. In each VFO the grid condenser unit is easily identified, on the right of the valve. A wire is soldered to the inductance end of the condenser and taken to the 5 $\mu\mu$F condenser and RFC, as described by G2NS, the only difference being that the unit is driven by the normal speech pre-amplifier *via* a 15 : 1 output transformer. Audio drive of about 4½ volts peak at the anode of the 6J5 final in the pre-amplifier gives very nice modulation. Crystal or carbon microphone may be used. The figures quoted were recorded during a test on 20 metres, using an 1N23A crystal and an RFC of about 1¼ mH. G8DL's little unit is very attractive and is used, although a reactance valve modulator is available. A feature of NBFM is the ease with which RF output to the aerial can be varied over a wide range, simply by adjusting the drive control; no adjustment of modulation is required and the clamp looks after the PA, making the transmitter very flexible.



Re-arrangement of the TA-12 panel control functions, as modified by GI3FWF. It should be noted that the "high number" elements refer to original items in the assembly, as given in the TA-12 manual. The four VFO's, as in the original, are on the left. A shielded grid current meter is fitted in place of the original RF ammeter. S2 is the PA tank selector switch; the original coils and tuning condensers are adapted to tune on 160 and 80 metres. The S1 band-switch control (see circuit Fig. 1) is brought out on the left-hand side of the chassis.

One-Sixty Metres

At first one of the 807's in the PA was arranged to have its heater supply cut for One-Sixty; however, results seemed to be just as good by allowing the pair to remain in circuit and simply switching in additional grid resistance to bring the total up to 66,000 ohms while reducing the screen supply to about 120 volts by switching a 10,000 ohms resistance (R31) in parallel with the clamp. With this arrangement and 350 volts HT results are satisfactory.

There is absolutely no trace of any 160-metre break-through while operating on any band above 1·8 mc. (This has been troublesome with unmodified samples of the TA-12.) Probably the screened compartments and the double tuned circuits would alone stop break through; however, as a precaution, all 160-metre leads from the VFO's are run in screened wire.

CW Operation

Operation on CW is with 600 volts maximum HT, owing to the type of clamp circuit used. Screen current is about 12 mA, and with no drive the clamp draws 22 mA and the PA anode 80 mA. For higher values of HT it would be preferable to include an additional voltage stabilizer valve to act as a switch to isolate the screens during "key-up" intervals. (Reference *A.R.R.L. Handbook, 1956*). Drive for CW is 4½ mA on all bands except One-Sixty, where less than 1 mA is used.

Ten-Metre Band

Owing to the low resistance of the PA, quite a lot of tank capacity is required for good loaded "Q," consequently the tank inductance is smaller than one would like. Brass strip is used where reasonably possible in con-

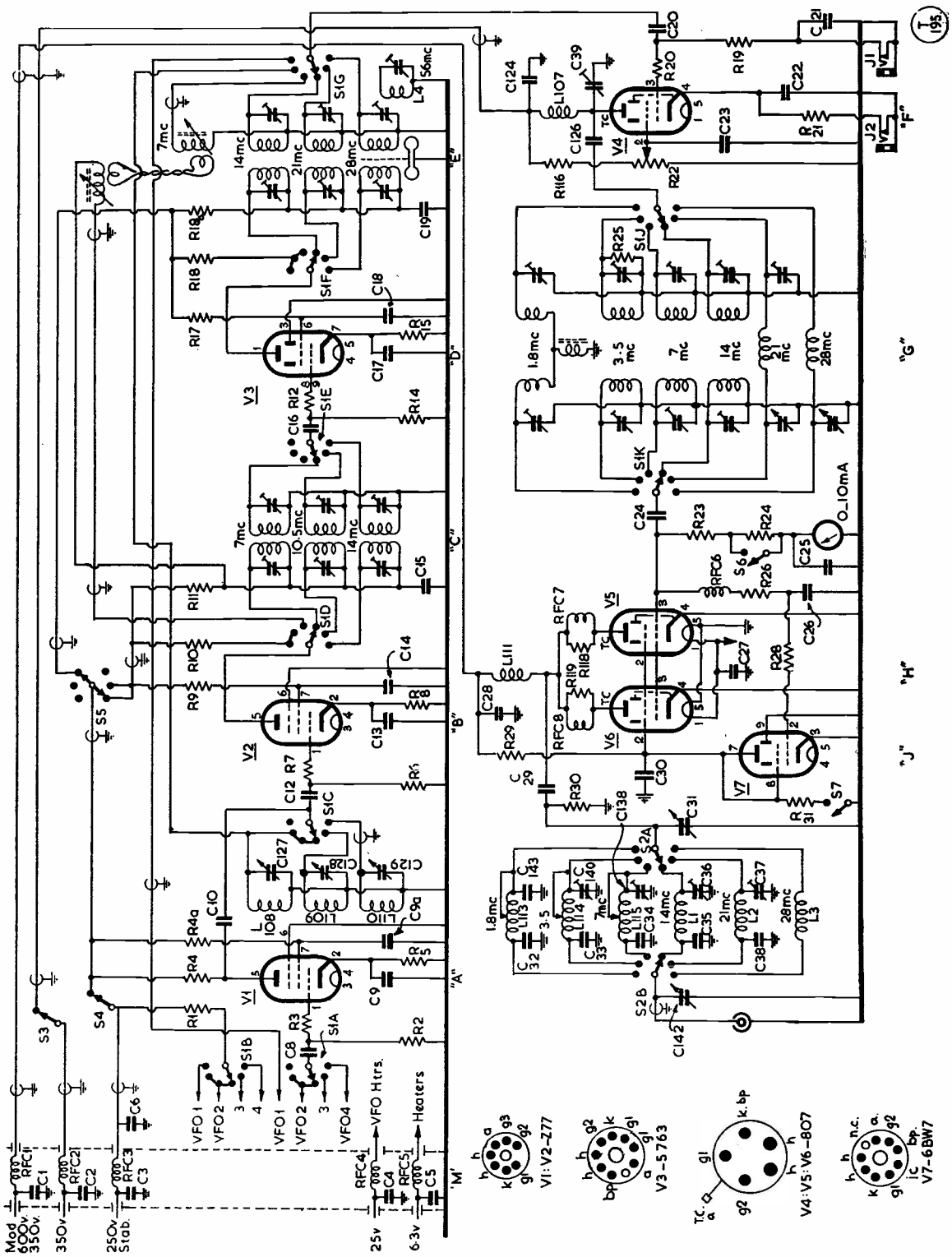

Mod 600v 350v
350v
250v Stab.
25v
6.3v
VFO 1
VFO 2
VFO 3
VFO 4
VFO Htrs.
Heaters
V1: V2-277
V3-5763
V4: V5: V6-807
V7-6BW7
1.8mc
3.5
7mc
14mc
21mc
28mc
56mc
O-10mA
"A"
"B"
"C"
"D"
"E"
"F"
"G"
"H"
"J"
"K"
"L"
"M"

Fig. 1. Circuit complete of the TA-12B Bendix aircraft transmitter, now sold as "surplus," as here modified for CW/Phone operation on six amateur bands. Full constructional details are being given in Part II of this article. In the circuit, all "high-number" references are to component items as fitted in the original and named in the TA-12 instruction manual. (*Note : In this drawing, the PA tank section should be identified as "K". The variable condensers to the left of the 21 and 28 mc coils in section "G" should be marked C41 and C40 respectively*).

necting up the PA tank circuits ; efficiency on Ten is lower than on the other bands.

Interference Checks and Tests

There is a TV receiver about 35ft. from the transmitter and there is no TVI on any band. However, this does not mean very much as it is really a matter of luck with frequencies ! The local TV channel is 45 mc vision and 41·5 mc sound. Indeed, the transmitter can operate out of its case and with no filters in the aerial circuit, without causing interference to this receiver. But there are harmonics which can be picked up with a sensitive ten-valve VHF receiver reasonably close to the aerial. The most important of these, and apparently also the strongest, is the second harmonic from the 10-metre band, which could, if strong enough, be very unpopular at the local TV link receiving station which operates on 56 mc (the link is with Kirk o' Shotts over a path of 120 miles).

Tests were made with the VHF receiver placed 50ft. from the simple six-band aerial and no filter at the transmitter. This harmonic was quite strong, and, although it was possible to reduce it by doubling the capacity in the PA tank circuit, the fall in RF output was quite appreciable on 10 metres. The GM3IAZ low-pass filter, on the other hand, for all practical purposes eliminates the harmonic and if there is any decrease in output on Ten, it is not noticeable.

For these tests a high-pass filter was used at the receiver, otherwise it was found to generate a second harmonic of its own from the fundamental signal on 10 metres, probably due to one of the RF stages acting as a doubler.

During subsequent tests, without a low-pass filter at the transmitter, the range was increased and the harmonic was lost at about 125 yards with the BFO out of circuit, and at about 200 yards with the BFO operating. On reducing the range again a slight trace of the harmonic was noticeable, without BFO, at 95 yards, so the receiver was left at this range and the screened link, in the aerial coupler of the transmitter, was removed and replaced by an unscreened tuned link. This resulted in an increase in the strength of the harmonic to S6, which was so startling that the test was repeated with the screened link and, once again, only a trace was noticeable.

During all these tests Kirk o' Shotts, 120 miles away, could be heard in the VHF receiver.

Circuit Points

All valves are protected so that drive can be removed at any time, for long periods, without causing any trouble. Fig. 1 shows the circuit complete, as modified. [over

Table of Values

Fig. 1. Circuit complete of the TA-12B as modified by GI3FWF.

C1, C2, C3, C26 = .005 μF mica
C4, C27, C30, C32 = .002 μF mica
C5, C25 = .003 μF mica
C6 = .006 μF mica
C8, C10, C16 = 100 μμF mica
C9, C9a, C13, C14, C17, C18, C22 = .01 μF disc ceramic
C15, C19, C21, C23 = .01 μF mica
C12 = 30 μμF mica
C20 = 300 μμF mica
C24 = 75 μμF mica
C28, C124, C126 = *Original condensers in original positions*
C31, C36 = 27 μμF variable, .052 inch gap, *Eddystone No.* 588
C37, C39 = 12 μμF variable, .062 inch gap, *Eddystone No.* 580
C41 = 50 μμF variable, *Surplus*
C40 = 50 μμF variable, *Eddystone*
C143 = .0003 μF variable, original (*see text*)
C29 = .002 μF, *from original loading panel*
C33 = .0013 μF, C34 = .0006 μF, C35 = .0002 μF, C38 = 80 μμF } *Condensers from original loading panel are built up to capacity by adding best quality silver mica condensers*
R1, R19 = 27,000 ohms, 1-watt
R2, R26 = 4,700 ohms, ½-watt
R3, R7, R20, R28 = 150 ohms, ½-watt
R4 = 7,500 ohms, 1-watt
R4a, R9 = 33,000 ohms, ½-watt
R5 = 300 ohms, ½-watt
R6 = 22,000 ohms, ½-watt
R8 = 270 ohms, ½-watt
R10 = 100 ohms, ½-watt
R18 = 100 ohms, 1-watt
R11, R18a = 150 ohms, 1-watt
R12 = 39 ohms, ½-watt
R14 = 23,000 ohms, ½-watt
R15 = 1,000 ohms, 1-watt
R17 = 15,000 ohms, ½-watt
R21 = 320 ohms, 5-watt
R22 = 50,000 ohms, *potentiometer*
R23 = 10,000 ohms, *original*
R24 = 56,000 ohms, 1-watt
R29 = 25,000 ohms, *made up from original* 15,000 ohms *resistor with two* 5,000 ohm 5-watt *resistors, all in series*
R30 = 2 megohm, *original*
R31 = 10,000 ohms, 1-watt
R116 = 15,000 ohms, *original*
R118, R119 = Original resistors (*see text*)
R25 = 15,000 ohms, 1-watt, carbon

Power Supply Requirements

VFO and Multiplier Chain ...	250 volts 40 mA stabilized.
Driver 807 stage	350 volts 70 mA.
PA	600 volts 212 mA.
PA on One-Sixty	350 volts 42 mA (*including 14 mA for screen voltage dividing network and screen*).
PA (alternative HT voltage)	Any voltage from 350 to 600 volts.
VFO heaters	25 volts 0.3 A.
Heaters (*all other valves*) ...	6.3 volts 4 A.

Three of the VFO's are used unmodified, while the fourth, which in the original is the VFO for channel 1 and operates on 300-600 kc, has been modified to operate over 1·8-2·0 mc for 160 metres. This is more convenient than using VFO-2 for One-Sixty as it avoids changing VFO settings when changing from One-Sixty to, say, Eighty. The modification is easy and consists simply in re-winding the variometer tuner with slightly heavier Litz wire so that there are 10 turns on rotor and 10 on stator. The turns are well cemented with liquid polystrene. Existing grid to cathode condenser is ·0015 μF and cathode to ground ·003 μF. Maximum frequency at which the VFO will operate without changing these condensers is 2·4 mc provided only variable inductance is used for tuning, but no higher than 1·5 mc if the more usual inductance and series tuning condenser are used. (The latter makes a good 900 kc VFO for One-Sixty and the values tried were 35 μH and a 300 $\mu\mu$F variable condenser.)

Anode and screen current to the VFO in operation is about 5 mA only. A 12SK7 valve is fitted in each VFO originally and 25 volts AC is used now for heaters of the four valves, which are connected in series-parallel. This is perfectly satisfactory and the note on CW is T9x. While testing, if the note is not T9 it is a certain indication of parasitics or instability, and the same may be said for chirp, provided the 250 volt HT is stabilized.

Section "A" Referring to Fig. 1, it will be seen that the circuit is divided into 11 sections, each identified by a letter along the foot. Section "A" contains the original tuned circuits which are ganged to the VFO's and are used unmodified for inter-stage coupling between V1 and V2. This is, to a certain extent, necessary in order to select the correct harmonic. For V1 a Z77 is ample and a low-value grid leak gives best results; 3,800 ohms seems about right. The anode and screen current is 7 mA and the output is twice VFO frequency, *i.e.*, 3·5 mc for Eighty, Forty and Twenty, 5·25 mc for Fifteen, and 4·66 mc for Ten. It is perhaps important that RFC's should not be used in the multiplier chain (V1, V2 and V3).

Section "B" Again a Z77 is ample and with a 22,000 ohm grid leak, which is optimum, the anode and screen current is 7 mA. The stage doubles for 40, 20 and 15 metres, and trebles for 10 metres.

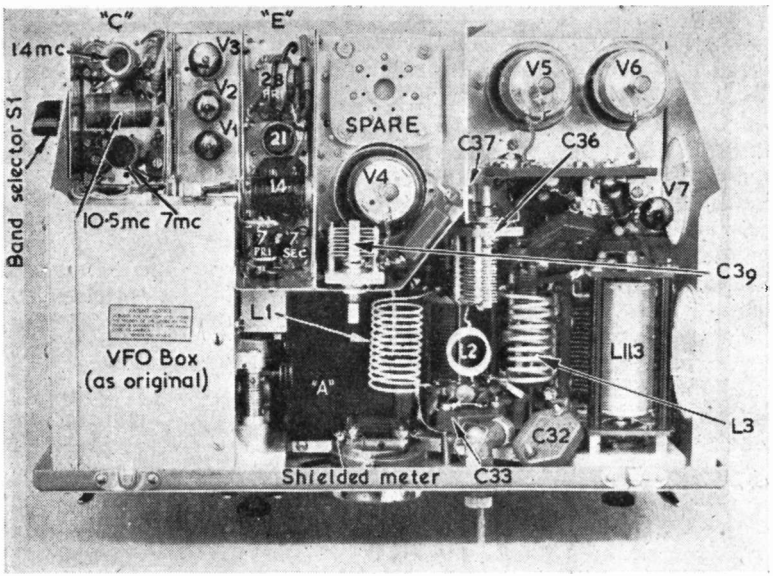
Section "C" Wide-band coupler transformers are tuned with 3-35 $\mu\mu$F ceramic trimmer condensers, and are well screened in a small coil box. The 10- and 20-metre WBC's are mounted vertically and the 15-metre horizontally. The capacity for the 10-metre grid coil (secondary) is a Philips concentric trimmer soldered directly to the band-change switch. Good screening is essential and long leads, *e.g.*, the 40-metre lead, are in co-axial cable.

Section "D" A slightly larger valve is necessary for V3 if good results are to be obtained on 10-metre phone and about 20 mA anode current is required. A 5763 is very satisfactory and is run at about half its normal rating. The anode and screen current is 21 mA and the stage works as a doubler on Twenty, Fifteen and Ten, providing ample drive over the entire 2 mc of the 10-metre band.

Section "E" Wide - band couplers for Fifteen and Twenty are of similar type to those used in section "C" and are mounted in a screened box. The 10-metre anode coil (primary) is mounted in this box and is coupled by screened links to the secondary coil mounted direct to the band-selector switch in the grid compartment under V4, together with its ceramic trimmer condenser. An absorbtion trap tuned to 56 mc is coupled to this coil, and is effective in suppressing the harmonic at the grid of V4, although the final effect at the PA anode is not clear. The "notch" is, of course, quite narrow. The ceramic trimmer for 15 metres is also mounted in the grid compartment beneath V4. For 40 metres the WBC is made from two Aladdin formers mounted at right angles to each other and link coupled. Tuning is by dust cores and capacity is provided by the co-axial leads. The $\frac{1}{4}$-inch co-axial cable used has a capacity of 1·71 $\mu\mu$F per inch. Coils in this box mounted vertically are 40-metre secondary and 15-metre primary and secondary. The 40-metre primary is mounted horizontally, in a recess above the box, and the remaining coils in the box are horizontal.

Section "F" A large screen, mounted vertically completely shuts off the power stages from the multiplier chain. V4 is the original 807 driver and it is used again with the original RFC (L107) and coupling condenser (C126). Potentiometer R22 is used to vary the screen potential and provides very smooth drive control from less than 1 mA to over 15 mA. The original intervalve screen can be seen in the photographs. The lead from the coupling condenser C126 descends through the chassis

directly into the grid compartment of the PA (Section "G"). The usual 807 type of cylindrical screen is used for V4 and a grid stopper resistance of 150 ohms. The grid condenser C20 is inserted to provide a grid current indication at J1 during initial tuning operations and between 1¼ and 1¾ mA is obtained provided S3 is open and no HT is applied to V4. When tuning is complete condenser C20 can be short-circuited for Class-B operation, if desired. Anode and screen current is 50 mA with C20 in circuit and about 70 mA when C20 is short-circuited. There is plenty of drive either way. The condenser C124 is grounded to the under side of the chassis.



Looking down into the TA-12B as modified for six-band operation. The knob of the band-selector switch assembly S1 can be seen top-left. L1, L2 and L3 are new coils, other tank inductances being as used in the original. Much additional screening has been provided and the exciter section, above the VFO box, is new construction with wide-band couplers; the exciter valves are in the second box from the left above the VFO compartment. A dimensioned layout for the new metal-work will be given in Part II of the article.

Section "G" Wide-band couplers for Forty and Twenty are mounted direct to the switch wafers of the band-selector switch in the grid compartment of the PA (S1j and S1k) together with the 21 and 28 mc inductances for the pi-network intervalve coupling used for these two bands for low harmonic content. Tuning condensers C40 and C41 have their shafts brought out to the front panel to provide peaking adjustment for 10 and 15 metres respectively, following a change of frequency within either band. Wide-band couplers are used for all other bands and no adjustment is necessary. The 160-metre wide-band coupler is mounted horizontally and the 80-metre vertically, at the end of the compartment, after all the other coils in this section have been tuned and wiring completed. The circuit of the WBC for One-Sixty is perhaps unusual; however, it is an easy way to obtain a flat top tuning curve which covers the band 1·8 to 2 mc and provides sharp attenuation beyond these points.

Caution is indicated when drilling the front panel for the extension shaft of C40 in order to avoid damage to the teeth of the counter wheels for the Channel 3 and Channel 4 rotating coils. The ¼-inch hole is centred 1 13/16th inches above the base of the panel and equi-distant from the Channel 3 and Channel 4 counter dial apertures. This is the maximum height that can be drilled with safety.

Section "H" The original valves are used in the PA and probably the main attraction of the 807 is the comparatively low value of HT voltage required; 600v. at 200 mA. The stage seems quite stable and has given no trouble. The original stopper resistances in the grids are removed and the anode stoppers are modified by shunting a 5-turn coil, ¼-inch inside diameter and ⅜-inch long, across each anode stopper. The original stoppers are not very suitable for 10 metres. Grid bias is entirely by grid leak with V7 acting as clamp for the screen, to limit input under no-drive conditions. About 4½ mA grid current is required for CW and about twice this for plate-and-screen modulation. Alternatively fixed bias can be used and drive reduced for Class-AB1 operation, if desired.

Section "K" The original 600-metre tank inductance is removed and a 2-wafer 6-way ceramic band-selector switch is mounted in its place. The three rotating inductances are connected, with brass strip where possible, to the underside of the switch. The original Channel 2 loading condenser C142 is disconnected and wired direct to the rotor arm of the switch so as to act as "fine loading control" on all bands. The fixed condenser, mounted on the end of the Channel 2 tank unit, C143 300 $\mu\mu$F,

is wired direct to the inductance for tuning and a fixed condenser C32 of ·002 μF is in parallel as loading; the coil is adjusted so that 33 turns are in circuit, which is about right for One-Sixty. Channels 3 and 4 are also altered so that the variable condensers C140 and C138 act as tuning condensers, while fixed condensers are soldered in to take care of loading, C33 and C34. Channel 3 is tuned to 80 metres with 18 turns in circuit and condenser set at 25°. Channel 4 tunes 40 metres with 12 turns and condenser locked at 10°.

Three new Eddystone variable condensers are mounted (as illustrated in the photographs). C31, fine tuning all bands, has a flexible coupler and extension spindle to the front panel. C36, 27 $\mu\mu$F, is soldered direct to L1 and set at full capacity for 20 metres. C37, 12 $\mu\mu$F, is soldered to L2 and set at full capacity for 15 metres. L1, L2 and L3 are mounted to the upper side of the switch. L2 is placed vertically. Original loading condenser C142 is connected *via* co-ax to the output socket.

Section "M" This is an external filter unit which is useful when leads to power supply, modulator and other external items are not themselves sufficiently screened to prevent radiation of harmonics. In addition, a mains filter is fitted to the power supply.

(Part II of this article will deal with construction and operation of the fully Modified TA-12B.)

Top Band Talking Box

UTILITY CO-PA FOR PHONE/CW OPERATION— FIXED, MOBILE, PORTABLE OR STAND-BY

THE little transmitter described in these notes is a simple arrangement which has proved its worth in several different applications when the requirement was for something handy that would put out a signal immediately and with the minimum of fiddle.

It is the sort of circuit that can be put together in a number of different ways—that illustrated has been found convenient because it can "kick around the place," either on the bench or on the floor of the car, without coming to any harm. It is handy-sized, without either being cleverly-midget or too big to stow in an odd corner. It works equally well on CW or phone, and the model as illustrated and described here shows an absolutely hum-free output with either AC or DC on the heaters, with any normally-smoothed HT supply of from 200 to 300 volts. It has given many hours of strenuous service under mobile conditions, when testing whip aerials, and has also been used as a fixed-station transmitter for working the local net, with long and short aerials. The modulation is full, with quite reasonable quality, and on CW the note is clean, sharp and absolutely T9x. The CO will go off with any normally active crystal, and the PA tank can be brought to resonance anywhere in the 160-metre band.

The only drawbacks with this version of the "*Talking Box*"—which is how it is regarded by those who have used it—is that it is fixed frequency, and it is liable to give "downwards" (or decrement) modulation under certain load conditions. However, in practice, crystals can be selected for the required frequencies—for mobile operation, around 1915 kc, and for the local net in whatever part of the band it normally operates—while the effect of "upwards" modulation can always be obtained either by making the load capacitive at exact resonance or, if this is inconvenient, by detuning on the output loading condenser C10.

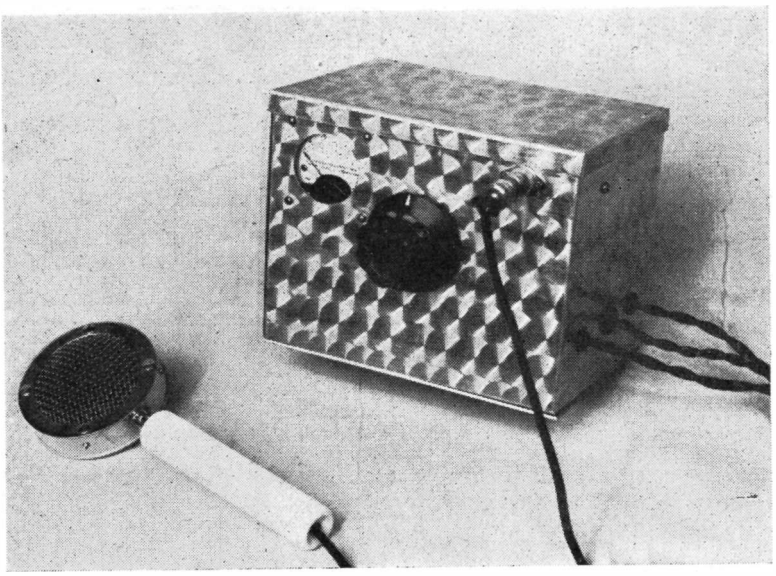
It will by now have been appreciated that the "*Talking Box*" is not offered as a DX-working transmitter for serious county-chasing on the 160-metre band. But it is a very handy item to have about the place for the local Sunday morning natter-party, for mobile operation, for aerial testing, for portable excursions under non-competitive conditions—or simply as a stand-by if everything else is u/s when you want to have a QSO.

The Circuit

The valves used are all modern miniatures from the Brimar range. The crystal oscillator circuit, around V1, is of the type that will respond at any usual crystal frequency—from Top Band to Forty—and the 6AM6 at V1 (which is the same as an 8D3) puts well over one milliamp. of drive into the grid of the 6BW6 PA, V2. As the figures show (*see* circuit) all the power that matters is where it should be—in the PA. As long as there is about one milliamp. through R5, the 6BW6 can be driven to about 5 watts input. The

CO will produce this level of drive with either a 1·8, 3·5 or 7 mc crystal; there being no tuned circuit to adjust in the CO, any band can be used merely by changing the crystal.

On the PA side, the tank circuit is parallel-fed in the familiar pi-section arrangement. The values for this have been chosen strictly for operation on 160 metres; C9 tuning is sharp on 80 metres, and tricky on 40 metres. L1 could probably be proportioned to cover both 1·8 and 3·5 mc, with C9 either nearly all-in or all-out—but this has not actually been done, since the original idea was that the "*Talking Box*" should be built as a Top Band unit.



General appearance of the "Talking Box" as constructed. It is a simple CO-PA, with built-in screen modulator, for CW or phone operation — either on the bench, portable or mobile — and the adjustment is virtually one-knob. The longest dimension is 7 ins. PA input is about 5 watts, the heater supply can be either AC or DC, and as pictured the Box will also radiate on 80 metres with a 3.6 mc crystal — though for best efficiency on that band about a third of the tank-coil turns should be tapped out.

In the model, the meter in the cathode of the PA is brought out on flying leads, since it is also the keying point for CW operation. With HT off the PA and the CO on, it will show the grid current—though for an accurate reading, an 0-5 mA meter should be temporarily substituted for this particular measurement. It is not necessary to meter the CO after the initial setting-up check.

The other items in this part of the circuit to mention particularly are the RF chokes. They are standard types, but should be of dissimilar characteristics to avoid any possibility of resonances. This can usually be achieved by mounting them so that mutual coupling is at a minimum.

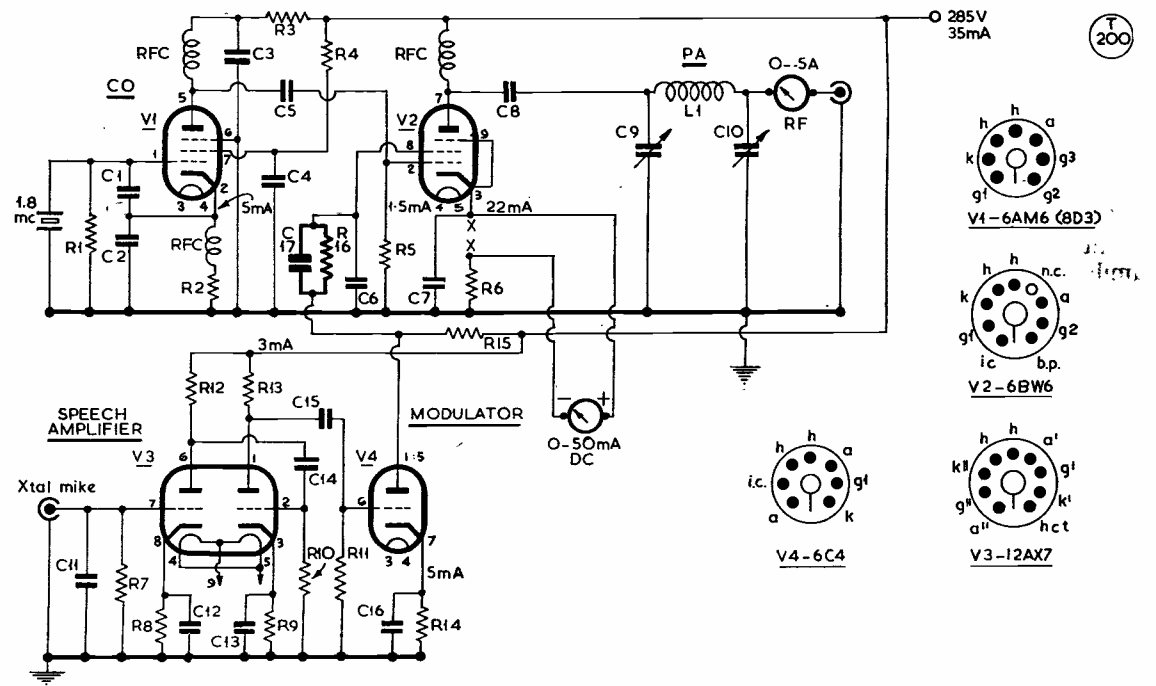
System of Modulation

As the circuit shows, modulation is by control on the screen of the PA. It is about the simplest and most practicable system having regard to the uses for which the "*Talking Box*" is intended. The speech amplifier is V3, a 12AX7, and the modulator proper V4, a 6C4.

An obvious disadvantage of screen modulation is that, because the PA screen must be run at less than the usual HT voltage, the RF output is correspondingly reduced. Hence, one cannot modulate what would be the "full CW carrier" obtainable with the proper screen voltage. On the other hand, look at the simplicity of the speech-amplifier/modulator! Two valves give full control of the carrier, with a crystal microphone at that.

The important items in the modulator circuit —which is based on suggestions by G3IYX, who has collaborated in many of the tests with which the "*Talking Box*" has been used— are R16 and C17. The function of R16 is to reduce the V2 screen voltage to a value sufficient for increment (or "upwards") modulation to be obtained under normal loading of the PA; C17 is the audio by-pass condenser associated with R16. The value stated for this resistor is that which has been found to give the best results under the all-round conditions of use of the "*Talking Box.*" However, it would be worth making R16 variable over a range of about 30,000-100,000 ohms by using a 100,000-ohm potentiometer in series with a fixed resistor of, say, 10,000 ohms, all paralleled by C17. This would permit accurate adjustment of the screen voltage under all conditions of load, and a setting could also be found for full RF output under CW conditions. Alternatively, this resistor could be switched in.

With any usual type of crystal microphone, the 12AX7 at V3 gives ample voltage gain and when the whole circuit is properly loaded for increment modulation, results on telephony are quite pleasing. It is just as well to use a crystal microphone as, for one thing, the input circuit is so much simplified, and for another, they can nowadays be obtained at



Circuit of the "Top Band Talking Box," as described in the article. The CO will go off with any crystal in the range 1.8-7.0 mc, but in the model as photographed the tank circuit C9, L1, C10 is designed for 160 metres. The resistor-condenser combination C17, R16, for obtaining modulation by screen control of the 6BW6 PA, is discussed in the text. All four valves used in this transmitter are Brimar miniatures in the current range.

such a reasonable price that there is no point in putting up with "carbon-mike quality" (with respect to those who *do* succeed in getting good speech output from a carbon microphone) or the complications of the types requiring special input transformers.

Construction

As illustrated here, the model is built into a box of 14g. aluminium 7ins. wide by 5½ins. high by 4½ins. from back to front, with a tight-fitting lid and a detachable bottom plate.

The CO-PA section is put together on a small chassis which bolts into the bottom of the box. With the exception of the valves, crystal, output tank circuit, coupling condenser C8 and the RF meter, all components in this part of the circuit are in this chassis sub-space, which can be exposed by removing the bottom plate.

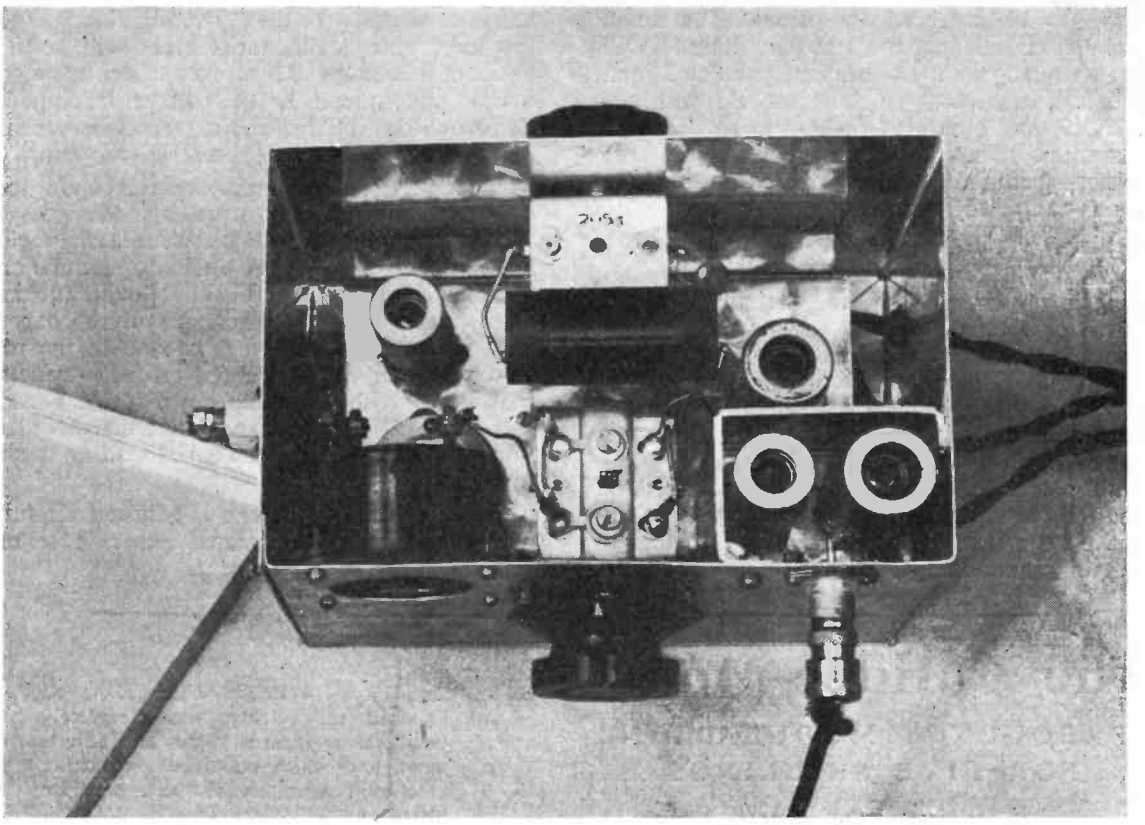
Condensers C9 and C10 are the small BC tuning types now readily available for a few shillings; C10 is a two-gang with its sections paralleled. These variable are mounted centrally on opposite walls of the box, with L1 between them, as shown in one of the photographs; this makes for a symmetrical layout.

Table of Values

Fig. 1. Circuit complete of the "Talking Box."

C1, C11	= 50 $\mu\mu$F	R7	= 3 megohm (or as required for microphone)
C2	= 500 $\mu\mu$F	R8, R9	= 1,500 ohms
C3, C15	= .005 μF	R10	= 470,000 ohms
C4, C6, C7, C14	= .002 μF	R11, R12	= 220,000 ohms
C5	= 100 $\mu\mu$F	R13	= 100,000 ohms
C8	= .001 μF	R14	= 2,000 ohms
C9	= 500 $\mu\mu$F BC midget variable, single section	R15	= 27,000 ohms
		R16	= 75,000 ohms (*see text*)
C10	= 800 $\mu\mu$F BC midget variable, twin-gang paralleled	RFC	= Dissimilar RF chokes
C12, C13, C16	= 8 μF 6v. midget elect.	V1	= Brimar 6AM6
		V2	= Brimar 6BW6
C17	= 8 μF, 150v. elect.	V3	= Brimar 12AX7
R1	= 180,000 ohms	V4	= Brimar 6C4
R2	= 100 ohms	L1	= For 1.8 mc: 58 turns 24g. enam. wire on 1-in. dia. Paxolin former, 2-in. long.
R3	= 5,000 ohms		
R4	= 35,000 ohms		
R5	= 15,000 ohms		
R6	= 500 ohms		

The modulator section V3, V4, is built as an entirely separate unit, on a small chassis of its own, fitted into a corner of the box after construction and testing. The metal-work for the modulator consists simply of a piece of aluminium bent up to form a compartment 3½ins. deep by 1½ins. by 2¼ins., on the 2¼in. wall of which is fitted a small shelf for the V3, V4 valveholders; the height of this shelf is adjusted to bring the tops of the V3, V4



Interior view of the "Talking Box," showing general arrangement. The CO valve is upper left and the PA to the right of the coil; the crystal mounting is beside the CO, below the RF meter. The modulator section, with V3, V4 mounted close together (V4 left), is in the screened compartment at lower right. C9 is centred on the rear wall with C10 immediately opposite, alongside the RF meter on the front of the Box. The only adjustment is on C9, C10, as for a pi-section coupler, and the full tuning range of the model is 1800-3600 kc.

caps just flush with the top of the box. In the 1½in. by 2¼in. by 1½in. sub-chassis space thus formed under the V3, V4 mounting shelf there is *just* room to get in *all* the V3, V4 circuit elements if small-sized (not necessarily miniature) components are used. At any rate, with a little juggling and squeezing it was possible on the model.

External connections to the modulator section are HT+, one side of LT, the connection to R17, C16, and the shielded lead to the microphone socket on the front panel; these leads are made slack enough for the modulator section to be tested and adjusted before finally bolting it into place in the box. The microphone connection is the only item in the V3, V4 assembly that is fitted above the sub-chassis level.

With the form of construction shown (and the lid on) screening is complete, internally and externally, with the modulator side entirely shut off from the RF section.

The external leads to the "*Talking Box*" are made several feet long for convenience, and are for LT (positive side earthed) HT+ CO, HT+ PA (normally joined together at the HT supply point, but brought out separately for meter check) and the meter/key leads to the cathode of the PA.

Power Supply

On the bench the "*Talking Box*" can be run from an AC supply for LT and any power pack giving 200-300 volts at up to 40-50 mA. Under portable/mobile conditions, the HT supply is from a vibrapack, and the heaters are fed from the 12-volt car battery. For this purpose, the heaters are actually connected in a series-parallel arrangement (V1-V2 and V3-V4) so that the LT feed can be either AC or DC at 12-13 volts. (As is usual, the car electrics are positive-earthed.)

Owing to the dissimilar current ratings on the heaters, the 6AM6 CO and 6BW6 PA

have to be balanced by means of a small parallel resistor across V1 heater. The 12AX7 is operated with its heaters paralleled and similarly the 6C4, which is series'd with the 12AX7, has a parallel resistor to equalise the current at 0·3 amp. With a car having a 6-volt system there would, of course, be no need for series-paralleled connection.

Setting-Up and Adjustment

This really amounts to no more than plugging in the crystal, checking that there is grid drive of around 1·0 mA (by putting a low-range meter across the PA cathode leads) and then, with C10 at maximum capacity, and an 0-50 mA meter in the PA cathode, tuning C9 for minimum plate current. After that, the tank circuit is loaded in the manner usual with pi-section couplers. In this connection, the RF current reading is more important than the plate meter, the objective always being to obtain maximum RF current into whatever aerial is in use with the "*Talking Box.*" With low-impedance loads, the current will go up to about 0·35 amps. RF or even more, but with aerials which tend to be voltage feeding (a half-wave on 160 metres, or somewhere near it, say), the indicated RF will be very low.

Modulation effectiveness depends upon the correct ratio of screen voltage to anode voltage for the loading on the PA. Some aerials will load in such a way that upwards modulation is obtained at exact resonance — with others, C10 should be tried either side of resonance until upward modulation is shown on the receiver S-meter or on the station field-strength indicator. With the value given for R16 and 250-300v. HT on the transmitter, the modulation will be upwards if the aerial loading tends to be capacitive.

For CW, the PA loading is adjusted for full output and a key is inserted either in series with the meter, or instead of it.

The "Midge-Mod"

FREQUENCY MODULATION FOR FIVE SHILLINGS

B. WARDMAN (G5GQ)

Our contributor rightly claims that this is about the cheapest and simplest modulator — and modulating system — that is practicable for reasonable quality under modern operating conditions. What is described here is the modulator itself, since anyone on phone will already have a one- or two-stage speech amplifier and microphone. The output from this is applied to the "Midge-Mod," which produces FM in the normal VFO. The important advantage of frequency modulation is that it goes a long way to eliminating BCI and TVI, and is thus an excellent phone system for the HF bands in crowded residential areas. The unit itself as illustrated has been thoroughly tested in accordance with the operating instructions given in the article, and has been found to do all that is claimed for it.—Editor.

"I'D like to try NBFM to see if it would help with TVI," say one's friends over the air, "but I can't just get down to building a special rig for it—never seem to have the time."

That's a fair enough answer, and it was what started the development of this new unit. What was in mind was a whole lot of ideas, such as:

(a) Simplicity: A design which could be knocked up quickly, was completely uncritical as regards values and adjustment, and which could be used either as a built-in unit or else as a separate little box.

(b) Cost: The idea to start with was a maximum of about twenty-five shillings as an interesting figure; *the unit described here costs five bob*, and that's within reach of all.

(c) Flexibility: It must be usable with existing gear without any real modifications. As far as the RF side is concerned, it should have *one extra connection only.*

(d) Quality: Modulation quality to be reasonable compared with more complex circuits. If anything, this unit gives *better* quality than anything tried before, even than much more complicated efforts.

(e) Limitations: It will work with VFO's only, not with crystals.

The answer is shown in the photograph and circuit; one diode valve, three ½-watt resistances, one tiny variable (pre-set) and one fixed condenser.

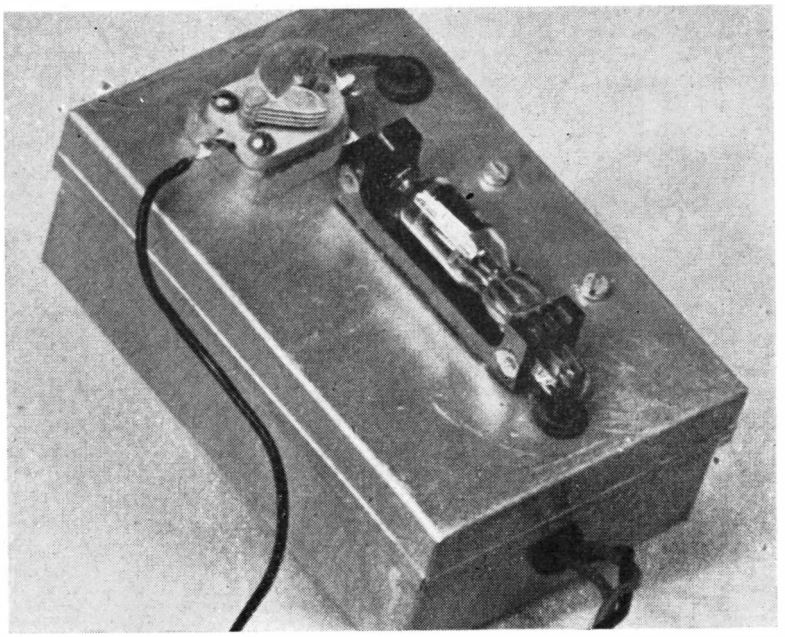
First, however, since most of us like to know "what makes it tick," a mention of the reasons *why* this design was developed.

Design Factors

To begin with, direct NBFM cannot be used with a crystal oscillator; what is known

as " indirect FM " is applied by means of a phase modulator, the phase shift being turned into FM subsequently in the circuit. In general, phase modulators are the most critical, especially when several different frequency bands are used in the oscillator. So far, although the writer has tried pretty hard, it has not been possible to find any sure-fire, simple method of FM with crystals. Therefore, reluctantly, that part had to be cut out.

Next, with VFO's, the standard approach is by using a reactance modulator; about the minimum requirement is an HF pentode (with several resistances and condensers) or—although more complex from the point of view of components — the pentagrid, which makes inter - action between the audio and RF components far less troublesome. But, because they are reactance modulators, they are part of the oscillator circuit, and their reactance does vary from band to band—with one adjustment, just a whisper of audio will give full modulation on Top Band with practically none on Ten ; a slight difference in adjustment, and the reverse takes place. Hence it's a matter of compromise adjustment, and since they have so many components (allowing different reactances to occur) one can run into trouble trying to set them up. What is more, this bother varies from VFO to VFO, being dependent on layout.



The " Midge-Mod " designed by G5GQ is built into a box with 4¼ ins. as its longest dimension. On the lid is mounted the EA50 modulator valve and the series pre-set condenser by which the degree of FM on the VFO is controlled. How it works and the results it gives are explained in the text.

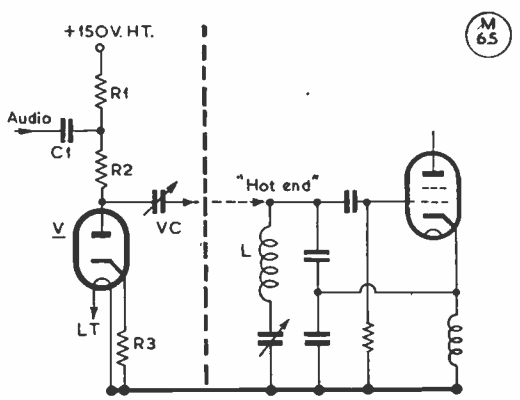


Fig. 1. The " Midge-Mod " as connected to any VFO (right of dotted line). V is an EA50 ; R1 can be anything from 100,000 to 500,000 ohms ; R2 is about 50,000 ohms ; R3 between 10,000 and 25,000 ohms (15K used in the model) ; VC is a 30 $\mu\mu$F air-spaced trimmer ; and C1 is .01 μF for audio feed-in. As indicated, none of these values is very critical, and the only essential adjustment is that of VC, which controls the degree of modulation of the VFO.

Hence, the need can be seen to keep components to a minimum ; it reduces setting-up adjustments enormously.

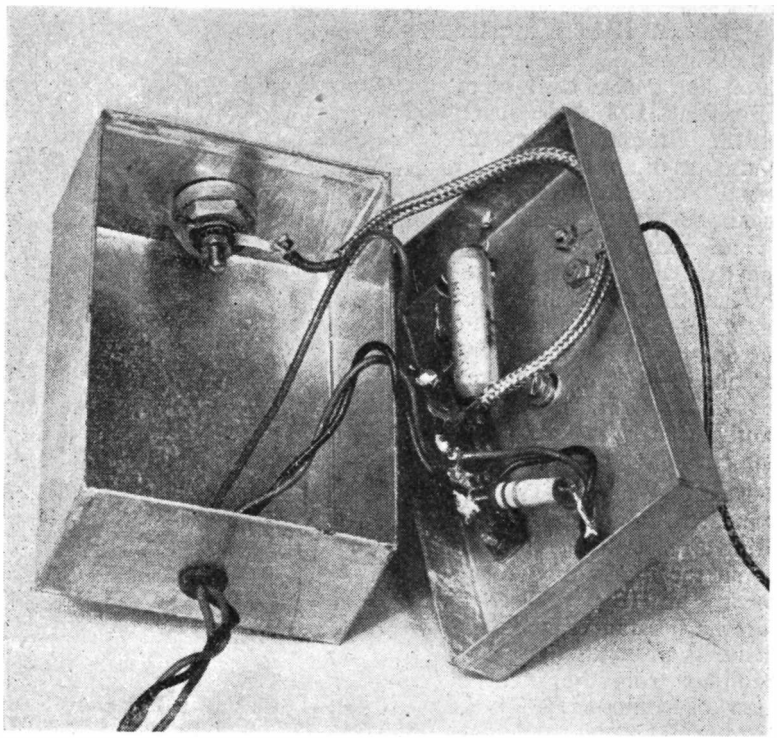
This narrowed down the possibilities, and so attention was turned to the other extreme, the simplest possible valve. And there can be none simpler than a diode. Reviewing every possible source of published information on this subject, there seemed to be two lines of approach :

(a) The Westinghouse series diode modulator. This is a brilliantly simple circuit, especially where centre frequency control is required (applicable to

commercial use) but it does present minor wiring problems on the speech amplifier because the final audio HT is fed *via* the cathode of the FM diode.

(b) The crystal diode modulator. Again very simple, but it is possible to have noisy crystals, and it's easy to burn them out if you run beefy VFO, like the one at G5GQ.

Hence the final decision to use a thermionic diode, as more robust, and also for the fact that it is accepted as the quietest and most distortion-free frequency modulator. And so it came to the final arrangement, circuit of Fig. 1, which incorporates all the wanted features, and in truth is a simple derivation of the frequency shift keying system used in Marconi transmitters for years. Not one item is critical — except the valve, and that is not really critical because it has been found that the EA50 (which can be picked up for a shilling or so anywhere) is just streets ahead of any other type tried. It has been tested against accepted ones like the metal version 6H6 and even more expensive types.



There is not much inside the "Midge-Mod" and, in fact, on the model ample space is left for building in a speech-amplifier stage (say, a 12AX7 twin triode for a crystal microphone) which would make it a complete, self-contained unit. The screened lead to the Pye socket in the upper wall of the box is for the audio input connection.

Circuit Development

As Fig. 1 shows, the circuit is simplicity itself. In Fig. 2 is shown the way it works. From the "hot" end of the VFO coil, L, the little pre-set condenser, VC, is connected to earth *via* a varying (not variable) resistance; this resistance (shown as VR) is the electrical equivalent of all the other bits and pieces, *i.e.*, R1, R2, R3, V, and C. This equivalent resistance changes in accordance with speech. Therefore, the tuning across the VFO coil changes at speech frequency and we get frequency modulation.

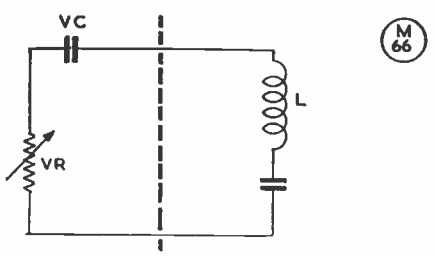


Fig. 2. The equivalent circuit of Fig. 1, the operation of which is explained in the text.

Wiring up is so simple as to need no instructions. The power supply connections to heater transformer and to the 150v. HT can be done with flex or any other convenient method. Audio from the speech amplifier is plugged in; at G5GQ, the output from two RC-coupled amplifiers running from a crystal microphone is more than ample for all bands from 1·8 to 28 mc, and in many cases the output from a one stage pre-amplifier is adequate.

Setting Up

Now to the adjustment. Start with VC at minimum and connect it to the hot end of the VFO coil, with a lead as short as possible. Turn the microphone gain up and listen on side-tone, noting that you listen on the final output frequency. This does not mean switching on the PA or even the doublers—it means that you listen on the appropriate harmonic, and anything you hear from it will be exactly

as it will come out from the PA. To put this in figures: At G5GQ the VFO operates on 5·25 mc fundamental when driving the transmitter on 21 mc, so that the VFO modulation is checked on the 21 mc harmonic.

With VC at absolute minimum, it is unlikely that you will hear any modulation. So increase the capacity slightly and soon you will find it modulating very fully. Now, in doing this simple adjustment, you will find that:

(a) As the capacity of VC is increased, the amount of modulation will increase *very* rapidly until you find you are modulating fully with your audio gain turned well back.

(b) If, on the higher frequency bands, VC is too large, then there is a tendency for the VFO valve to stop oscillating.

(c) Increasing VC affects the VFO calibration more and more.

(d) A much larger value of VC is required on 1.8 mc than on 28 mc for the same depth of modulation.

Actually, it's much easier and quicker to do than to read these notes ! The first time it was tried, this particular unit was lined up in under three minutes on all bands from 1·8 to 28 mc, with the exception of re-adjusting the VFO calibration.

There are no " ifs and buts " about it ; the thing either works, or it doesn't. Whatever audio quality goes into it comes out as modulation, and it is impossible to get distortion as one can by mal-adjustment with other systems.

Finally, even this tiny unit is really far too big for the job. However, a box as large (!!) was used because it was thought that readers would wish to try it out as built—then, if they liked it, there would still be room for a one-stage microphone amplifier in it to make a complete unit.

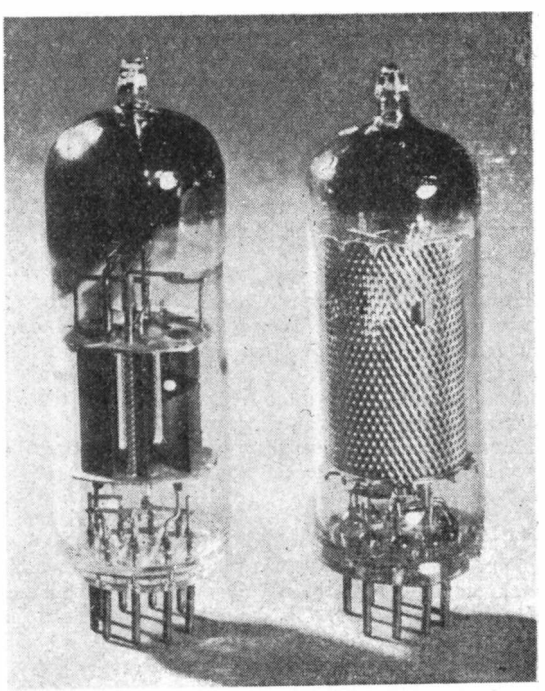
Lastly, the name. It has been christened the " *Midge-Mod* " because it is really small, easy to connect up to those inaccessible VFO's some people have, and you can buzz it up and buzz it into action in half-an-hour from start to finish.

NEW MULLARD VALVE FOR UHF

The band now in use for mobile radio was allocated for Band III television some time ago. Eventually, therefore, it will be cleared of mobile users, some of whom may have to move to a new UHF band (450-460 mc). At present, no British commercial mobile station operates in this band, largely because technical problems bound up with the use of these frequencies greatly increase the cost of suitable equipment over that for normal VHF working. One such problem is that valves suitable for the present VHF band may be quite inefficient at the new frequencies. Types that have been available up to now have tended to be rather bulky, expensive, and of high power consumption.

A new Mullard valve, the QQVO2-6, marks an improvement on all three counts. Little bigger than a miniature receiving type, it will function efficiently up to 500 mc, giving enough power output for mobile working. The QQVO2-6 is a miniature double-tetrode RF amplifier on the noval (B9A) base. Its centre-tapped heater can be operated from either a 12.6V., 0.4A. or a 6.3V., 0.8A. supply. A high value of mutual conductance (7mA/V per section) has been obtained by incorporating the latest type of control grid, by means of which very fine grid wires are positioned very close to the cathode. The grid-anode capacitances are internally neutralised, so that stable operation is obtained when the two sections are used in push-pull amplifier circuits.

As a power amplifier at 490 mc, the QQVO2-6 delivers 3.5w. under typical circuit conditions when operated at maximum ratings with anode-and-screen modulation. The drive power needed is 1.4w., and this can readily be obtained from another QQVO2-6 operating as a frequency tripler from about 163 mc. Working HT voltage is 180v., and no special cooling arrangements are necessary. The QQVO2-6 is of obvious interest for 430 mc amateur band operation. It is shown at left in this photograph, to compare with a normal miniature type.



DX COMMENTARY

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

AT the time of writing, the autumnal DX seems to be piling up very nicely, although we have had some blank spaces during the four weeks under review. Those readers who remember previous sunspot cycles on the rise (and it's strange to think that many who are reading this have never experienced one before) will remember that a high sunspot number is, in itself, no guarantee of lasting good conditions. All we can promise is that the good spells will become better and better, as well as more frequent.

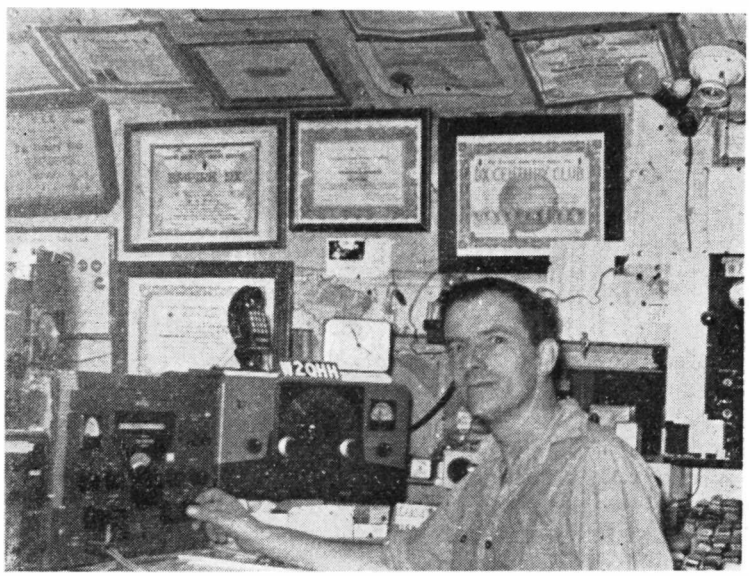
Meanwhile it is, perhaps, a good thing to remember that the sun is losing roughly four million tons of its mass every second—all of which is converted into radiation of various kinds—and that it takes only an infinitesimal increase or decrease in this figure to disrupt all our communications, ninety-three million miles away! (We put that bit in to remind you that amateur DX is not terrifically important in the cosmic scheme of things . . . .)

Don't worry, by the way, about that four million tons a second; there is still enough left for a few hundred million years at that rate of radiation.

And so from the cosmic to the microscopic, and our own efforts at taming the universe, with special reference to the HF bands . . . .

Ten Metres

Ten is still pretty slow in awakening, although the old bogey of a low activity level is responsible for some of the trouble. Remember, also, that Fifteen has turned out to be such an excellent DX band that a vast amount of traffic which would otherwise be on Ten has been siphoned off.



W2QHH

CALLS HEARD, WORKED and QSL'd

G3GGS (Preston) is once again a six-band reporter; the only one this month. He finds Ten well open and reports working ZS3AB for a new one, also ZC4's, EA8, ZE, ST and VE8. He missed XW8AB on CW.

G3FPQ (Bordon) was active on phone and raised EL, KP4, OQ, VS1, 2 and 6, VP8BR (Antarctica), ZS3 and 4S. G3BHW (Margate) found things improving but still rather patchy; he has heard little from the East, but probably because of his operating hours. Best contacts were ZD3BFC and CX2AY, both on phone.

G3DO (Sutton Coldfield) raised VP8BR on phone for a new one. G2CDI (Stokenchurch) lost his beam in a gale and was inactive for a while on this band, but since re-erecting it has booked SP, 4S, OE, OQ and ZE for new ones this year. VS6's and VK5 have also been worked.

GM3BCL (Aberdeen) works Ten more than any other band, and on phone has raised FB8BZ, TI2GC and numerous CX, LU, PY, OQ, VK, VQ2, ZE and ZS stations. He has worked 49 countries on the band this year, through (as he says) "hanging aimlessly around on Ten even when Fifteen is wide open."

Fifteen Metres

This is probably the best band now for real DX, and it is settling down into some sort of reliability at last. G3DO collected three new ones on phone in the shape of ZK1BS, VR2BC and KW6CA—a nice trio.

G6VC (Northfleet) also added three new ones—FM7, ZL and VU. G3FPQ's phone brought contacts with DU6IV, KH6's, KW6CA, PZ1AC, VK9DB, VP3YG, VP8BY, VR2BA, 2BC and 2BZ, ZD3BFC, ZD8SC and ZK1BS. His score on 15 metres is now 149 countries—the highest we know of, up to date.

G3BHW is not yet TVI-proofed for Fifteen, but in his restricted hours he worked CR5SP, MP4KAL, ZD4CF, ZS7C and 4S7GE, all on phone. Several QSO's with South Africa and South America have been at the S9-plus level, both ways.

G3GGS is troubled with high local noise, but raised UC2 and XW8AB for two new ones, also HC on phone. He missed CR9AH (phone) and HB1MX/HE (phone and CW). G3GZJ (London, S.E.23) also complains about the noise; his new ones were HB1MX/HE, PY and ZS6MI.

Other DX heard on the band by a variety of people included ZD1FG, KX6ZB, KH6's, KL7's, VP5ES (Turks) and a very large bunch of JA's and VK's.

G2CDI's bag included HZ1AB, YA1AA, CP1CJ, ZK1BS, FQ8AK, M1PDN, LZ1KNB—all new ones—as well as BV1US, VS4NW, VP3, 4, 5, 6, 7 and 8, VK's, FM, KH6, KL7, VR2, DU and VK9.

G2DC (Bulford) thinks Fifteen is improving rapidly and notes the return of ZS signals to the band. During the period 1800-2000 GMT he now finds it easy to work DX from East, West or South—meaning such as W6 and 7, KH6; VU, VS1, VS6, JA; CR6, CR7, ZD and ZS. New ones for the month were CR7BS, ST2NG, XW8AB, ZD8DCP and DJ2MB/LX.

Twenty Metres

At last it seems that Twenty is being ousted by Fifteen as the premier DX band—in spite of the fact that twenty-metre conditions have been very good indeed.

However, it seems to be the main band for "expeditionaries" still, and G3DO collected two of them—VR4AA (Danny Weil, ex-VK9TW) and SM8KV/Spitzbergen, both on phone.

G3FPQ, on phone, worked AP2U, FB8ZZ, FO8AD, HR1FM, LX1DA, TG9MQ, VK1IJ (Macquarie), VP2KG, VR4AA, UH8KAA and ZK1BS. Not content with this, he also went on CW and raised CR4AH, PZ1AH, UA1KAE (Antarctica), UJ8, UL7, UP2 and UN1.

G3BHW collected two new ones—XK9XK (Papua) and I1AMO/M1, as well as CR4AH, FY7YB, PZ1AI, UAØKQB and 9VB, and CO3YP. JA's, KL7's and VK's were also numerous, but some tooth-gnashing was caused by the escape of I5RAM and VK1ALR—all this on CW only.

G2HPF (Chelmsford) reports for the first time in some years, and mentions FP8AP, SM8KV/Spitz, DL1CR/LX, UAØSB, VQ1JO and 8AG, and UL7CB—all worked; UJ8AF was heard. G2HPF also tells us that VQ4EF is looking out for QSO's with his home town, Aldershot.

New ones for G3GGS were VQ1JO and PZ1AP, both CW. Heard, but missed, were BV1US, SVØWE, ET2US and two M1's, all phone. CW gotaways were UI8, I5RAM, CR4AH and CR5AD.

G3GZJ roped in PJ2CE, ZA4FH, HB1MX/HE, I1TZ/MI, and CVX, UG6, VP6, VU and YV, apart from the more usual VK's, ZL's and the like. OY2H and a UC2 were new ones for G3JVJ.

Forty Metres

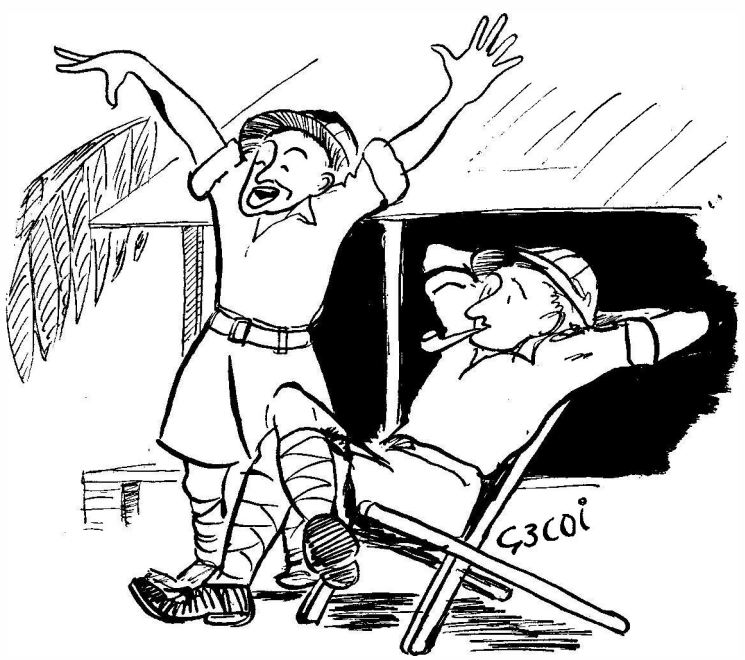
G3JVJ (London, S.E.22) writes "in defence of poor old Forty" (some say "guddold Forty"), on which he finds it easier to work the DX (when it can be heard) than on any other band. The month's offerings include VP6CJ, TI2PZ, UA9CM, UF6AA and HH3DL.

G3GGS worked 4X4CJ, UO5FC and UF6AA on CW, but even better ones that got away were XW8AB, FG7XE, UI8, UM8 and UAØ, all around 2300 GMT. G2HPF worked UI8KAB. Note—all this was on 40 metres!

Top Band Topics

The Top Band should, by now, be coming back into its own. Static doesn't trouble us any more, darkness falls at a reasonable hour, and activity is increasing. Nearly 140 users of the band have already claimed and received their WABC Certificates, but there are plenty more to come, and those who have already made the grade don't seem satisfied until they have worked their score up to the 80's or 90's.

One of the latter is GM3EFS (Alexandria), who says he continues "dishing out Dunbartonshire QSO's to all and sundry." And



". . . . Well, I think I'll go and start another pile-up on Twenty . . . ."

he remarks that even people who seemed to have disappeared for good are apt to pop up when somebody signing /P shows his call. He tells us, too, that GM3COV (Caithness) and GM3KHH (Moray) are both active at the moment. GM3EFS admits that he is a CW enthusiast, but he says that he does regret any encouragement being given to those who seek a WABC phone, chiefly for the reason that any great increase in phone activity on this band might easily lead to trouble concerning QRM to coastal stations. And he adds that the bee in his bonnet concerning phone operation has been "buzzing very loudly since this new rule allowing new licensees to use phone right away . . . Have you heard some of them?" We have, and we, too, are a bit worried about them. (It was a change not even wanted by most of the beneficiaries!—*Ed.*).

GM3KLA (Shetland) has pushed up his score with GI5RI/P (Fermanagh). GM5PP/P (West Lothian) GM3AKU/A (Ayr), GM3JDR/A (Caithness) and GM8DF/A (Kincardine), but has listened in vain for Armagh and Anglesey. His forty-foot mast broke recently, and its new height of twenty feet has brought things down by an S point or two; he hopes to have it up to the full height again by next month.

G3JEQ (Great Bookham) managed to winkle out GI6TK/A (Armagh) through heavy QRN, putting his score up to 94/95.

G2CZU (Bath) has succeeded in finding Cumberland at last (thanks to a personal QSO with G2RF at the "Topsfest"), and also worked Jersey. A chase after G3AID/A (Scillies) was a failure, but GW3KOR/A (Anglesey) put the phone score up by one. G3GGS worked GI6TK/A and GM3COV, but missed out on GC3BHT/A in Jersey; his only blank in GI is now Tyrone. G3BRL (London, W.5) worked GM5PP/P (Ross) and collected his card, but otherwise has not been active.

G6VC is seriously thinking of building a modulator and has got the cobwebs out of his Top Band rig. He would like to know of any activity from Sutherland or Perth, these two being his stumbling-blocks at present.

Top Band chasers will find some extra activity on the band during Sunday, October 21 (0900-2300 GMT), when the FOC Marathon is held. But the object of this contest is for FOC members to work *one another*, and non-members will not be too popular if they crowd around anyone who happens to be in a rare spot!

G3BHT (Liverpool) reports on his recent expedition to Jersey, whence he signed GC3BHT/A. Owing to conditions, power trouble, lack of activity and the fact that it was a holiday, only a moderate number of contacts were made. He used a Command Rx with a B.2 power pack, and a home-built transmitter. The aerial was 450 ft. long and 50 ft. high, erected by GC3KPO, G3JBS and G3BHT.

G2NJ, who shares the 97/97 pinnacle with G5JM, writes that he has heard from GC3KAV, of Guernsey, who says he will not be trying Alderney this year—so it looks as if the 98th won't come till 1957.

The Overseas Mail

4S7GE (Trincomalee) sends some news of activity in that area. 4S7JB is on phone and CW, all bands; 4S7WM works phone and CW on 14 mc, and 4S7LJ CW only, same band. 4S7HM is another all-rounder, while 4S7GE himself runs phone and CW on 14, 21 and 28 mc. He puts 50 watts into a single 807 and receives on a modified HRO; the aerial farm consists of a ground-plane for each band, after trying several other types.

In Ceylon the 21 mc band has been rather poor but is improving; 28 mc openings are not yet very frequent. There is an interesting net on Sunday mornings at 1130 GMT, controlled by VS2DQ. 4S7GE tells us that the previous Sunday's roll-call revealed ZS9G, ZD4BV, ZS6LW, ZE2KO, VQ3ES, VS6CO, VS4BO and PY1TX. G's would be welcome, and all credit for this interesting international net, which is on 21120 kc, goes to VS2DQ, who is the master of ceremonies.

VS6DL (Hong Kong) writes that he is moving to a much better location and will try to continue the Top Band and 80-metre tests that ex-VS6CQ started. He will

FIVE BAND DX TABLE
(POST-WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	744	102	161	221	145	115	230
W8KIA	657	61	145	258	84	109	258
G5BZ	647	64	115	238	137	93	244
G3DO	543	24	46	218	126	129	236
G3FPQ	539	60	73	174	149	83	191
W6AM	497	30	58	267	85	57	267
W1VG	480	25	113	188	100	54	193
ZB1AJX	442	6	56	119	136	125	182
G2YS	432	62	79	146	90	55	163
K2BZT	422	65	66	187	79	25	193
GM2DBX (Phone)	384	33	31	158	81	81	171
W6AM (Phone)	331	13	32	226	39	21	226
G2HPF	293	28	48	140	45	32	155
G6VC	288	29	35	133	60	31	139
G3INR	282	43	51	108	57	23	120
G3IGW	231	42	60	74	46	9	98
G3IUW	212	30	37	65	58	22	100
GM3EFS	209	25	39	97	27	21	107
MP4BBW (Phone)	201	1	5	53	85	57	111
G3JLB	197	32	36	56	46	27	85
ZB1HKO	186	18	26	68	49	25	79
G2DHV	180	19	26	114	9	12	115
G3GZJ	175	18	42	62	47	6	88
G3JWZ	174	42	49	51	27	5	80
G3JVJ	146	23	57	38	24	4	73
G3JJZ	128	21	32	65	8	2	80
DL2ZO	124	2	14	82	25	1	88
G3JZK	116	14	17	30	51	4	67
G3HEV	65	10	20	17	14	2	39
MP4BCA	60	1	2	9	32	16	45
G3IDG	50	11	14	6	1	18	27

keep us informed; meanwhile, any G's who want a definite sked should drop him a line.

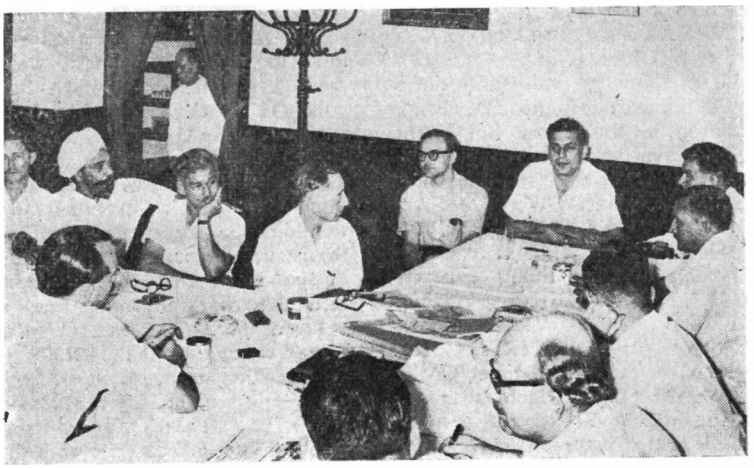
ZB2Q (Gibraltar) reports that he, ZB2R and ZB2T are all active with 35 watts or so, mostly on 14 mc. ZB2V hopes to give Top Band a try this winter, and the others will also have a go at Eighty. ZB2Q is always happy to work G's, and says the worst QRM of all comes from W-land, followed by DL and YU. G's don't count as QRM!

"Tahiti-Nui"

As noted briefly last month (p.375, September SHORT WAVE MAGAZINE), an expedition is leaving Tahiti on or about October 15 with the object of carrying out what we might call a Kon-Tiki in reverse. They hope to prove it possible to navigate a Polynesian bamboo raft, 50 ft. by 16 ft., from Tahiti to South America and back. The craft is called *Tahiti-Nui* ("The Great Tahiti"), and among the crew of five will be Roland d'Assignies, using the call FO8AD/MM.

Frequencies will be chosen with regard to propagation conditions, on 7, 14, 21 and 28 mc, and it is hoped that European contacts will be made on 14 and 21 mc, CW, around 0800 and 1730 GMT. All operators should follow FO8AD's instructions after each call, to avoid a pile-up — he will use QHM, QMH, QLM and QML, and contacts will normally be confined to an exchange of operators' names and RST. A special three-colour map of the itinerary is available from the R.E.F. for 480 francs (or 16 IRC's)—address B.P.42-01, Paris, R.P. Contacts may be marked on these maps, and at the conclusion of the expedition they will be verified and autographed by members of the expedition, free of charge.

W6YY (La Canada) sends another of his bulletins, from which we garner the following: **XW8AB** is back on 14 mc CW . . . there will be an active **HS** station from September 29, using 300 watts and a 3-element beam . . . **PK7ADM** is active, details unknown . . . **VQ8AL** and **8AR** are both now using phone . . . **CR5SP** is on phone and CW, 14 and 21 mc . . . **ZC5SF** may be found on 14012 kc, around 1330 GMT . . . **FR7ZC** is a French naval officer stationed on Reunion, and puts out a nice signal.



At a recent meeting of the Malayan Amateur Radio Society. VS2DB of Kuala Lumpur is lower right (with glasses but no hair!). Facing, from right to left, are: VS2CP, VS2DV, VS2CV, VS2CB and VS2AZ (in turban); lower left is VS2UW.

DX heard regularly in W6 during recent weeks included VQ1JO, FL8AB, FB8ZZ, SM8KV/Spitz, FR7ZC and VR2BZ (all CW) and ZK1BL, DU7SV, ET2US, BV1US and FB8ZZ (all phone).

From the Circular Letter of the *Radio Society of East Africa* we get it that those unfortunate chaps will actually have to *pay* for their licences now! They don't pretend to be pleased about this, but hope it will also bring a tightening up of regulations. Apparently they have a number of types out there who think nothing of introducing advertising blurbs into the Sunday morning nets, and behaving in a way that would soon have them off the air in the U.K.

From the same source we learn that VQ4ERR will be using a Minibeam for /P and /M work on his new car! (All we gather from this is that it's not an Austin A.30).

DL2ZO (RAF Butzweilerhof) is not G6ZO cropping up in yet another place, but G3KMQ, who has already booked 83 countries. On 14 and 21 mc he has worked lots of creditable DX (in his list are XW8AB, FB8BX. SM8KV/Spitz, EA9DF and many other good ones). But he finds the G's coming in so well on Top Band that he is very sad at not being able to use that frequency himself —so he wants to work them cross-band, from *Forty*. He is looking for them most nights, so if you're feeling DX-minded on Top Band, take a look round Forty for DL2ZO and you might have a surprise.

DX Strays

VQ8CB/8AB is now on Mauritius . . . **XW8AB** will be active on all bands, Ten to Eighty, CW and phone . . . VQ4AQ will be operating as **VQ9AA** during October . . . **HG8GC** is on and gives QTH as William Guzman. San Cristobal, Galapagos Islands . . . **VR3D** QSL's may be obtained from the operator, who first signed VE7ASL/VR3, and is now in KH6; QTH is C. H. Freeman, 99-139E Heen Way, Aiea, Hawaii. He was also VR2CD, ZL1BI, 3AE and 4FH.

VR4AA (ex-VK9TW, VR1B and so on) is active now, but few first-hand reports as yet . . . An SV7 or SV9 call may be heard during October, operated by SVØWJ . . . **YA1AA** is back in Lebannon and his station is being used by someone else for commercial traffic . . . VQ5GC's trip to VQ9 may not come off, owing to shipping trouble, but see

earlier concerning VQ4AQ . . . **UM8KAA** has been heard on 7015 kc (2200-2300) . . .

The following calls and times give an idea of the DX being worked in the States, but might also serve as a guide to us in Europe. Only the rarest ones are quoted. *Twenty CW:* KM6FAA (0310), UAØKQB (0500), KJ6BP (0430), ZC5SF (1250), YA1AM (1400), FL8AB (1500), FU8AA (1700), KX6NC/KC6 (0530), HC8GC (0300), VR3B (0445), VR4AA (0500), VK1RW (1350), PK7ADM (1230). All times GMT.

W6AM (Long Beach) manages to tie with W1FH for the position of World Champion (267 countries)—but only until W1FH receives XE4A's card! We hear that W6AM drove more than 800 miles to get home in time to work this elusive one, but XE4A had gone QRT and left the island by the time W6AM got on the air! This rivalry at the top of the ladder is just about as hot as anything could be . . . eventually we shouldn't be surprised if one of the parties financed a DX-pedition on condition that the operators refused to work the other one!

From the *East Africa Circular Letter* we gather than **CR5SP** is one of the strongest signals out there—most nights after 2100, on 21200 kc. The VQ's are also busily filling in their gaps with the U stations, particularly the UAØ's in Zones 18 and 19. Cards are flowing, and VQ4ERR says "the curtain is lifted . . . duck under quick, chaps, while the going is good."

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G5JM	97	97
G2NJ	97	97
GM3EFS	96	96
G3JEQ	94	95
G6VC	94	94
G3HEK	89	92
G2AYG	88	89
G3GGS	86	92
G3JHH	85	86
G3BRL	84	84
G3KEP	80	81
G3FNV	79	88
G3AKX	78	80
G3DO	74	74
G3KOG	72	77
GI3JEX	72	77
G2CZU	67	69
GM3KLA	62	67
G3DVQ	62	63
G3KOC	61	67
G3EJF	60	64
G2HDR	58	59
G8CO	56	59
G2HPF	45	60
G3ICH	38	55
G3JZP	30	42
G3JSN	26	30
G3KMQ	24	54
G3JME	16	25

Miscellany

G3INR (Hereford) feels strongly about CW QSO's that develop into "please listen for my phone," usually when the other man is a rare one and in the process of handing out snappy contacts in a row. He asks whether the perpetrator of this tactic, presumably chasing DXCC on phone, claims such a contact as a proper phone QSO? We have never been very happy about the mixing up of CW and phone; personally, we think a properly claimed phone contact should only be the result of both stations moving up to the phone band then and there.

The sensible procedure, of course, is for a rare DX station to work for so long on CW and then to go up to the phone band and work phone. If he is not equipped with a modulator himself he could stay put and announce that he is only tuning the phone band for the next thirty minutes or so. But whatever he did, someone would be annoyed!

MP4BBW writes from Solihull and tells us that on his way back from Bahrein he made personal QSO's in MP4K, OD5 and PA. The OD5 gang held a get-together in Beirut, and he met people from HZ, SM and SU as well as the locals. He also had a chat with YA1AA in person and collected his QSL. Further activity from YA may start up when the operator returns from his vacation in the States. MP4BBW will be back on the air around October 14, or within a week of that date.

G2HPF asks whether we cannot publish lists of results in the more important International Contests, showing how the G competitors fared. We have to some extent done so in the past and will continue to do what we can, and even to expand it if possible. Unfortunately, the results of the bigger contests come out so late nowadays (up to a year in some cases!) that one can hardly look on them as news when they *do* arrive. We will do our best to meet this request, though.

Contest Reminders

The following events are of interest to those who follow the competitive side of things, and the dates may also be useful as a warning to those who don't!

October 6-7, 1000-1000 GMT: ***VK/ZL Contest, Phone.***

October 13-14, 1000-1000 GMT: ***VK/ZL Contest, CW.***

October 13-14, 0001-2359 GMT: ***FOC DX Marathon.***

October 21, 0900-2300 GMT: ***FOC Marathon (160, 80 and 40).***

October 20-22, 0200-0200 GMT: ***CQ World-wide DX Contest, Phone.***

October 27-29, 0200-0200 GMT: ***CQ World-wide DX Contest, CW.***

November 10-11: ***RSGB Top-Band Contest.***

November 17-18, 1600-1900 GMT: ***MCC (Club Contest, Top Band).***

November 24-25, 1600-1900 GMT: ***ditto***

November 24-25: ***RSGB 21/28 mc Phone Contest.***

If you're looking for a quiet week-end, it seems to be on November 3-4—or has someone fixed something for that one already?

Late Flashes

W6ITH asks us to correct our statement (in the August issue) that YVØ (Aves Island) was only 38 miles from the Venezuelan mainland. It is actually 330 miles from the mainland, and 275 miles north of the nearest Venezuelan territory, Isla la Blanquilla. For the record, W6ITH adds "FS7RT and PJ2MC both licensed to me *not* PJ2MA, as given on p.311. FS7RT operated in February,

1956; FS7RT and PJ2MC both operated in June and July." Still no news of his other new ventures, mentioned in this column last month.

Ethics Again

Time was when this Commentary regularly included a "hot-under-the-collar" section. Reading it gave one the impression of purple-faced characters sitting at their receiver controls, looking more like the drivers of fast cars thwarted by a crawler than mere chasers of DX.

Some of these types must still exist, but they have given up airing their grievances—or is it possible that this coming DX season will bring them out again and that their apoplectic countenances will be glaring at us once more?

Concerning all this, let us quote GM3BCL, thuswise: "I get rather annoyed at your various correspondents who complain of all sorts of things on the pretext that they are concerned with the ethics of operation, whereas in fact they are merely complaining that a certain station has not come back to their call." *(Hear, hear!)*

To continue: "A station will not reply to you for two reasons, and two reasons only. They are *(a)* he doesn't hear you, and/or *(b)* he doesn't want to hear you. Both these reasons are good enough for me, hence no complaints."

GM3BCL adds that the "thrill of the chase" is a major element in the DX rat-race—and how dull it would be if they all came back on the first call!

With all of the above we agree, but we must add that even if you are *not* chasing an exotic piece of DX, but merely listening round the bands (as we often are), you hear things and you observe behaviour that is either childish, unskilful or of the type corresponding to sheer road-hogging. We should be better off without it, but that applies to so many other things in this sad world.

Incidentally, it occurs to us that the sound of a really exotic piece of DX has exactly the same effect on certain operators as that Rock 'n Roll film has on teen-agers. Instead of tearing up the seats, they wreck a section of the band.

That brings us to the end of this month's piece, and it only remains for us to say that next month's deadline is first post on **Friday, October 19.** The following one (overseas readers, please note) is *Friday, November 16*—plenty of time for the airmails. Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

GI3CFI is at Coleraine and runs a modified Army 12 Set at up to 80 watts input; his receiver is a Marconi B-21. Operating on 20, 40 and 80 metres from rather a poor location, his aerial is a 136-foot end-fed wire.

21-28mc MARATHON, 1956

Station	21 mc	28 mc	Total
	Phone Only		
G2CDI	146	81	151
G3HCU	120	45	125
G3KHE	82	20	87
MP4BBW	77	57	95
GM2DBX	59	19	63
	Phone ond CW		
G2DC	101	36	106
VQ4RF	74	80	113
G5BZ	74	38	87
ZB1HKO	39	19	42
G3GZJ	39	6	39
G3GGS	38	41	64
G3JWZ	27	5	28
G3JVJ	23	4	23
GM3BCL	15	49	62

ECHO FROM THE PAST

We were interested to have a letter recently from a (very senior) OT reader, whose query was the value and rating of a resistor in a particular transmitter, published in an early issue of SHORT WAVE MAGAZINE. This turned out to be the CO-PA design described by our original "A. A. Mawse" in the September and October issues dated *1938!* Our correspondent still operates the transmitter.

VS1/VS2 AMATEUR LISTINGS

A recent issue of VS2DB's *Malayan Radio Amateur* shows that there are 40 VS1's licensed in the territory of Singapore, and 52 in the VS2 area (Federation of Malaya). Three VS4's are shown for Sarawak, all in Kuching, and two in North Borneo—ZC5SS and ZC5VS. Another interesting statistic is that there are no less than 31 VS6's licensed in Hong Kong.

ZBOR III, BEOGRAD, 1956

THE YUGO-SLAV AMATEUR CONVENTION

THE writer was fortunate enough, on arrival in Belgrade on holiday in July, to find that an international Amateur Radio convention was to take place during July 7-9, at which the Iron Curtain countries were to be strongly represented.

Having succeeded in finding the Hq. of the S.R.J. (the Yugo-Slav national association of radio amateurs) and going on the air with their Hq. station signing the highly improbable call of G3FOO/YUØC, personal contact was soon made with the redoubtable Mirko, YU1AD—who, among his other talents, speaks about 12 languages.

The opening meeting of the convention was held on July 7, when delegates from DL, HA, HB9, LZ, OK, OZ, SM, SP, UA, YO/YU and 9S4 spoke. Quite a lot of discussion ensued, in spite of the fact that it all had to be interpreted (mainly by YU1AD). In addition to a large exhibition of amateur-constructed gear and commercial apparatus of YU manufacture, a certain amount of foreign equipment was also on view, including one of the more *de luxe* British communication receivers.

On July 8, the second day, the main features of the proceedings were a two-metre D/F contest and a coach trip to Avala, a local beauty spot. The day concluded with a lecture on transistory, followed by a concert and dance. On the morning of the third and final day, all foreign visitors to the convention were asked to meet the Mayor of Belgrade—with appropriate refreshments in the mayor's parlour—and in the afternoon the concluding business meeting took place. The *grand finale*, in the evening, was the Hamfest, at which prizes were distributed for the D/F events, the home-constructor sections and the high-speed Morse contests, with pennants and souvenirs for all foreign amateurs present. The festivities continued until daylight the following day!

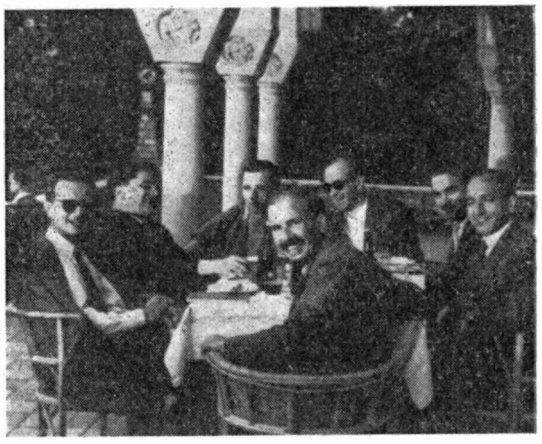
General Impressions

The writer's lasting memory is of the extreme friendliness and boundless hospitality shown him, as a chance (and the only) G visitor to this most cosmopolitan gathering, held in the capital of a country with a foot on both sides of the Curtain. More than 30 licensed amateurs from countries outside Yugo-Slavia were present, some with their wives, and for most of them (who had never been out of their own countries before) it was their first experience of a personal QSO with a British amateur. In some cases, visas and passports were not granted until the very last moment; in fact, the LZ party's documents only reached them in time because a fast car raced the train to the frontier station!

For the duration of the meeting, many of the visiting amateurs were quartered in a students' hostel, the doors of which were adorned, very properly, with QSL cards. The evenings were taken up with gay parties sampling the local brew—*slivovitz*, a Yugo-Slav concoction said to resemble brandy—and talking in the way that radio amateurs do the world over. An amusing experience on one of these occasions was with YU1DHI, who spoke no language except his own, but nevertheless managed quite well in Q-code with pencil-and-paper!

It was with real regret that the time came to say good-bye—and the writer is sure that all foreign amateurs visiting this convention would be with him in thanking the S.R.J. for organising such a first-rate show. To all the YU's—*Hvala Vam I Dovidjenja!* (We hope it's all right!—*Ed.*).

G3FOO



Caught at the Yugo-Slav Amateur Radio convention in July last—the group round the slivovitz includes, from left to right, YO3RF, YU1AD (Mirko), SP5FM, two YU's not identified, and YU1AF on the near right, with G3FOO in the foreground. The only G present at the convention, he was lucky enough to run into it by chance during a holiday visit to Yugo-Slavia.

NEW QTH's

Readers recently licensed, and those who have changed their address, are reminded that they should inform us immediately if they wish to be listed in "New QTH's" and in the *Radio Amateur Call Book*, which is the world-directory of radio amateurs. There is no charge of any sort for making these appearances, which we are glad to arrange as one of our services for readers. Your *name*, *address* and *call-sign* should be clearly written on a separate slip, addressed to "QTH Section" (with a request to change your card in the index if you are a direct subscriber). Any U.K. amateur can use this service.

MAGAZINE CLUB CONTEST — "MCC"

The 11th annual Club event organised by SHORT WAVE MAGAZINE takes place this year during the week-ends November 17/18 and 24/25—*see* p.441 for rules. All 160-metre CW operators are invited to take part, as they can give Club stations single-point contacts. The fun is fast and the going furious, and non-Club stations will find that it is a real contest event.

THE SOUTHAMPTON MOBILE RALLY

STONEY CROSS, SEPTEMBER 16

ORGANISED by the Bournemouth Amateur Radio Society, the intention on this occasion was to make the Rally a get-together rather than a stage-managed event with a set programme. Though held in cold and depressing weather, about 75 people were present during the peak period and appeared to be thoroughly enjoying the opportunity for discussion and personal QSO's.

The 160-metre station, G3KYU, talked-in the following mobiles: G2FIX, G2FK, G2FSR, G3GMN, G3ISZ, G3IVP, G3JXA, G3KAS, G4AP, G5PP, G8ML and G8QW. In addition, Top Band mobiles G2BRR and G3IPR were present. The two-metre station, G2HIF, brought in G2DSW, G3CGE, G3HKT, G3IRA and G3KSR. The 80-metre mobileers were G2AOK/M and G2CDN/M. This makes a total of 21 fitted vehicles (cars and *motor-cycles*) present at the Rally.

Mobile on Two Wheels

For it will interest many readers, and potential mobileers, to know that G2FIX/M is on Top Band with his Triumph m/c, complete with a loaded whip bolted to the carrier bracket and the transmitter-receiver-power pack items disposed conveniently round the machine, making a neat and handy job. G3IRA/M is also a motor-cycle mobile, but on two metres, and with very much miniaturised apparatus—the PA runs a pair of 6AK5's in push-pull!

There were many other interesting equipments on

G2FIX of Salisbury is /M on 160 metres, on a Triumph motor-cycle. He was present at the Southampton Mobile Rally on September 16 and was one of the twelve mobiles talked-in on that band.

G2HIF/P provided the two-metre talk-in for the Southampton Mobile Rally, and had five callers. His assembly is portable rather than mobile, in that the gear is carried on a shelf which hooks over the front seats of his A.40 Austin; operation is in comfort from the rear seat. It is a neat layout, with the change-over and control panel between transmitter and receiver (foreground). G2HIF also carries a little home-built P-E charging set to revive the car battery after long /P sessions.

view at the Rally—indeed, the ingenuity and resource of our mobileers knows no bounds, and all bands are being tackled with success. For instance, on 160 metres, G4AP/M has the first, and probably so far the only, all-transistorised receiver-transmitter assembly for mobile working; he is to be congratulated on his effort in this new field. Quite different is the approach of G3GMN/M, who runs a transmitter, with a TT11 PA, band-switched for all bands 160 to 10 metres.

The beautifully constructed miniaturised two-metre gear shown by G3CGE/M attracted much attention—it was built by SWL R. Bassett, well known on the VHF bands. By contrast, G2CDN/M has his Morris Traveller fitted with the latest American commercial mobile equipment, covering 80-10 metres inclusive, with a whip aerial that can be resonated at any frequency in the transmitter range. One of the 160-metre installations, that of G3JXA/M, was complete down to a miniature frequency meter and oscilloscope (1-in. tube) for modulation checking!

The Aerial Systems

For 160 metres, the resonant whip—either centre, base or top-loaded, with or without capacity hat—is the usual fit. On two metres, however, the aerials vary from quarter-wave spikes to the loop-dipole used by G2DSW/M (for which his XYL talks of crocheting a netball-net for keeping the juniors amused!) and the VHF skeleton sphere displayed by G3KSR/M; he also has a telescopic 4-element flat-top, on a boat-hook mast, for /P operation when stationary.

Control Station Arrangements

G3KYU/P on 160 metres ran 10w. to a QVO4-7 PA, into a quarter-wave end-fed aerial, with an S.640

receiver—in case departing mobiles may have wondered why G3KYU was not on " to hear them away," the reason was that the FC valve in the receiver blew just as the Rally was breaking up. G3GYK/P did not have a lot to do on 80 metres, for which a ZC1 was provided.

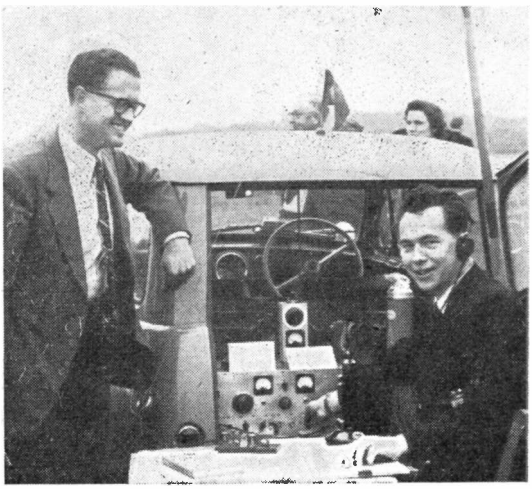
G2HIF/P, the two-metre control, has a screen-modulated 832 in the PA, and his receiver is a 14-valve miniature double-superhet; as much portable work is done, G2HIF has built himself a small petrol-electric generating set—capable of charging the car battery at 7 amps.—which caught the attention of many people with the same sort of problem.

Among the visitors to the Rally were OD5BN, on leave from Beirut; G2FSR/M just back from Cyprus, who built and fitted the 160-metre /M gear into his Consul in less than a fortnight; Mr. Leslie Lowe, chairman of the BBC's Radio Club, G3AYC; and a helicopter which circled purposefully for some time and was rumoured to be a mobile from Southampton! In addition to the /M operators already mentioned, there were about a dozen other G callsigns present, with G5PP/M from Coventry as the most GDX arrival.

Altogether, the Rally was another very successful Amateur Radio occasion, and to G3KYU, honorary secretary, and the members of the Bournemouth A.R.S. responsible for the organisation, go the thanks and the congratulations of all who were there. We are informed that plans for another B.A.R.S. Mobile Rally are already under consideration for June next year, for which the experience gained from this last one will be invaluable.

(*Editorial Note:* The photographs were taken by G2FK, and the details from which this account is written were supplied by G3KYU, on behalf of the Bournemouth Amateur Radio Society.)

". . . But I tell you, old man, spark's illegal . . ."



G3KYU/P (Hillman Husky) talking-in the Top Band mobiles at the Southampton Rally. G3HLW was operating when G3KYU (left), honorary secretary of the Bournemouth Amateur Radio Society, organisers of the event, looked in to make sure that everything was still under control.

CHANNEL CABLE PROJECT

The decision, recently announced, to commence the laying of an underwater cable to link the British and French electricity grid supply systems is of considerable technical interest, because the Channel cable is actually to transmit at DC. This involves the construction of converter stations at each end to effect the conversion for the cable link. It is understood that the AC/DC change-over will be by mercury-vapour rectifiers and that the transfer capacity of the linking system will be 150,000 kW.

QSL's for SWL's

If an SWL who gives " GPZ/21 " as his listener identification will get in touch with us, we can let him have some cards held for him in our Bureau. And if the " BSWL " (no number given) who is expecting a QSL from, say, KG1FR, will do the same, we can likewise clear his cards.

CARDS IN THE BOX

Please send a stamped, self-addressed envelope, with name and callsign, to BCM/QSL, London, W.C.1, if your call appears in the list below—we have cards for you, but no forwarding address, because you are not yet in any published list. If you would like your callsign/address to appear in " New QTH's " and in the *Radio Amateur Call Book* (for which we are sole agents for Europe) please mention it when sending in for your cards. The *Call Book* is the only directory to the amateur stations of the whole world, and as such circulates in all countries.

G2AJJ, 2FPQ, 3DLU, 3IKJ, 3JIO, 3JPP, 3KNK, 3KPV, 3KRV, 3KUV, 3KZE, 3LAH, 5BW, 5CZ, 5PJ, GW3GLI.

SSB Topics

TECHNICALIA, ACTIVITY & OPERATING RESULTS

Conducted by **R. L. GLAISHER, G6LX**

FROM small beginnings in 1933, when W6DEI first transmitted amateur Single-Sideband from a home-constructed LF-type filter transmitter on 75 metres, amateur SSB has developed into a fully established competitor to the more familiar amplitude modulation. Although the commercial services have used SSB for point-to-point fixed frequency long-distance telephone communication for many years, until recently little or no consideration had been given to the adoption of sideband for the fixed-to-mobile and mobile-to-mobile services.

The continuing development of amateur sideband has aroused quite a lot of interest in official circles on both sides of the Atlantic. The saving in channel space, combined with the ability of Single-Sideband to get through under poor propagation conditions, is very attractive in these days of a heavy and constant demand for more and more frequencies.

The U.S. Armed Forces have not been slow in realising these advantages, and the U.S. Navy have recently specified that all new MF and HF communications equipment for Fleet use must have Single-Sideband capability. The U.S.A.F. have been testing amateur SSB equipment for long-distance air-to-ground communications.

On the British side, the Ministry of Civil Aviation are known to be interested and have already carried out some comparison AM and SSB tests. The GPO are considering how SSB could be introduced into the Maritime Mobile Radio-Telephone Service.

VHF Single-Sideband

According to ZL3AR, getting on two-metre SSB is no real problem. Following the recent notes in *QST* and being an active VHF exponent as well as having SSB interests on the DX bands, he decided to see what could be done with his present equipment and a minimum of extra units.

For the transmitter, he is using his normal phasing exciter with the output on 14.3 mc. This output is mixed with a 130 mc signal from an SCR-522 and the resultant 144.3 mc signal fed to an 829B Class-AB1 buffer, which drives push-pull 826's in Class-B to 300 watts peak envelope power. The mixer stage is the only additional item that had to be built, and this uses a Mullard QQV03-20 as a balanced mixer with cathode injection. A block diagram of the transmitter is shown in Fig. 1. The receiver in use at ZL3AR is a home-constructed selectable sideband type, preceded by suitable crystal-controlled converters for the band in use. The change to SSB was accomplished during a week-end, and the results have been very gratifying, with regular QSO's over the previously difficult 250-mile path to ZL2ACB in Wellington.

VHF SSB has caught on in a big way in the States, with more than 20 stations now active on the East Coast. With two-way SSB contacts a regular occurrence, the convenience of voice-controlled break-in working has produced a new TR switch circuit suitable for use with balanced feeders. The circuit is shown in Fig. 2 and is a modification of the cathode-follower type, first described by W9LSK in *QST* for May 1956. The insertion loss is reported to be less than 3.5 dB.

Although it has not yet been possible to test this switch at G6LX on two metres, it is in current use on 10, 15 and 20 metres with excellent results.

Query Department

At the request of several of the newcomers to Sideband, it has been decided to introduce a "Question and Answer" section which can deal with individual queries of general interest related to all aspects of Single-Sideband.

Query number one is from SWL Richardson (Ashton-under-Lyne), who has recently been doing quite a lot of listening on the "high-end" of 20 metres. He asks for information concerning methods of selectable sideband reception, and in particular for details of the Multiphase "Sideband Slicer," which is used by so many Sideband stations in the States.

The two basic methods of obtaining practical sideband selection are the McLaughlin and the out-phasing systems. The first arrangement relies on a selective IF amplifier having a bandwidth just wide enough to pass one sideband. Sideband switching is accomplished by changing the local oscillator frequency from one side of the signal frequency to the other. The necessary selectivity can be obtained either at the normal IF of the receiver by the use of a bandpass crystal or mechanical filter; or by double-conversion techniques with LC-type filters, or even a number of tuned circuits, *e.g.* the BC-453 "lazy-man's" Q5'er. In order to avoid slight retuning when switching sidebands, it is also necessary to

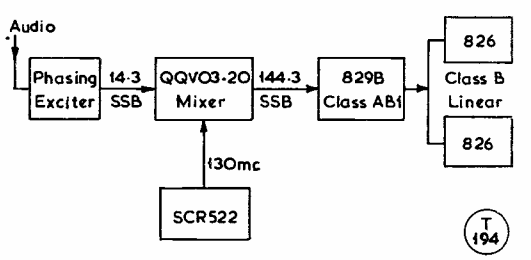


Fig. 1. Block schematic of the two-metre SSB transmitter layout devised by ZL3AR, who is getting very satisfactory results with this arrangement—see text.

Table of Values

Fig. 2. TR Switch for 300-ohm Balanced Feeders.

C1, C2 = 50 $\mu\mu$F	R1, R2 = 1.5 megohms
C3, C4 = .005 μF	R3, R4 = 220 ohms
C5 = .001 μF	R5, R6 = 1,500 ohms

change the BFO frequency to the other side of the IF.

The phasing method, which is used in the "Slicer," was first described by Norgaard in *QST* for July 1948 and reprinted in the ARRL publication *Single Sideband for the Radio Amateur*. The circuit for the "Slicer" can be found in "Single-Sideband Techniques," by W3SHY, published by *CQ Magazine*.

The principle of operation is very similar in many respects to that of the phasing-type transmitter-exciter. The receiver IF output is mixed with a locally generated carrier, which has been split into two equal amplitude signals phase-separated by 90°. After detection, the two audio signals from a double-channel detector are fed through an AF phase-shift network to "sum" and "difference" combining circuits. By a switching arrangement, it is possible to select either sideband output from the combining circuit, the unwanted sideband being cancelled-out to a marked degree.

The phasing method is quite useful when used with receivers having an IF amplifier with poor "nose-to-skirt" characteristics. Under practical conditions it can provide upwards of 25 dB improvement in unwanted sideband rejection. However, due to the lack of IF selectivity, it is very vulnerable to cross-modulation from strong signals on an adjacent channel. For this reason, the McLaughlin system is to be preferred, and the majority of the sideband receiving adaptors now available in the USA use the double conversion principle.

News and Views

On leave from the R.A.F., GW3IVS is active from his home in Llandudno. His last spell of overseas duty was in Hong Kong, where he operated VS6CW, and was for a time the only active Sideband station

SSB Countries Worked Ladder

Starting Date January 1st, 1954

STATION	COUNTRIES
DL4SV	55
K2DW	50
ZS6KD	50
G6LX	46
VK3AEE	44
G3MY	43
AP2BP	42
G3GKF	42
G5BJ	28
G3BFP	24
G3AUB	20

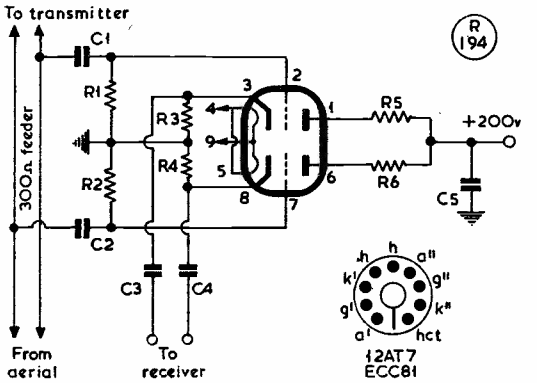


Fig. 2. A TR switch for VHF, when 300-ohm balanced feeders are used. Values are given in the table. Good results are claimed for this circuit.

in the Colony. At present he is on 20 and 80 metres with a phasing-type transmitter.

G3AUB (Stockport) has recently migrated to Twenty after a long spell of 80-metre operation. In the first 10 days of DX-chasing he managed to collect 19 countries. G3GKF (Purley) reports that Fifteen is still paying off. With the increased South American activity, several new ones have been acquired during the last few weeks.

GW3EHN (Swansea) reports that he is very happy with the results he is getting on Sideband. Rumour has it that he has been burning midnight oil trying to make a two-way SSB W.A.S.

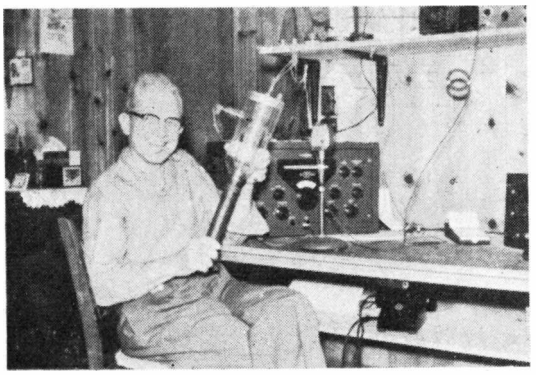
W4API, who was so busy last year on 80 and 20, reports that he has been posted to Paris and expects to be on early in October with an F7 call. He looks forward to working old friends on Eighty during the winter months.

A very welcome letter from G5BJ (Birmingham), who has recently discovered Single-Sideband. He reports that his phone DX results have improved out of all proportion, following the change from "ancient modulation"! At present he is using a G3CWC phasing-type exciter driving a QY3-125 in Class-AB1. (He has just purchased a new Eddystone 888 receiver and finds that it works very well on Sideband.) G3MY has been taking advantage of the improved conditions on 15 metres and has upped his country score to 44. Congratulations are in order, as he was the first G to work KC4USV.

G3KTU (Esher) is back on 80 metres from his /A location in Mill Hill. He has recently returned from a holiday visit to Sweden where he met several of the SM5 Sidebanders. Recent sideband visitors to G6LX included W2DPZ, W2CFT, WØDRD, DL4EW and OH2ZA.

DX Notes

Sideband activity from South America has taken a turn for the better, with the appearance of PY2JU and LU6DHR. From Bolivia CP5EK is back and OA4CL is again active following his recent visit to the U.K. CP5EK has a new linear using a 4-250A which has given him a much improved signal into



W4NQN, Opa Locka, Fla., runs Sideband on 10 and 15 metres, and works a lot of DX — but not with the valve he is holding, which is a blown QRO type from the local BC station!

Europe; although he prefers Fifteen he can sometimes be found on 28650 or 14300 kc. PY2JU is at present running 15 watts peak to a "barefeeted" '20A, but a 500-watt linear is under construction. YV5FL, CX5AF and CE2HV continue to represent the remaining South American contingent.

From Central America HR2WG (21425 kc), KZ5GZ and KZ5LB are on, while the West Indies have a strong Sideband following led by KV4AA, KV4BB, CO5LF, VP7NJ and VP9HH. VK3AEE reporting (on 14 mc) on Sideband happenings in the Pacific area, provides information that VR2CG is back on 15 metres after a rebuild; KG6AAY and KX6NB are on Twenty, but otherwise things are fairly static with little to report.

AP2BP and AP2CR have again been the mainstays for Asiatic contacts, with occasional appearances of JA1ACB and KA2YA. 4X4AA is new to SSB, having been bitten during a recent visit to the States. 4S7YL has a Sideband transmitter and can be persuaded to change to SSB, if you can first attract her attention. She can often be found working AM on the low end of 21 mc. VS6DA has a new SSB transmitter, but is inactive at present. VS6BE has just received a new KWS-1 and 75A-4 and should be on soon. (Thanks to GW3IVS/VS6CW and VK3AEE for the information.)

According to DL4YU, 28 mc Sideband is on the increase over there, with contacts being reported with all W districts, KZ5, KH6 and CP5. On the European front ZB1CZ, TF3CJ and 9S4AX have been on 14 mc; ZB1CZ is G3FVB, who was so active a few months ago from Hull. 80-metre operation from Malta is planned when the other bands cool off.

Several stations have reported hearing EAØAC in Spanish Guinea (14310 kc). ELØA is none other than W4DGW, who has let his W call lapse. He is on the move again and is operating /MM on board the s.s. *DelCampo*. For those stations looking for a KL7 contact, the following are on: KL7PIV (0900 GMT 14 mc), KL7BGA (1800 GMT 21425 kc), KL7FX (1200 GMT 14 mc) and KØAIR/KL7 (1930 GMT 28600 kc).

Countries Worked Ladder

It seems that some readers, at least, like the idea suggested in the last "SSB Topics" of running a Countries Worked table for two-way SSB. It was thought, at the time, that because of increased activity on the higher-frequency bands, the Table would be more interesting if the scores were tabulated for *each band*. Perhaps this point was not made clear, as only one of the scores sent in included this data.

We still think it's a good idea, so please provide this information when sending in the next report. The top scorer this month is DL4SV (Munich) with a total of 55 different countries worked. It is known that several G/SSB's have exceeded this total and in the States at least one station has 70-plus. We hope that in due course we shall get the necessary details from many more SSB operators.

Dead Line

Reports for the next offering under this heading, to appear in the December issue, are requested by October 31 latest, addressed: "SSB Topics," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. CUAGN on December 7—or how time flies!

A FEW REMINDERS

That we are always glad to see good photographs of Amateur Radio interest for possible publication in SHORT WAVE MAGAZINE—all those used are paid for on appearance.

That contributions for our "Other Man's Station" series are always welcomed, from readers at home or overseas. The photograph should be a good one, and accompanied by all the necessary details from which the write-up can be prepared. Payment is made for the material.

That you can sell practically anything in the way of good, unwanted gear through our Readers' Small Advertisement columns, for which the rate is 3d. a word, with a minimum charge of 5s., plus 1s. 6d. for a box number if preferred.

That we accept six-monthly subscriptions at the rate of 15s. post free, entitling full two-way use of our QSL facilities—BCM/QSL, London, W.C.1.

That it is getting near enough the time to suggest that if you want to give a radio friend overseas a really useful present, how about a 12-month subscription to SHORT WAVE MAGAZINE? The cost is 30s. post free, anywhere in the world, for a year of 12 issues—besides reminding him of you each month, few gifts could be more acceptable to an amateur (or so we are told!).

That if you live and read this outside the sterling area, our subscription rate is based on $4.00 U.S.

R.A.E. PREPARATION IN LIVERPOOL

Readers intending to take the May 1957 Radio Amateurs' Examination and living within reach of Liverpool may like to know that an evening course is starting at the Riversdale Technical College, Riversdale Road, Aigburth, with instruction in Morse as well as radio theory. Application for details should be made immediately to the Principal.

VHF BANDS

A. J. DEVON

EDX Breaks at Last!—
Mid-September Conditions Good—
New Contacts and "Firsts"—
ON4BZ Tops Countries Worked—
Results on 70 Centimetres—
GW6DP/P - GM2JT/P Work 130 Miles on 25 Centimetres—
July Contest Report and Results—
Station Notes and News—

ALL things come to those who wait—and are on the band at the right time. In other words, it is good to be able to report, *at last*, a definite improvement in VHF conditions, with EDX again workable and many new contacts made. As several of our correspondents this month have remarked, it is the EDX breaks that make life worth living for the VHF-only fraternity.

However, for us the openings came just too late really to register with the International Contest during the September 8-9 week-end. Though in the U.K. conditions were quite good on the Saturday, they fell off noticeably on the Sunday, and activity was disappointing. On the other hand, in the Central European area, things were much better; interesting stations reported active include HB1IV, HB1RD, LX1SI, OE9BF and 9S4BS, all making numerous contacts with DL and HB. It would certainly seem that, for their event, the D.A.R.C. had better conditions than we did in July, when there were two week-ends from which to choose; at the same time, the area of good conditions during September 8-9 did not extend as far as the Channel coast.

Since the latest news is always the most interesting, let us survey the happenings of the last few weeks first . . . As the weather began to change for the better round about September 9-10, so conditions started to build up, bringing the nearer Europeans within range of the north of England by the 13th, with good openings over the next six days, especially on the 14th, when lots of things happened. GI3GXP (Kilkeel, Co. Down) was hearing F8XT (Chillac, Charente), a distance of about 670 miles, and good enough for checking on as a possible new European distance record, to say nothing of an F/GI "First," which has been wanted for a long time. However, no actual contact ensued, apparently because F8XT (who had started at S9 with GI3GXP) went down into the noise by the time G3GPT got him listening for GI3GXP—though even then a QSO might have been possible on CW. Unfortunately, F8XT persisted with phone and so missed several other chances, apart from GI3GXP. The latter was somewhat compensated for his abortive sortie with F8XT by getting a good QSO with GC3EBK (Guernsey), for the GI/GC "First," representing also a new country and a new county for them both; this was on the 14th, when GC3EBK was hearing ON4BZ and PE1PL (for the first time).

Taking a shifty at the map, one feels that, with the state of the band during September 13-14, there *might* have been a good chance for a West Country station to have worked EA1CO (*see* p.375, last month). The path is more favourable than GI3GXP-F8XT, and the distance Gijon-Plymouth about 500 miles, almost entirely over-sea.

On September 16, DJ1BC and F3LQ were getting into southern England, and on the 19th DL3QH was being worked from East Anglia in the late evening, while ON4BZ was a good signal in the South Midlands; two of the Cambridgeshire stations, G3IIT and G3WW, were shouting in down in the south-west and were among the strongest GDX signals on the band.

For G's generally, the most exciting EDX station was, of course, F8XT, who made many QSO's at distances around the 500-mile mark—for he is not just another F; his nearest G station cannot be much less than 350 miles distant.

ON4BZ at 16 Countries

For a long time now, the leading positions in the Countries Table have been held by G3GHO, G4MW, G5YV, G6NB and ON4BZ — each of whom had worked 15C, but not the same fifteen. ON4BZ has never succeeded with GD, nor have any of the front-row G's yet had LX (though LX1AS has been worked by G5MR for the G/LX "First").

Guy of ON4BZ now has the bulge on everybody by his QSO with a most unusual one—9S4BS, of Neukirchen in the Saarland. This was on September 8, during the D.A.R.C. contest, so giving ON4BZ 16C, and the hot seat! The "loose" countries workable by the leaders are now GD, LX, 9S4 and (we think) EA, as soon as conditions give us another break. ON4BZ must go for GD and EA1CO (a very difficult QSO for him, but possible if he can work F8XT), while the G's must look for EA1CO, LX1AS and 9S4BS, of whom LX1AS, on for every contest, is the easiest (so far as any of them could be regarded as "easy"!), with EA1CO a good chance.

Anyway, congratulations to Guy for having broken through the crust at last and got to the top of Countries Worked. Apart from this, ON4BZ also had QSO's with HB1IV and HB1RD during the D.A.R.C. contest, when European activity was high.

Some 70 cm Items

G3JHM (Worthing) had a fortnight with F8MX at St. Valery

earlier in the period, when conditions were not so good. In spite of this, on each evening during his stay G3GDR (Watford) and G6NB (Brill) were worked on 70 centimetres—which to us seems pretty good going! The interesting thing is that, of all the G's worked on 430 mc, G3GDR was the outstanding signal, being consistently 12 dB or so up on G6NB. The other G's raised, either direct or cross-band, were G3FZL, G3HBW, G3IRW, G4KD, G5MR and G8AL. While in France, G3JHM also visited F8GH (Beauvais), who has since heard him on 70 cm.

From home, G3JHM has got to five counties on 70 cm and now has a new QQVO6-40 PA, giving 25 watts RF out. His "best DX heard over land on 430 mc" is G6NB (80 miles), but repeated calls have so far failed to evoke any response from Bill.

G3KEQ (Sanderstead) is trying hard with G3IRA and G3KHA for his 20th county on the band. G3KHA (Bristol) has heard G2CIW (Cambridge) on 430 mc, the latest occasion reported being on September 20. But G3HBW (Bushey) cannot be received in Bristol, yet. G2XV (Cambridge) is now at the top of 70-Centimetre Counties with 27C worked, the latest being G5LL in Mablethorpe.

GDX on 25 Centimetres

This should be sub-titled "Another Mountain Epic," for on September 1st GW6DP/P was in position on the summit of Snowdon, with GM2JT/P waiting for him on the top of Criffell (1,866 ft.) in Kirkcuds., overlooking the Solway Firth. At their heights, they had virtually an optical over-sea path, the distance being 130 miles. Signals were S7 at GM2JT/P and S8-9 at GW6DP/P, on 1220 mc MCW. Their transmitter units were similar, consisting of a CV90 oscillator in a coaxial cavity, energising an 11-element Yagi backed up by a plane reflector. GW6DP/P got his power from a hand-cranked generator, while GM2JT/P had a P-E set for HT supply.

G2JT/G6DP, who have worked together on VHF and UHF for many years, are to be congratulated on this very interesting new result, which is a British ground record, as well as being the GM/GW "First," for the 25-centimetre band. They have plans to extend the range to beat the world record, which, just at present, is held in W6 for a distance of 190 miles.

It is also very interesting to note that, 'way back in October 1949, G2JT/G6DP worked this same Snowdon-Criffell path on 70 centimetres; comparison with the log for that occasion shows that the 25 cm signals were much stronger than on 70 cm seven years ago.

From their home QTH's, about 30 miles apart, G2JT and G6DP do a lot of 1250 mc work, using CC equipment—and, incidentally, signals are not as good as they were during the GM/GW test on September 1st. In their 25 cm home-station transmitters, they do *not* multiply from 70 cm; this is in order to keep as near as possible to the 1215 mc band-edge, where valve efficiency tends to be higher than towards the HF end. Separate exciter chains are used, which multiply up to the 405 mc region and are then tripled. This has another advantage: By choosing appropriately-spaced crystals (in their case 5633.3 and 5744.4 mc) the one exciter unit serves to produce both transmitter drive and local oscillator injection for the receiver, to give an IF of 24 mc. Later experiments have shown that it is even better to multiply up into the 600 mc area, and then double, the crystal frequency selection technique being as before. Of the aerial systems tried, including paraboloids, the multi-element Yagi has proved the best.

The active 25 cm group in the Lancs. area now consists of G2JT, G2OI, G3BPJ, G3IUD and G6DP—so, as G2JT says, they have quite a nucleus of interested people.

At this point, we might usefully draw attention to the merits of the Brimar triode types 6AF4 and 6AM4, as potentially very useful valves for 1250 mc receivers. The 6AM4 is a GGT rated to 900 mc for amplifier or mixer use, and the 6AF4 is a good oscillator up to about 1300 mc. Both these valves are classified as miniature receiv-

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are requested for this section, set out in the form shown below, with callsigns in strict alphabetical and numerical order).

G3KEQ, Sanderstead, Surrey.

WORKED: G2CVD/P, 2FJR, 2HGR, 2OI, 3ALC, 3BJQ, 3CKQ, 3EPW, 3FGT, 3GKZ, 3GPT, 3HAZ, 3HVX, 3IEX, 3IOO, 3IWJ, 3JWQ, 3JZG, 3KFD, 3KHA, 3LDW, 3WW, 4JJ/A, 5BD, 5BM, 5ML, 6AG/M, 6CI, 6SN, 6YU, 8DA, GC3EBK, ON4WI.

HEARD: EI9C, F3LQ, 9EA/P, G2ADZ, 2BMZ, 2BVW, 2CRS, 2FNW, 3GFD, 3IRS, 3KPT, 3KUH, 5JU, 5SK, 5YV, 6LI, 6XX, 8MW, GI3GXP, GW8SU, ON4HN, PAØBL, ØFB.

(70 CENTIMETRES ONLY)

WORKED: G2CIW, 2XV, 3HAZ, 3KFD, 3WW, 6YU. *All above* (*August* 23 *to September* 18).

G3DLU/A/P, Nr. Bletchley, Bucks.

WORKED: G2ANS, 2FNW, 3AYL, 3BJQ, 3CKQ, 3DKF, 3GHO, 3HBW, 3HHD, 3HXS, 3IOO, 3KHA, 3KPT, 5MA, 6FO, 8VZ.

HEARD: G2AIW, 3FAN, 3JQN, 3JWQ, 3JZG, 5KW, 5YV, 6OX, GC3EBK. (*September* 3 *to* 20).

G2DVD, Slinfold, Sussex.

WORKED: F3LP, 8GH, 8XT, 9EA/P, G2ANS, 2ATK, 2CVD/P, 2FJR, 2FNW, 2HOP, 3ALC, 3DKF, 3EJO, 3FGT, 3GHO, 3GKZ, 3GPT, 3HHD, 3JWQ, 3JXN, 3KHA, 3LAY, 5SK, 5YV, 6CI, ON4WI. (*All over* 100 *miles*).

SWL Bastin, Coventry.

HEARD: G2ANS, 2BMZ, 2CIW, 2DVD, 2FJR, 2FVD, 3BFP/P, 3BII, 3CGQ, 3ENY, 3FAN, 3GPT, 3HBW, 3HRH, 3HTY, 3IIT, 3IRS, 3ISI, 3JWQ, 3JXN, 3JZG, 3KBS/P, 3KEQ, 3WW, 4PS, 5BD, 5BM, 5KG, 5KW, 5MA, 5YV, 6AG, 6LI, 6LL, 8KW, 8VZ, GC3EBK, PE1PL. (*All over* 50 *miles—September* 8 *to* 14 *only*).

G3KUH Rotherham, Yorks.

WORKED: G2ANS, 2CIW, 2FJR, 3BJQ, 3DKF, 3DVK, 3EJO, 3ELG, 3FFV, 3FGT, 3FUL, 3GFD, 3GPT, 3HBW, 3IWJ, 3JWQ, 3JZG, 3KEQ, 3KFD, 4JJ/A, 5BD, 5DS, 5MA, 5YV, 6BX, 6OX, 6YU, 8UQ/P, GC3EBK.

HEARD: G2AIW, 2HCG, 3DLU/M, 3IRA, 5ML, 5JU, 5KW, GI3GXP. (*August* 21 *to September* 18).

G3KHA, Knowle, Bristol.

WORKED: G2AIW, 2CIW, 2CVD/P, 2FMJ, 2FVD, 3ABA, 3BFP/P, 3CLW, 3DLU/P, 3EGV, 3GHO, 3HBW, 3HRH, 3ION/P, 3JHM, 3JTQ, 3JWQ, 3KBS/P, 3KSR/P, 3WW, 5KG, 5KW, 6OX, 8AL, 8UQ/P, 8VZ, GC3EBK, GW8SU, 8UH, ON4WI.

HEARD: F3LQ, F8XT, G2ANS, 2BVW, 2FNW, 2HCG, 3GNR/P, 3GPT, 3GWB, 3HTY, 3INU, 5YV, 6XX, ON4HN, 4IE. (*August* 20 *to September* 17).

G3KPT, Kingswood, Bristol.

WORKED: F8MX/A, 8XT, 9EA/P, G2NM/M, 2AIW, 2CIW, 2DVD, 2DSW/P, 2FNW, 2HIF/P, 2YB, 3BFP/P, 3DLU/P, 3FAN, 3FIH, 3GHO, 3GPT, 3GYQ, 3HHY, 3HRH, 3HSD, 3IER, 3ION/P, 3IRS, 3JHM, 3JWQ, 3KHA, 3KSR/P, 3MA/P, 3YH, 3XC/P, 5BD, 5KW, 5MA, 5ML, 6AG, 6OX, 6XX, 8QY/P, GC3EBK, GW8UH, 8UH/P, ON4WI.

HEARD: F3AL, 3LQ, 8GH, 9AL, PE1PL. (*August* 17 *to September* 16).

ing types and are in the latest Brimar list issues. Another very interesting new UHF valve is the Mullard EC57, which is rated up to *4000 mc* as an *oscillator!* Needless to say, none of these is yet on the "surplus" market!

European VHF Contest — July

The table herewith is a digest of the results of our European VHF Contest in July, held over the two week-ends July 14/15, 21/22, the overall winner being G5KW, as announced in last month's "VHF Bands."

It was a great disappointment to all concerned that we did not get a better break with conditions, as the spread of entries actually received shows that, had anything much more than semi-local working been possible for the generality of stations, this Contest would have been a real international event. However, we are grateful to all those who thought it worth while to send in an entry. Nearly all who did so commented on the rules. These were received very favourably—indeed, it was even suggested that they should be the model for all such events. It is, however, fair to say that one or two people (non-entrants) have said that the multiplier system did give an advantage (presumably unfair) to those in a position to work EDX. Well, we fully appreciate that; but surely it is clear that had we had an EDX break comparable with that during this recent September spell, when Europeans were generally workable, the multiplier system would have made the Contest all the more interesting. Everybody, or nearly everybody, would have been offered the chance of working Europeans and thereby gaining multipliers.

It was with the reasonable hope (based upon the experience of previous years) that there might be a good EDX opening during the period of the Contest that *(a)* It was set for July, over two week-ends, to double the chances; and *(b)* The country-multiplier system was devised. In the event, because conditions did not materialise, all the advantage went to well-placed stations.

Anyhow, we do not see why the multiplier system should have deterred anybody from entering the contest, irrespective of conditions! Contests on the VHF bands are laid on primarily to promote activity and sort out the most effective stations. Only the best-placed (and best-operated) stations can get the leading places, whatever the rules may say. Stations in the same locality should feel that they are competing—not necessarily for the lead—but with other stations *in their own area*, where conditions are the same for all in that area. The outright winner and any placing in the final table ought to be of secondary importance, since it will depend upon a number of factors over which individual entrants obviously have no control.

We suggest that it should *not* be a matter of looking over the rules to see where the advantages lie, and then deciding not to enter because "old so-and-so is bound to win it." Unfortunately, this is very much the tendency nowadays! The fact is that however the rules are drawn they cannot give absolutely everybody the same chance—but they will always be fair as among groups of stations in particular areas, *e.g.*, the West Midlands, or East Anglia, or South Wales.

So, having said all that, let us look at the results that did come in for the July International Contest . . . G5KW did extremely well to find four multipliers (F, GW, ON and PA) for the first leg, and six (DL, F, GC, GW, ON and PA) for the second. The next highest scorers in terms of multipliers were HB1RD (DL, F, ON and 9S4), DL6SV (G, ON, OZ and PA) and DL1SE (also G, ON, OZ and PA).

Among the best QSO's recorded in terms of distance were G3GHO-DL1SE, G5KW-DL3QH, HB1RD-DL1EI, DL6SV - G5KW and DL1SE-OZ2PF, all of which were at the over-500 km distance and worth 25 points. During the first week-end, July 14-15, HB1RD made 38 contacts, but DL6SV only 22, whereas G2DVD had 46 QSO's to score. G5KW's total for the first week-end was 45, and G5YV's 52, of which five were at the E-distance, worth 12 points each; the conditions were dead against Harold making any long-haul QSO's.

As the Table of Results suggests quite clearly, conditions were much better (though still far from good) during the second week-end; this produced more apparent activity and hence higher scores than for the July 14-15 leg. The fact that five stations succeeded in scoring aggregates of over 1,000 points—mainly as the result of long hours and hard work—makes it clear that there was a certain amount of DX available for those who could get to it. It also proves that G5KW, G5YV, HB1RD, DL6SV and DL1SE are among the best-placed, and best-operated, VHF stations in Europe.

It can also be said that for the first week-end any score of 200 points or over was good, and for

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1955

FINAL PLACINGS

Worked	Station
48	G5MA
43	G3GPT
41	G3GHO
38	G2DVD, G3FIH
36	G5DS, G5DW
35	G3JWQ
34	G2HDZ
32	G3IOO, G3JZG
31	G3WW
29	G3KHA, G3WS, G5BM
28	G3IRA
24	G3BJQ, G3DLU
23	G3IER, G4JJ/A, G5MR, G8VN
22	G3KPT
21	G3CKQ, G3DO, G3JXN
20	G3HWJ
18	G3IEX
17	G3ITF
16	G3BW, GM3DIQ

This Annual Counties Worked Table closed on August 31st, 1956. The final placings for the year appear above. Annual Counties opened again w.e.f. September 1, 1956, and will run till August 31, 1957. All operators who have worked 14 or more Counties on Two Metres are eligible for entry in the Table.

the second period anything over 500 points. This comparison is also just about the measure of conditions. The total entry for the first leg was 21 and for the second 27. Had we had anything like reasonable summer conditions, these figures would have been at least doubled, if not trebled.

To all who did enter and send in a log, and to the several European Amateur Radio periodicals which gave the Contest the necessary local publicity, our very best thanks.

Some Station Reports

Turning now to the domestic scene, we have quite a large clip of reports. First, let us mention that the Activity Report shows we have two very new stations on the two-metre air — G3LAY and G3LDW, who are welcomed.

In the year's final placing for Annual Counties, Bob of G5MA comes out top with 48C worked, with a total of 31 stations in the list. These are very much lower figures than last year (G5YV 67C, 45S listed) and undoubtedly reflect the poorer conditions during 1955-'56. The table opened again w.e.f. September 1st, and we have already had some claims in. All who have worked 14C or more for the new Annual Counties are asked to put in their figures so that we can get it going in the next issue.

G3KUH (Rotherham) reports for the first time this month, and as he is one of the active northerners, should find himself in demand as a new station to work. G3DLU, normally of Sheffield, has had a few weeks of /A, /P operation in the Bucks./Beds. district and was disappointed with activity during TV hours. An old friend in G3IOE (Newcastle) writes that his absence has been due to service with the R.A.F., but he hopes to be on again in due course with new gear. SWL Bastin (Coventry), well known as G5ML's 2nd operator and a keen VHF listener, will probably have his own call-sign by the time this is in print; he says he is looking forward to joining our "happy band of former SWL's—G3HAZ, G3HBW, G3IOE." (He might also have added G3GBO!) Frequency will be 144.4, with 25w. to an 832, the receiver a CC "G2IQ" into a BC-454, and the beam an indoor 3-element Yagi. Needless to say, SWL Bastin's gear is all ready to go, and has been for some time!

From Sanderstead, G3KEQ searched diligently for GM's during the September openings, when he could hear GI3GXP consistently. G3GPT (nr. Preston) was able to get his signal across (and over) to GM3BOC/P in Sutherland throughout the two-week period of the latter's visit there, in spite of the then bad conditions; GM3BOC/P was heard only once, however, at RST-529. G3BJQ (Rugby) puts in claims, and reports more activity with the improved conditions since. G2CZS (Chelmsford) moves up by reason of his contact with GC3EBK, who has been a great help to a lot of people lately; we should also say here that several correspondents

EUROPEAN VHF CONTEST — JULY, 1956

Station and Location	July 14-15		July 21-22		Grand Total	Placing		
	Score/ Mult	Total	Score/ Mult	Total		1st W/E	2nd W/E	Final Pos.
G5KW, Orpington	204/4	816	447/6	2,682	3,498	1	1	1
G5YV, Leeds	235/2	470	438/3	1,314	1,784	3	2	2
HB1RD, Mt. Chasseral	206/3	618	250/4	1,000	1,618	2	5	3
DL6SV, Ahrensburg	97/2	194	281/4	1,124	1,318	7	3	4
G2DVD, Slinfold	119/2	238	218/3	654	892	4	7	5
G3GHO, Roade	115/2	230	133/2	266	496	6	14	6
DJ1XX, Osnabruck	36	36	194/2	388	424	17	9	7
G3JWQ, Ripley	127	127	138/2	276	403	9	11	8
DL9LT, Espelkamp	39	39	138/2	276	315	16	11	9
G3KHA, Bristol	68	68	81/3	243	311	13	15	10
PA0BN, Oosterbeek	16	16	86/2	172	188	20	17	11
OZ5AB, Copenhagen	70/2	140	42	42	182	8	23	12
G5MR, Hythe	58/2	116	28	28	144	10	25	13
G3EEO, Derby	62	62	32	32	94	14	24	14
G2CZS, Chelmsford	26	26	60	60	86	18	22	15
PA0APD, Apeldoorn	11	11	63	63	74	21	21	16
OZ8MD, Soborg	24	24	1	1	25	19	27	17
G2ADZ, Woolacombe	118/2	236			236	5		
G3CGQ, Luton	86	86			86	11		
G3BFP/A, Selsdon	80	80			80	12		
DL1EI, Kassel	60	60			60	15		
DL1SE, Dettmold			257/4	1,028	1.028		4	
DL0HH, Hamburg			272/3	816	816		6	
ON4OZ, Zandhoven			186/3	558	558		8	
GW3BOC/P, Nr. Colwyn Bay			155/2	310	310		10	
DL3IY, Konigslutter			136/2	272	272		13	
PA0ZJ, Poeldijk			93/2	186	186		16	
PA0DSW, Amsterdam			62/2	124	124		18	
DL2WJ, Nr. Osterode			94	94	94		19	
G3GSO, Derby			67	67	67		20	
PA0DEF, Haarlem			14	14	14		26	

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
27	G2XV
26	GW2ADZ
23	G3BKQ
20	G6NB
19	G3KEQ
18	G3IOO
16	G6NF
15	G4RO, G5YV
14	G2HDZ
10	G2OI, G3HBW
9	G5DS
8	G2CIW
7	G2DDD, G2HDY, G3IRW
6	G3FAN, G3JMA, G3WW
5	G3FUL, G3IRA, G3IUD, G3JHM
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

have remarked upon the high standard of operating at GC3EBK when he knows he is being heard at GDX and that there are stations waiting to work him. Credit where it is due.

G3KPT, not well placed at Kingswood, nr. Bristol, and only running 15w., was very glad to get in with F8XT and F9EA/P. And with reference to last month's comments about Bristol and the West Midlands, G3HTY may be interested to know that G3KPT called him for two hours, on and off, on September 13—but no joy, though G3HTY did work G3IRS. From Plympton, G3JGJ is calling CQ on 145.5 mc on a daily schedule from 1900 to 1930 clock time; he would like not only contacts, but also SWL reports.

Vernon of G5MR (Hythe) has been very pressed for time lately, but managed to be there when the band opened to the south on September 14—his best QSO was with F8XT, S8-9 phone both ways. Their last contact was in November 1953, and F8XT had not been heard at G5MR since then.

G3JWQ (Ripley, Derbs.) has been getting his share of the GDX, in the shape of welcome QSO's with GI3GXP and GC3EBK, and has also been doing his share in maintaining activity on the band; in just over a year on two metres, G3JWQ has had 1,800 contacts, worked 37 counties and 6 countries, turned out for both our Contests, and gained his VHFCC. A very creditable record, particularly in view of the generally poor conditions of the last twelve months. G3KHA (Knowle, Bristol) though clear in most other directions, has difficulty with the northern stations, due to bad local screening; he now stands at 33/173 in All-Time Counties.

G2AIW chose a good week-end to visit EI2W; he was in Dublin during September 14-16, when Henry was able to give him demonstration-QSO's with four countries, in the shape of EI9C, G2HGR, G3EPW, GI3GXP and GM3DIQ — nice going! EI2W reports that EI6N, also of Dublin, is now on two metres. G5DS (Surbiton) brings his ladder positions up to date; it is interesting to see that he now has 9C worked on 70 cm, with G3EGV for Hants. and G5TP for Oxon.

In his report, GC3EBK (Guernsey) remarks that during September 13-14 he worked no less than 60 different stations, besides hearing several new Continentals, including an unidentifiable DL7?? on phone. When the right time comes, GC3EBK should have a very good chance with EA1CO. G2ADZ (Woolacombe) keeps in contact with EI4E, G3FZL and G5MA—of whom the EI at 250 miles is the strongest signal—and has in mind the possibility of putting a station on Lundy Island sometime in the future. It will raise one or two tricky points as regards status and call-sign! In the wanderings of his youth, your A.J.D. happens to have been to Lundy, and for several years afterwards kept a (somewhat unauthorised) schedule with Lloyd's signal station there—actually, the light-house keeper, who worked a particularly raucous brand of R/T with his opposite number at Hartland Point, on the North Devon coast. In case someone says "What has this got to do with VHF?" the answer is that in the old five-metre days, listening tests from Lundy revealed that it was a very good site; stations from Cardiff, Newport, Bristol and Torquay could be heard on a two-stage squish box.

G2DVD (Slinfold, Sx.) was one of the several G's in for the D.A.R.C. international VHF contest; he reports conditions as being very good on the Saturday evening, September 8, but poor on the 9th, with activity low. One of the more interesting Europeans coming through during the evening of the 8th was ON4WI, actually a camp, near Ostend, of three DL's who had obtained an ON licence for the occasion! When beaming north-west, ON4WI was an easy QSO right into the Midlands and a push-over for most of the G's who were on; he is said to have had more than 70 contacts, including HB1IV, LX1SI and 9S4BS.

The Tabular Matter

Owing to pressure on space, with the Contest Report, certain of the tables do not appear this month. All movements claimed have, however, been noted and the amended positions will be included in the next showing of All-Time Counties, Countries Worked, and the "Firsts" tables.

All calls h/w lists received for the Activity Report this time have been printed—but, as mentioned before, we can do with a lot more of them, in particular lists of stations heard. In fact, the worse conditions are and the lower the activity, the more useful the Activity Report becomes.

Dead Line—

For the November issue, your A.J.D. would like to hear from you by **October 24** latest—we have a little more time this month—with everything addressed to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. There may have been another opening by then, in which case we hope to be here on November 9 to discuss it.

A Simple Oscilloscope

FOR MODULATION ADJUSTMENT AND BENCH TESTING

The intention of this article is to show how a very useful amateur oscilloscope can be evolved, without describing a constructional model in full detail. As described here, it was made up largely from "surplus" items, including the metal-work. So long as the circuitry and general methods of construction are followed, the result should be an instrument suitable for much practical work.—Editor.

FROM time to time various oscilloscopes have been described in SHORT WAVE MAGAZINE and there is no excuse for bringing up another except that this one contains only the absolute essentials. It gives a picture of the carrier, so that one can see the modution, and also an audio trace, in order to check distortion. Since it does these two jobs so well, it was felt that others might be interested in the unit. It is not necessary to copy the layout exactly; so long as this article passes on the idea its purpose will be achieved. This oscilloscope has its limitations, but it does meet a need around the station—after having it in use a few months one wonders how one got along without it.

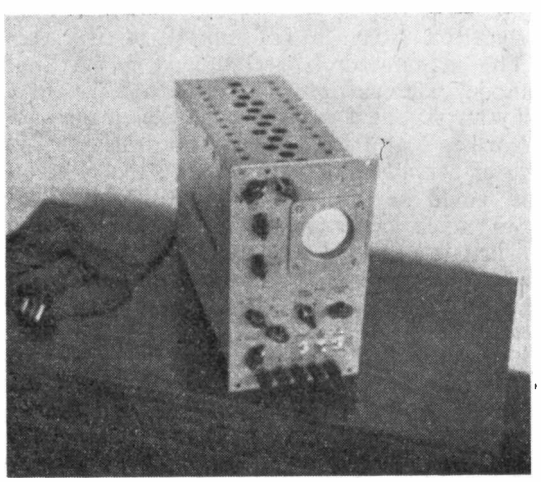
The instrument as illustrated is built up on a "surplus unit" chassis of unknown origin. It was selected because it happened to be available, because it was small, and because it met the requirement without any serious mechanical changes. There is no reason why a similar oscilloscope should not be made up on an aluminium chassis with some form of wooden mount to hold the tube.

The CRT itself is a VCR139A; according to the books it requires a final anode potential of 800 volts. This is not very high, and at first it was thought to adapt a small mains transformer of ordinary design giving 350/0/350 volts, used half-wave, for the HT, 4 volts for the CRT and 6·3 volts for the heaters of the other two valves which are used. It was not certain if the 4 volt winding would stand up to the EHT potential, but in any case no suitable transformer of this sort of rating was available. The next thought was to rewind an existing 500-cycle mains transformer. After some calculation it appeared possible to get sufficient turns on to the 500-cycle core to operate on 230 volts 50 cycles. (The power requirements are small and consequently small gauge wire can be used.) Not having local facilities for rewinding the job was sub-contracted with instructions to put the 4 volt secondary on last with plenty of insulation. The transformer was made up by a small firm and has been a complete success. It cost slightly more than a new transformer, but it does fit nicely in the space available. There would be no harm in using a standard mains transformer if the 4-volt winding tested to withstand 800 volts.

Circuit Arrangement

Regarding the circuit details: In order to examine audio voltages some form of audio amplifier is necessary as the VCR139A is relatively insensitive as regards deflection. It requires something in the region of 50 volts r.m.s. to get deflection right across the screen. An ordinary resistance-capacity coupled amplifier using a Mullard EF37 was decided upon; the stage gain is in the region of about 100, which is quite sufficient for the purpose. The valve is not capable of an output as large as 50v. r.m.s., but will give a trace of about 1 inch peak-to-peak on the tube screen before it distorts, and this is quite adequate. A switch is provided which puts the input either through the amplifier or direct to the Y-plate for the examination of the RF envelope when transmitting.

The time-base again is as simple as it could



Front view of the completed instrument, in one acceptable form of construction. Other layout arrangements are possible with a simplified instrument of this kind.

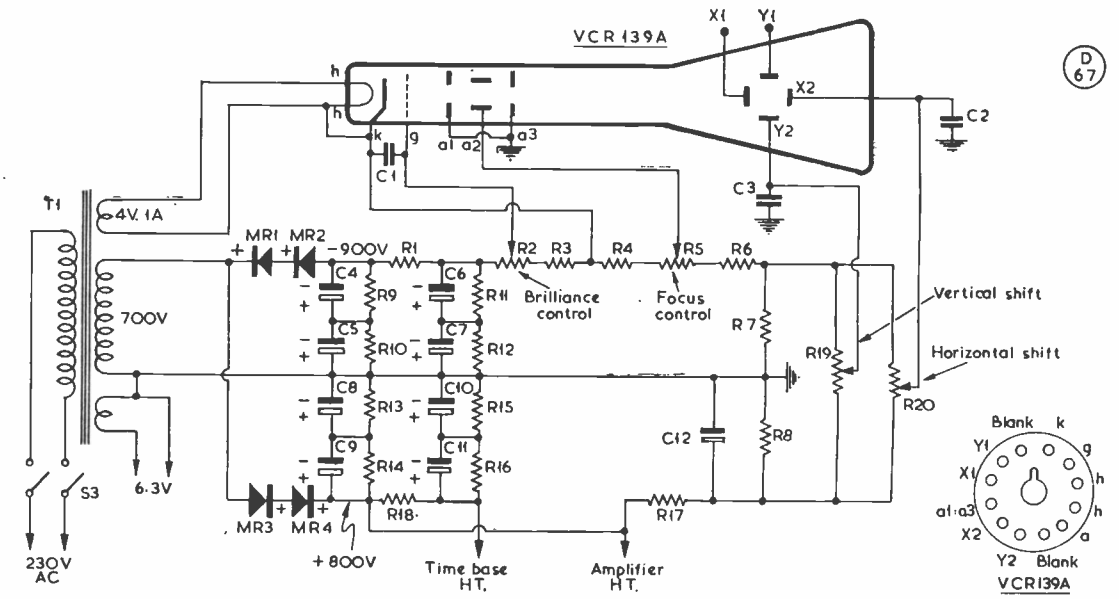


Fig. 1. The circuitry round the VCR139A tube used for this oscilloscope. All resistors are half-watt and the condensers valued at 4 μF are the tubular type for 450v working. The author explains why plenty of smoothing must be provided. Circuit for the time base and amplifier is given in Fig. 2.

possibly be made. It is the ordinary thyratron with a capacity-resistance combination in the plate circuit. This type of time base is very "unlinear" unless its operation is restricted to a small fraction of the HT available. About 120 volts of saw-tooth wave is required to make the spot sweep across most of the screen. After consulting Hallow's book *The Oscilloscope at Work*, it was felt that it would be possible to get a reasonably linear trace by applying the thyratron saw-tooth wave potential directly to one of the X-plates and feeding the thyratron from an HT supply of 800 volts. (The manufacturers recommend a maximum anode potential of 400 volts for the 6K25 thyratron, but it was reasoned that if the valve "strikes" at about 120 to 150 volts it would never actually have 800 volts on the plate and so would be safe.) The trace is quite linear and much better than expected. A toggle switch is provided to switch off the time-base when not required. The usual controls are fitted for coarse and fine adjustment of the sweep frequency and also amplitude of sweep. The latter two are somewhat interdependent on each other. A small portion of the signal can be taken from the Y-plate and applied to the grid of the thyratron for synchronising the sweep with the input signal. The sweep amplitude control is not perfect as at one end position of the control the time-base "stops sweeping" and this should not be allowed to happen. It can easily be rectified by replacing the 5,000-ohm resistor R15 in series with the control by a larger value, say 10,000 ohms.

Table of Values

Fig. 1. Circuit of CRT Unit and Power Supply

C1	= 0.1 μF, 350v.	R6	= 820,000 ohms
C2, C3	= 0.1 μF, 1000v.	R7, R8	= 330,000 ohms
C4-C12	= 4 μF, 450v.	R9-R17	= 1 megohm
R1-R18	= 47,000 ohms	R19,R20	= 1 megohm linear, Vertical and Horizontal shift controls
R2	= 50,000 ohms, Brilliance control	T1	= Power xformer (*see text*)
R3	= 10,000 ohms	CRT	= VCR139A
R4	= 150,000 ohms		
R5	= 250,000 ohms, Focus control		

Constructional Points

When it comes to building the 'scope there are a few things to watch. The "Brilliance" and "Focus" controls (R2, R5 respectively in Fig. 1) are at a high potential and should be insulated from chassis. There should also be an insulated coupling between the potentiometer and knob, just to safeguard against accidents.

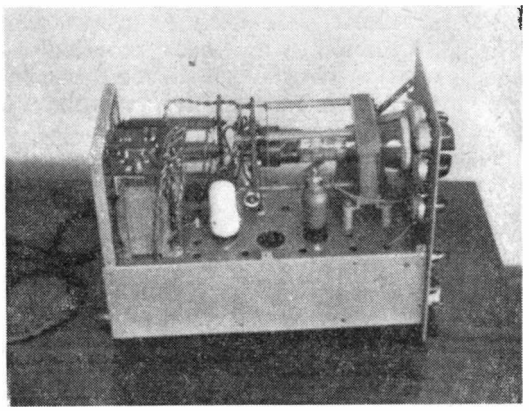
Do not play about with the unit when the power is on as it would be quite easy to get a fatal shock.

Do not try to cut down on the negative and positive HT supply smoothing condensers. Anything less than two 4 μF in series will give you a non-linear sweep and "hum" visible on the trace, which is annoying, and unless

you know what to look for, the peculiarity of the trace will probably puzzle you. As long as the wiring is done with reasonably thick-walled wire no special precautions need be taken as regard insulation. Ordinary tag strips can be used to mount the smoothing condensers.

One of the terminals on the front panel is connected to the unearthed side of the 6·3 volt heater winding of the mains transformer. This is for calibration or comparison purposes. There are times when you wonder exactly what voltage is being applied to the Y-terminal and it is very useful to be able to put on 6·3 volts at this point and see how it compares in amplitude with the voltage you are examining.

It is very easy in any oscilloscope to get cross-coupling between the time-base and the Y-amplifier either by way of the HT supply or by stray capacity coupling in the wiring. This is the reason for the large number of smoothing condensers in the positive HT supply (*see* Fig. 1). To prevent capacity coupling in the wiring, avoid running the time-base connections with wiring associated with the amplifier and Y-plate wiring going to the back of the tube. The connections to the X-plates should be arranged so that the trace sweeps from left to right—though unless the trace is very slow it is impossible to tell which way it is travelling. Changing over the connections to X1 and X2 will reverse the direction. With only one valve in the Y-amplifier there is a phase change of 180° between grid and anode so when switching from "ampli-



Showing construction of the Oscilloscope, with the 6K25 thyratron (left) and EF37 amplifier stage in the foreground. The tube itself is a "surplus" VCR139A.

Table of Values

Fig. 2. Time Base and Amplifier Circuit.

C1 = 0.25 μF, 1,000v.
C2, C3 = 4 μF
C4, C5 = 0.1 μF, 1 000v.
C6 = 50 μF
C7 = *See circuit*
R1 = 2 megohm
R2 = 100,000 ohms
R3, R4 = 150,000 ohms
R5 = 3,300 ohms
R6 = 470,000 ohms
R7, R9 = 2.2 megohms
R8 = 0.25 megohm, Sync control
R10 = 22,000 ohms
R11 = 500,000 ohms
R12 = 220,000 ohms
R13 = 1 megohm, Time Base fine adjustment
R14 = 1 megohm
R15 = 5,000 ohms } Amplifier sweep control
R16 = 25,000 ohms }
S1A-B = DPDT toggle
Valves = EF37 and 6K25 thyratron

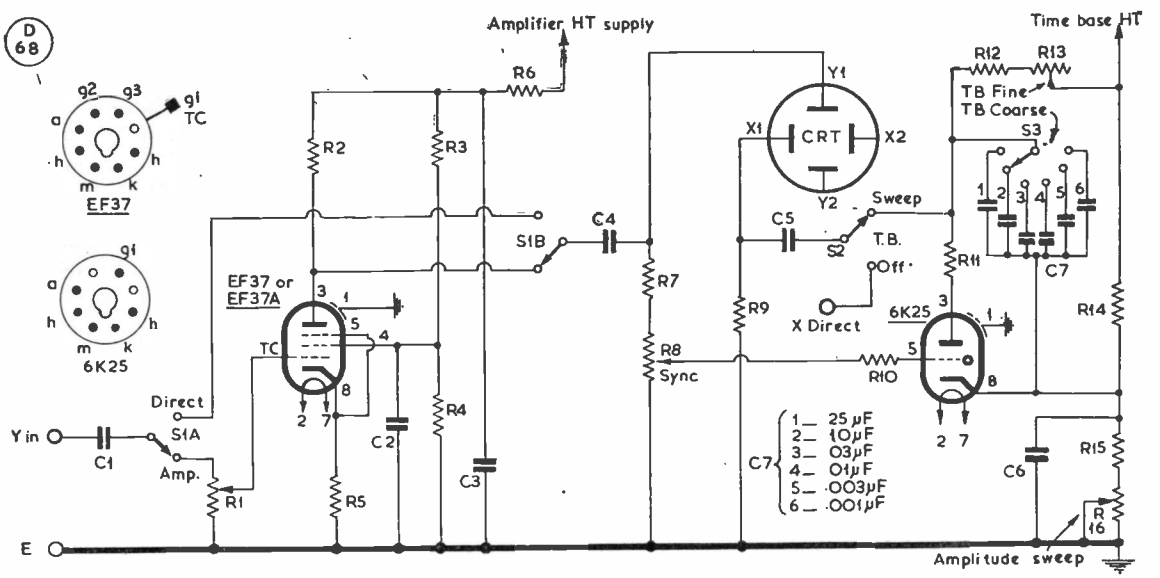


Fig. 2. Time base and amplifier circuit for the CRO described in the article. The audio connection shown is for vertical deflection on the tube. The time base is controllable and generated by a 6K25 thyratron, with an EF37 as audio amplifier.

fier" to "direct" the picture inverts itself. (This is not really a drawback provided one knows what is happening.) Usually oscilloscopes are arranged for a positive voltage to deflect the beam upwards. If you wish to change the direction it is only a matter of reversing the connections to the Y1 and Y2 pins.

If metal rectifier units are not available a pencil EHT rectifier for say 1000v., to replace MR1 and MR2, capable of handling 2 mA, can be used. Rectifiers MR3 and MR4 have to be bigger as there is about 10 mA to supply to the EF37 and the 6K25 thyratron. If by any chance or misfortune you should overload metal rectifiers, particularly the selenium type, the only indication is a very bad smell—once they start to smell they are ruined and you can throw them out.

Applications

Possibly a few hints on using the 'scope may be of interest. If you wish to examine the carrier envelope switch the amplifier to "direct" and couple it through a small condenser C1 to the low impedance coax feeding the tuning unit or aerial. The value of capacity will depend upon the voltage across the coax, *i.e.*, your transmitter power. In the writer's case the value was about one $\mu\mu$F, but each set-up will have to be adjusted individually until the trace is a ribbon about half-an-inch wide. Next, adjust the time-base for a slow sweep and speak into the microphone. If everything is as it should be you will get upward peaks on the ribbon and equal down peaks which should not cut the carrier. On the model, the trace is all right up to 14 mc, but

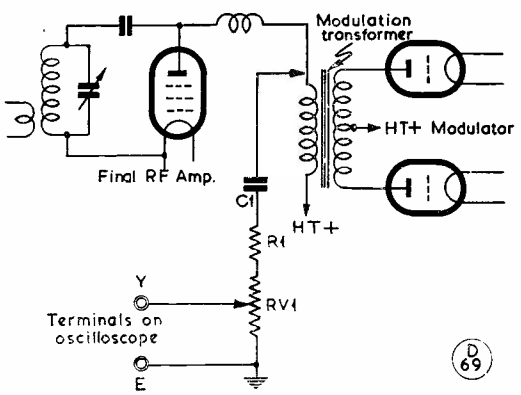


Fig. 3. The oscilloscope connection for checking modulation on the transmitter — see text. C1 should be about .01 μF, and rated to withstand well over the peak HT voltage at full modulation; R1 is 2.2 megohms, 1-watt, and RV1 a 250,000-ohm potentiometer, which is adjusted to present a balanced picture of the modulation.

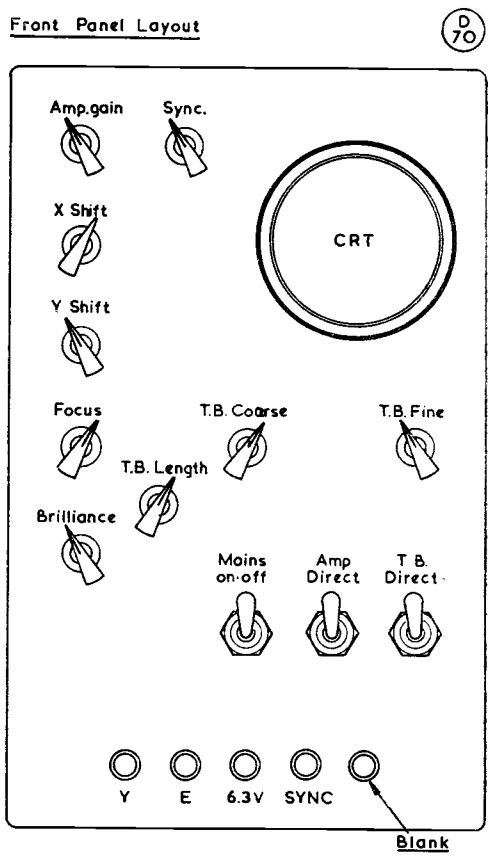


Fig. 4. A suggested main panel layout for the Oscilloscope described in the article. It is not necessary to follow this exactly, as any convenient arrangement can be adopted, depending upon the chassis shape used for the construction of the CRO. Compare with the photograph on p. 431.

at higher frequencies, 21 and 28 mc, starts to go lop-sided due to cross-coupling into the time-base circuits. To check the modulator, again switch to "direct" and use the circuit shown in Fig. 3. If you have no audio oscillator the next best thing is to whistle into the microphone and adjust the time-base until a sine-wave trace is obtained after adjusting the potentiometer RV1 to give a reasonable height of trace. A clear whistle is a very good sine-wave, but unless you do get a sine-wave trace there is distortion, of course; it may be necessary to turn the gain of the modulator down until the distortion disappears. Anyway, keep the modulator gain as high as possible and hold the picture on the screen by adjusting the potentiometer RV1 (Fig. 3) which feeds the oscilloscope. Then speak into the microphone and adjust the modulator until the height of the trace is the same as with the whistle. Next, check the modulation envelope

as previously described. If the envelope shows about 80% modulation you are correctly adjusted. If the modulation is only slight and you cannot increase the modulator gain without causing distortion, you are either short of modulator power or the final is not correctly adjusted. Whatever it is, an oscilloscope is the best and easiest method of adjusting a phone transmitter and will amply repay the cost and effort of building it.

The instrument described here has two small disadvantages. First, the spot is not very intense and is not easily seen in bright light, and secondly, there is a loss of focus due to non-symmetrical deflection — but these are minor points compared with the many uses to which it can be put.

Do not be afraid to try to build an oscilloscope. There is a first-time for everything, so do not hesitate to take the plunge. We all learn by making mistakes, and if you make a success of it nothing impresses a visitor to the shack more than a picture on the end of a cathode-ray tube—even a poor one !

Band-Switched ATU

SIX-BAND SELECTION, IN LINK COUPLED UNIT

N. P. SPOONER (G2NS)

The main purpose of this aerial tuning unit is that it should be part of a fully TVI-proofed installation — feeding only the wanted signal into the aerial. While once again our contributor makes good use of "surplus," the same principles apply whatever the actual method of construction, the components available, or the power used. It is thus another practical offering on the general subject of TVI-proofing.
—Editor.

DEEPLY grooved into our present radio vocabulary by the scourge of television is that much over-worked term, "TVI." The writer contends, however, that it is not applicable to amateur transmitters. With modern standardised suppression technique, it is not beyond average ability to keep transmitter harmonic radiation down to a reasonable level, and once that has been done, the chance of any particular *neighbourhood* being TVI-proof or not depends largely upon whether the manufacturers of local receivers have used frequencies on or near the amateur bands for their IF's ; whether they have taken steps to ensure good image response, and other vital points in circuitry design ; whether local dealers are selling ineffective aerial arrays ; and whether individual viewers are tuning their receivers correctly.

Whatever the answers may be, amateur interest in general should still be centred upon ensuring adequate suppression. If sufficient shielding, filtering and by-passing is not applied to pack, supply leads, VFO, frequency-multipliers and buffer, the belated inclusion of a pi-network tank circuit in the final stage will not (with one discriminatory blow of its moving vanes) regain the ground previously lost, or miraculously kill off the harmonics. In other words, no single step is of great value by itself alone ; the contribution of each must be combined to bring about the final level of rejection.

Pi-Tank Characteristics

Before discussing some very necessary measures, a passing word about Pi-tank circuits may be of interest. Although used for many years as networks between dissimilar impedances, their present deserved popularity is due to their high degree of harmonic discrimination and the ability to step the impedance of a PA down to that of a coaxial line. Both these characteristics are needed in a modern final stage, but a duplication of such good rejection should not always be expected under other conditions. When, for instance, a Pi-tank is used to match directly into a random length of aerial wire instead of into a coaxial line, the results may be less satisfactory. Alternatively, if the circuit constants are not reasonably correct or if adjustment is bad, a Pi-tank can still transfer energy to the aerial without keeping back any harmonics.

Further, a Pi-tank can misbehave when parallel-fed by a poorly-designed RF choke ; the effects in such a case should not be confused with those exhibited by insufficient loading capacity. If, when testing a new transmitter, the anode current at once soars to a high valve that cannot be reduced by tuning, any home-wound RF choke should at once be suspected, but the addition of fixed condensers in parallel with the variable loading condenser should also be tried. Quite a large

amount of extra capacity may be needed on some bands before the variable tuning condenser is able to resonate the network and dip the plate current. Each successive addition of fixed capacity can conveniently be equal to the maximum of the variable loading condenser. When every stage from pack to PA has been "doctored," and when a correctly designed and handled Pi-tank is feeding as intended into a low-impedance coaxial line, it is *still* not advisable to connect the PA output straight into the aerial by earthing the outer braiding and connecting the inner conductor of the coaxial line directly to the condenser of a series-tuned aerial circuit or, alternatively, tapping it directly along the coil of a parallel-tuned aerial circuit. The proper set-up requires a low-pass harmonic filter, a change-over relay and an aerial coupling, matching or tuning unit with all inter-connections in coax and the link to the ATU itself shielded to prevent capacitative coupling which, in addition to inductive coupling, always appears when two coils (the link and the aerial) are presented to each other.

In suggesting a simple way of suppressing these harmonics, it is the purpose of this article to describe how a switched, shielded and parallel-tuned 6-band Aerial Tuning Unit, with Faraday coaxial link coupling, can easily be constructed.

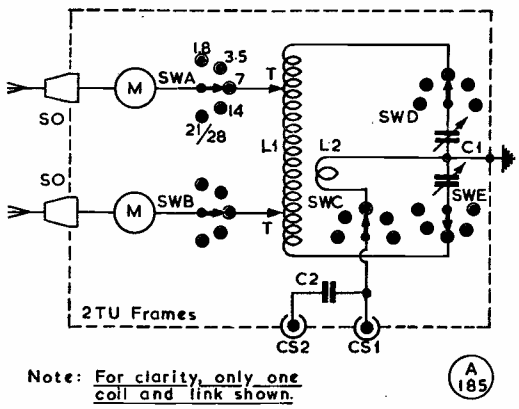


Fig. 1. Circuit of the Aerial Tuning Unit. CS1 is the input feed from the transmitter, by coax line — this is essential for good TVI-proofing. The ATU as described here covers all bands and the finalised version of the circuitry is shown in the photograph.

Constructional Approach

Two "surplus" TU frames with a single new panel have been used, because these and other TU components happened to be on hand after using similar materials to construct a band-switched 813 PA—as described in the June, 1956, SHORT WAVE MAGAZINE. If "surplus" cabinet work of the TU variety is not available, the requirement could just as easily be met by a home-constructed metal

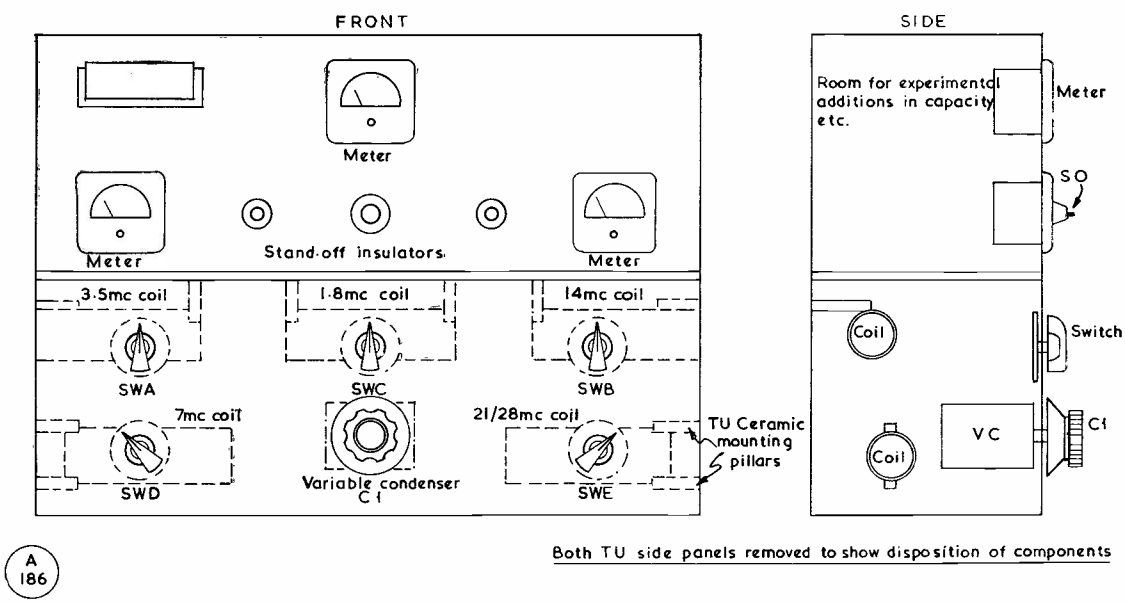


Fig. 2. General layout inside the TU-cases as used by G2NS for his aerial tuning unit, described in the article. Separate coils are provided for all bands (except 21-28 mc, which are found on one) and either twin-feed or end-on aerials can be accommodated.

Table of Values

Fig. 1. Circuit of the Band-Switched ATU.

C1 = 200 x 200 $\mu\mu$F, twin or split-stator, transmitting type.
C2 = 5 $\mu\mu$F, ceramic, harmonic check and LP filter point.
M = 2.5 amp RF thermo-ammeters, for twin-fed aerials.
SwA, B = Ex-Tu 6-position aerial coupling switch, for taps.
SwC = As above, for input to Aerial Tuner.
SwD, E = As above, for coil end taps.
T = Coil taps — *see text* for adjustment.
CS1 = Input coax socket, for transmitter feed in.
CS2 = Harmonic check socket — *see text.*
S/O = Stand-off insulators for aerial connection.

COIL DATA

L1 = 1.8 mc, 62 turns 20 SWG insulated, close-wound on 2-in. diam. ceramic (ex-TU) former, mounted on pillars. Link L2, 5 turns coax, Faraday construction—*see text.*
L1 = 3.5 mc, 34 turns, 16 SWG, wound 13 t.p.i., 2-in. diam. Link L2, 4 turns. Tap, 5 turns from either end.
L1 = 7 mc, 17 turns, 16 SWG, spaced 3-in., on 2-in. former. Link L2, 3 turns. Tap, either end.
L1 = 14 mc, 13 turns 16 SWG, wound 6 t.p.i. Link L2, 3 turns. Tap, 2 turns from end.
L1 = 21/28 mc, 4 turns 16 SWG wound over 2¼-in., 2-in. diam. Link L2, 2 turns. Tap, either end.

Note: On the model, the taps were determined using a 260-ft. aerial, and are for guidance only.

box of the dimensions indicated by the photograph.

To ensure complete shielding if the original TU panels are used, unwanted holes should be stopped with bolts or masked with sheet tin. Should five TU aerial coupling switches not be available, their functions are equally well carried out by a single Yaxley, "Oak," Wearite or other make of ceramic, heavy-duty, ganged-wafer switch giving the required single-pole five-position action. While the unavoidable positioning of separate switches disturbs symmetry, with one lead to each coil-end longer than the other, this has no effect upon results operationally. Besides the switches, stand-off insulators and tuning condenser, the front panel carries a couple of 2·5-amp. RF thermo-ammeters for use with twin untuned wires and a ½-amp. thermo for single end-on wires. If series Marconi or series-parallel Zepp tuning is required, these can easily be arranged for by modification, or by including extra tuning condensers in the top TU frame where there is ample space for experimental additions. The TU ceramic coil-formers, mounted on TU ceramic pillars as indicated by Fig. 2, allow inter-connecting coax to be used for the shielded links; the turns are wound on side-by-side over the centre of each coil and held closely together in two or more places by a length of insulating tape. With formers, of course, the degree of loading is pre-determined by the number of link turns and no variation of the physical distance between link and coil is required.

If for some bands open self-supporting coils are preferred, the present method of winding makes the total too bulky and it is then suggested that the links should be made as described by G2HJT in the January, 1956, issue of SHORT WAVE MAGAZINE. By his method, a length of large diameter coax sufficient to reach from the switch over to the coil and there circle the coil once, is first cut. The centre polythene with its inner conductor is then removed so that the outer insulation and the metal braiding form a hollow shielding "tube." To make up the link turns that go inside this tube, sufficient thin coax is cut to reach from

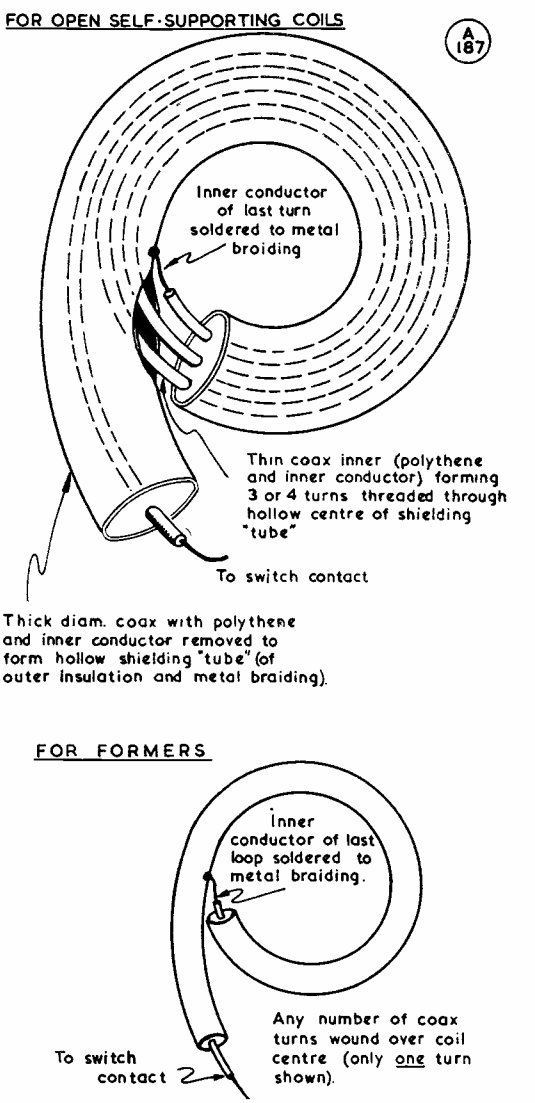


Fig. 3. Detail of the screened links, which in this application are Faraday shields, based upon an idea by G2HJT in the January 1956 issue of "Short Wave Magazine." This method adapts standard coax cable for the purpose of constructing the screened link.

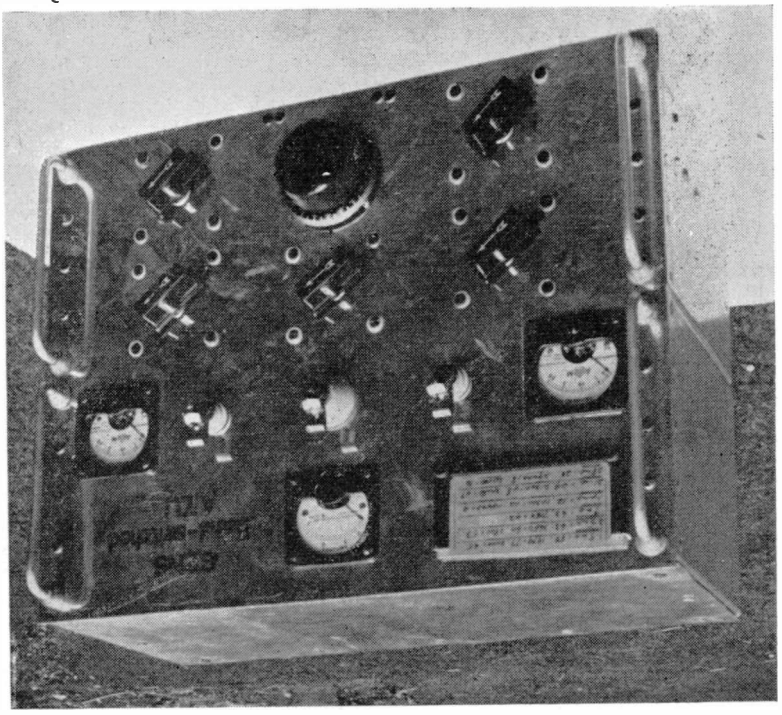
the switch over to the coil and there form three to four turns. The outer insulation and metal braiding are removed from this thin coax, leaving the polythene and inner conductor only. The whole is then made up by threading the thin inner right through the hollow shielding tube, bending the tube to the same circumference as the coil, and, where the circle meets, making a hole through the outer insulation and metal braiding of the hollow tube. The three or four turns of thin inner that are to form the link are then threaded in turn through this hole and pushed round the hollow centre. After the turns are pulled up tight, one end of the inner conductor is joined to its switch contact and the other end is carefully soldered to the metal braiding of the hollow tube. This forms a Faraday type of shielded coaxial link, both methods being clarified by Fig. 3.

A calibrated grid-dip oscillator will be found to save much time and labour when winding a coil and ascertaining its coverage by temporarily clipping its ends across the tuning condenser. The 21 and 28 mc bands are accommodated on one former, but, if preferred (and if six switched positions are available, as they are with the TU type) a separate coil could be used for each band. A harmonic check socket is wired in parallel with the input socket so that, by means of a harmonic indicator, any low-pass filter with variable adjustment can be correctly set for maximum harmonic rejection under working conditions.

Simplicity of Operation

Before putting the ATU to work, the best matching positions for the aerial in use must be determined for each coil. To do this, the following simple drill will be found useful: The ATU is coupled by coaxial line, *via* change-over relay and low-pass filter, to the transmitter output in the usual way :—

CW - *plus* - phone users should set the transmitter tuning to the centre of the first band selected for adjustment (CW - only and Phone-only users set it to the centre of their own favourite portions). The transmitter is then switched on and resonated at reduced power, one easy way of ensuring this safety precaution being the incorporation of a PA screen voltage clamper valve with variable input control as described by the writer in the September, 1955, issue of SHORT WAVE MAGAZINE. With a neon indicator or high-current loop-lamp held reasonably near to the selected coil, the ATU condenser is now tuned to the transmitter frequency and a note is made of its dial reading. The transmitter is switched off, and if a single-wire aerial is to be used, this is clipped on by means of a crocodile at some trial point along the ATU coil. With transmitter on again, the ATU is re-resonated at what is probably a different dial reading from that originally obtained. Another tapping position is tried and the process is repeated until a spot is found along the coil where the ATU dial reading with the aerial *on* is as nearly as possible the same as that with the aerial *off*. This will be the best matching position to hold good across the entire band, or the particular portion chosen, and a permanent connection between the tapping point thus found and the switch should then be made.



The aerial tuning unit complete, as described by G2NS. It is band-switched for 1.8 to 28 mc inclusive, with separate coils for each band. The dimension across is approximately 15 inches, and construction is almost entirely from TU " surplus " items.

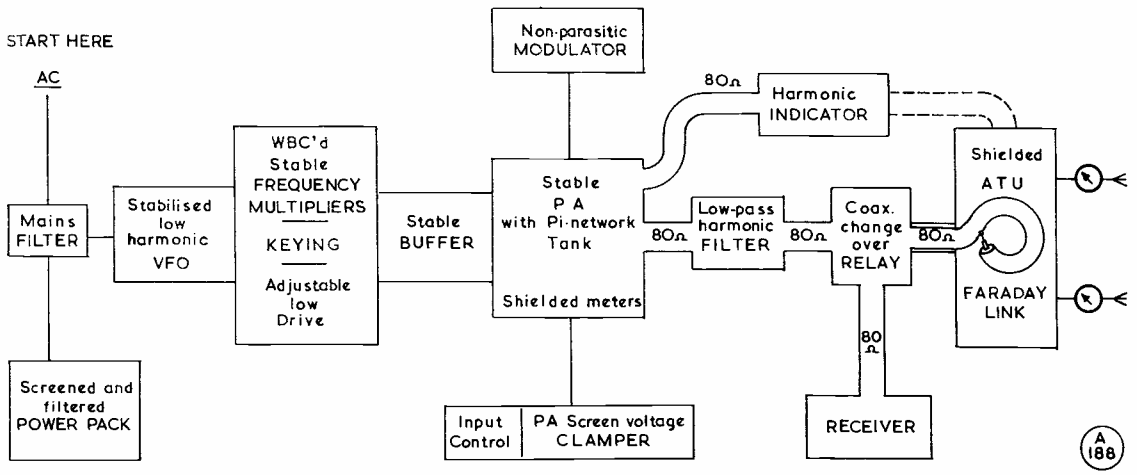


Fig. 4. Block diagram illustrating a typical transmitter layout for the proper suppression of harmonics; for good results, it is necessary to apply the correct treatment at the appropriate points since, as the author explains, no one anti-TVI measure by itself can be fully effective.

In general, the closer the aerial length is to a multiple of a half-wave, the nearer the tap is to the end of the coil. Each band is treated in the same way but twin wires are, of course, both tappd on at two trial points equi-distant from the coil centre.

Publicity on Suppression

At the beginning of this article mention was made of "modern standardised suppression technique," and although the writer cannot claim to be one of the early contributors to the principles now generally accepted as necessary for adequate harmonic rejection, he has since profited greatly by adopting the measures evolved by other operators with greater knowledge and skill in this matter. Practical personal experience, gained while following along the lines laid down by others, does show that it is wiser to be over-liberal with suppression than to skimp it on any one transmitter. To secure adequate rejection in "awkward" areas, the following points all require careful attention: Filtered AC mains; VHF chokes and by-passing of heaters; totally enclosed pack, transmitter and modulator, using chassis base-plates; screened wiring throughout except for RF leads; common earth points in each stage; screened and by-passed meters; screened and stabilised low-harmonic type VFO; early-stage keying; screened non-parasitic buffer; adjustable low drive; grid-leak bias; PA screen voltage clamper valve with input control; screened and ventilated non-parasitic band-switched PA, Pi-tank tuning/loading variables and PA by-pass condensers taken to PA cathode earthing point; high-impedance wide-range PA RF choke; PA grid and anode parasitic suppressors; PA grid/anode screening and decoupling; low-pass harmonic filter; coaxial line inter-connections throughout; aerial change-over relay, coax type; screened Faraday link; shielded ATU; balun with coax feeder.

The Air Ministry Type G and Type 78A "surplus" coax relays are strongly recommended so that the transmitting aerial can be used for reception. By bringing in the received signal through a tuned aerial unit (ATU), an appreciable increase in gain is obtained in addition to any directional properties the aerial may possess.

In cold print, the foregoing list appears formidable, but in practice the stage-by-stage suppression of a new transmitter under construction is certainly not beyond average ability.

AMATEUR TELEVISION

The interests of amateurs keen on TV transmission on our 70-centimetre band are looked after by the British Amateur Television Club, of which G3CVO/T is the guiding spirit, with G2WJ/T as one of the best-known members, fully equipped for ATV transmission. The B.A.T.C. holds its third annual convention on October 27, at the Bonnington Hotel, Southampton Row, London, W.C.1, from 10.0 a.m. to 7.0 p.m. There will be an exhibition of amateur TV equipment, a film show, and short lectures on subjects of interest in the field of ATV transmission. Admission to the meeting is 5s. (2s. 6d. after 2.30 p.m.), and the nearest Tube station and parking place is Russell Square.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Dead-line for November Issue: OCTOBER 19)

THE *Magazine Club Contest* is now a well-established event, next month's MCC being the eleventh of the series—incidentally, it was also the very first Radio Club contest of its kind anywhere in the world. The rules are published in full herewith, and the competing Clubs will note that they are unchanged except for a shortening of the sessions from four hours to three hours each.

It seems that we have at last reached stability where this event is concerned—after several changes in rules, we have observed the same general principle now for some years past, in accordance with the wishes of the majority. The scoring system puts the accent on inter-Club working, with a total of twelve points available for working each other contestant four times (compared with a single point for each non-Club station worked). Furthermore, the loss of one hour in each of the operating periods will necessitate some pretty snappy operating if all the other Clubs are to be rounded up.

We recommend secretaries and keen Club members to digest these rules right away and to see if there is any reason why their own Club should not be among the contestants this year. Last year there were 33 entries . . . we hope to see more than 40 this time. Even if a Club feels it is not in a position to make a strong showing, remember that an entry is good experience and training for operators in contest working.

On the subject of winter programmes generally, the attention of honorary secretaries is drawn to the possibility of arranging visits to local institutions and organisations of technical interest—such as radio works, police and fire brigade radio stations, GPO automatic exchanges and, in some localities, Post Office coast stations. A lot depends upon how the approach is made, since, in the nature of things, such visits have usually to take place at week-ends, meaning that some staff member must give up his leisure to show the party round.

For this reason, it is important to make sure that the immediate head of the organisation concerned receives a formal letter of appreciation from the Club, expressing their particular thanks to whoever took them round, as soon as possible *after* the visit. This little courtesy, which helps so much to maintain good relations locally, is too often overlooked.

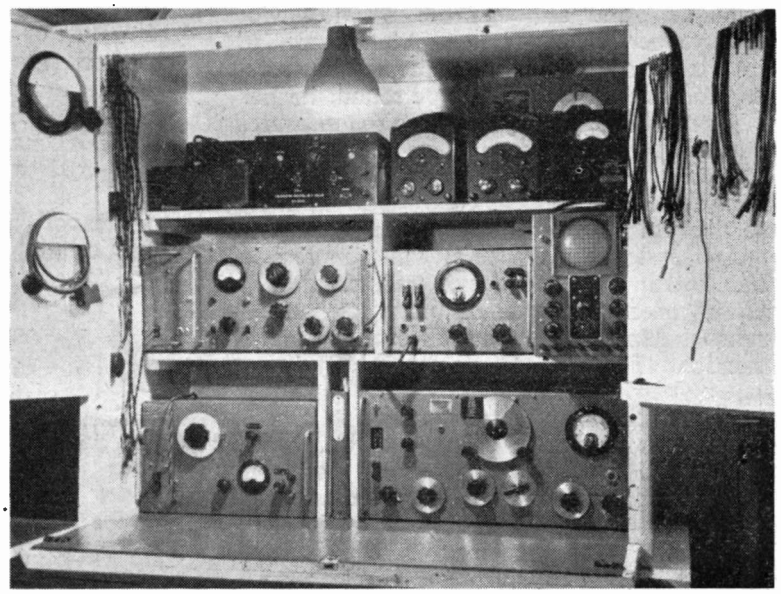
ACTIVITY REPORTS

Slade have an interesting month before them, with a "Double Midnight D-F Test" on October 7, an exhibition of members' gear (for the Enterprise Trophy) on October 12, and the Annual Dinner at the Roebuck Inn, Erdington, on October 20.

Stoke-on-Trent meet every Thursday, and have enrolled a number of new members during the past two or three months. They are hoping to be active in MCC once more.

Worthing are holding a Junk Sale at 8 p.m. on October 8. Please note new secretary's name and address—in panel. **Crystal Palace** will be hearing all about the Minibeam from G4ZU, its originator, on October 20 — 7.30 p.m. at Windemere House, Westow Street, S.E.19.

The **British Amateur Television Club** met on September 13 to hear about Flying-Spot Scanners from G2DUS; at the next meeting, on October 17, Mr. Fred Turner will talk on 70-cm. Techniques.



The very fine array of test equipment available to the Bailleul Radio Society, R.E.M.E., Aborfield, Berkshire. Fitted up by members, the cupboard and shelving accommodate, on the top deck: Valve tester, crystal calibrator, several Avo's and a wobbulator; on the middle shelf, a VHF signal generator, valve voltmeter and a double-beam CRO. On the lower deck there is a calibrated BFO and a standard-coverage signal generator. We might also add that Bailleul will be taking part in MCC next month!

The meetings are held at 10 Baddow Place Avenue, Great Baddow, Essex, and all are welcome, whether members of the Club or not. The B.A.T.C. convention takes place in London on October 27 — full details from the hon. secretary.

Cray Valley will be meeting at the Station Hotel, Sidcup, at 8 p.m. on October 23 for an exhibition of members' home-built gear. Awards will be made for the best exhibits. A full winter programme has been drawn up, and new members and interested visitors will be specially welcome.

Edinburgh resumes its weekly meetings (Wednesdays at Unity House, Hillside Crescent). The secretary will be glad to answer all enquiries, and for his new QTH, *see* panel.

Newbury hold their Hamfest on October 14, with High Tea, Films, Competitions for the YL and OM and, of course, the traditional "swindle" with over 40 prizes. The following meeting will be on November 9, with a lecture by G2UJ.

Warrington have resumed their meetings on the first and third Thursdays of each month, 7.30 p.m. at the Royal Oak Hotel, Bridge Street. *See* panel for new secretary's name and address.

Clifton held their second Transmitting Field Day on September 2. G3HZI won this event, and also the Club Championship cup for 1955/6, as well as retaining the D-F Championship shield for another year. Runner-up was G3FNZ. October 5 and 19 are Constructional evenings; on October 12 there will be a demonstration of the Hamobile and Geloso equipment by G8KW; and on the 26th Mr. B. W. Kersting will talk on Transformers. All meetings 7.30 p.m. at 225 New Cross Road, S.E.14.

Plymouth have now acquired a T.1154 and a BC-348 towards the Club station. Another auction will be held shortly, and in November visits will be paid to the BBC at Plymouth and Start Point. Next meetings, October 16 and 30, 7.30 p.m., at Virginia House Settlement. **Mitcham** reopened for the winter season on August 29, and the next meeting is on October 12. They have not yet picked their team for MCC, but we are informed that "all the boys are training hard on Mitcham Common in vest and shorts"!

South Shields took part in the Corporation Flower Show, despite damp and windy weather and the fact that the Park was only a few hundred yards from the North Sea. GB3SFS was on all bands from Eighty to Ten, much equipment was on show, and tape-recorded programmes of music and interviews with local celebrities were used and played over the PA system. An interesting winter programme is now under way, with meetings on the last Wednesday of the month, at Trinity House Social Centre, 134 Laygate; at the same address the clubroom is open every night, Monday to Friday.

Surrey (Croydon) held a very successful Junk Sale in September, with an attendance of 43. On October 9, G3BLP will talk on Test Gear, in response to the requests made in a recent questionnaire. Meetings are at the Blacksmiths Arms, 1 South End, Croydon, on the second Tuesday of the month.

Yeovil is still very active, with G3CMH on the

MCC — ELEVENTH ANNUAL TOP BAND CLUB TRANSMITTING CONTEST

RULES

1. ***Duration :*** Saturday, November 17; Sunday, November 18; Saturday, November 24; Sunday, November 25. On each of these days between the hours of 1600 and 1900, GMT (twelve operating hours in all).

2. ***Frequency and Power :*** All contacts will be made in the 1800-2000 kc amateur band, using CW only, with a power not exceeding 10 watts to the final stage. All reasonable precautions will be taken to avoid interference with other services using the band.

3. ***Call Signs :*** Where a Club has its own transmitting licence and call-sign, that call-sign is to be used. Clubs without their own call may use a member's station, provided this is nominated as their official entry by the Club Committee.

4. ***Calling :*** Club stations will call "CQ MCC" (Magazine Club Contest) and will sign off at the end of each transmission with "AR MCC K," or "AR MCC VA." Clubs in contact with one another will identify themselves by giving, after the RST report, "QRA" instead of "QTH." This will be followed by the name of the Club, abbreviated forms being permitted, *e.g.* "QRA Clifton Club" or "QRA Salisbury Club," but **the word CLUB must be sent in every case.** Clubs working non-Club stations will send their QRA and will log the other station's QTH.

5. ***Scoring :*** Other Club stations may be worked once on each of the four days of the Contest, and will count for *three points* each time. Non-Club stations may be worked once only during the whole period of the Contest and will count for *one point* only. The three points for an inter-Club contact will not be claimed unless the "QRA" and the word "Club" have been logged. Thus any Club station may be worked four times, for a total of twelve points, but other amateur stations only once, for one point.

6. ***Logs :*** Contest logs to be set out as follows: Quarto or foolscap sheets should be ruled into seven columns, headed: Col. 1, *Date and Time.* Col. 2, *Call of Station Worked.* Col. 3, *QRA, if Club.* Col. 4, *QTH, if non-Club.* Col. 5, *RST, outwards.* Col. 6, *RST, inwards.* Col. 7, *Points claimed for contact* (3 or 1). Col. 7 must be totalled at the bottom of each page and the running totals brought forward.
   The last page should contain the following summary: Club contacts (number) at 3 points each :— total figure. Non-Club contacts (number) at one point each :— total figure. Grand Total.

7. Any Club stations receiving reports consistently worse than T9 will be liable to disqualification.

8. Logs, addressed to "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1, must be posted to reach us by **Monday, December 3**, 1956. The Editor's decision on the results will be final, and will be published in the January, 1957 issue of *Short Wave Magazine.*

Deadline for next month's reports is: **Friday, October 19.** They should be addressed to "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. All Clubs are invited to report their activities.

DX bands during their weekly meetings. An Eddystone 888 was demonstrated at a recent meeting, and a Minibeam is under construction. G3CMH/A operated from a local Hobbies Exhibition, using one transmitter on 1,8 mc and another on 3.5 - 28 mc.

Liverpool meet on October 9 for G2AMV's lecture and demonstration on his home-made panadaptor. October 16 is an Open Night; October 23 is booked for G3LCO on Commercial VHF Equipment; and October 30 for G3HII on Printed Circuit Technique.

Purley will have had their visit to the BBC's very fine central receiving station at Tatsfield by the time this appears in print. It was arranged by the co-operation of the Engineering Dept. of the Corporation, and we look forward to hearing about it in time for our next.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

BRITISH AMATEUR TELEVISION CLUB.: D. W. E. Wheele, G3AKJ, 56 Burlington Gardens, Chadwell Heath, Romford.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CRAY VALLEY: S. W. Coursey, G3JJC, 49 Dulverton Road, London, S.E.9.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
EDINBURGH: M. Darke, GM3KGK, 44 Howe Street, Edinburgh 3.
LIVERPOOL: A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool 14.
MITCHAM: D. Tilcock, G3JYV, 67 Fleming Mead, Mitcham, Surrey.
NEWBURY: N.A.D.A.R.S., 83 Newtown Road, Newbury.
PLYMOUTH: C. Teale, G3JYB, 3 Berrow Park Road, Peverell, Plymouth.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley, Surrey.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTH SHIELDS: W. Dennell, G3ATA, 12 South Frederick Street, South Shields.
STOKE-ON-TRENT: A. Rowley, G3JWZ, 37 Leveson Road, Hanford, Stoke-on-Trent.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
WARRINGTON: S. Allen, 25 Bruche Drive, Padgate, Lancs.
WORTHING: J. R. Toothill, 113 King's Road, Lancing, Sussex.
YEOVIL: D. L. McLean, 9 Cedar Grove, Yeovil.

RADIO AMATEURS' EXAMINATION, MAY 1957

We would draw the particular attention of all readers interested in the next R.A.E. to the very full list of instruction centres published on p.357 of the September issue of SHORT WAVE MAGAZINE, with the notes on the possibility of getting more courses started in other areas. Unless the facilities are asked for locally, they may never be provided — simply because nobody *has* asked for them. Club organisations can do (and many are doing) a great deal to help in this respect.

VHF SOUND BROADCASTING

The BBC announces that it is to proceed with the building of a further six VHF stations, constituting the second stage of the plan to provide nation-wide coverage on VHF of its three sound programmes. These additional stations, together with the ten stations already authorised, will provide interference-free reception on VHF of the Home, Light, and Third programmes for about 96% of the population of the United Kingdom.

Each station will carry the Home, Light, and Third programmes, except Corwen, which will broadcast the Welsh Home Service only; this area will receive the Light and Third programmes satisfactorily from other VHF stations and can also receive them on long and medium wavelengths. The station at Sandale, near Carlisle, will carry the Scottish Home Service as well as the North Home Service and the Light and Third programmes; this is for the benefit of listeners in a considerable part of South-west Scotland who will be able to receive programmes from this station.

It is hoped that the new VHF stations at Rowridge, Kirk o'Shotts, Sandale, and Corwen will be completed by the end of 1957 and the other two during 1958.

Of the ten stations authorised in the first stage of the VHF plan, those at Wrotham, Pontop Pike, Divis, Meldrum and North Hessary Tor are already in full service.

A number of new receivers which will tune to the new VHF band (as well as the present medium and long waves) were seen at the National Radio Show. VHF adapters for use with existing receivers are also available. For listeners within the VHF areas much improved reception is possible, with better quality of sound and a most welcome reduction in interference of all kinds.

BBC VHF/FM broadcasting is in the band 88-95 mc, with a certain number of shared channels, and effective radiated power varies from 60 to 120 kW.

NEW VALVE FOR STABILISED POWER SUPPLIES

A new Mullard valve, the 6080, is a low-impedance twin power triode primarily intended for use as a series regulator valve in electronically stabilised power supplies. It is also suitable for use in servo-amplifiers. The outstanding feature of the 6080 is its very low anode resistance (280 ohms for each triode section at 125 mA) which results in a much lower voltage loss across the valve than is normally obtainable.

The 6080 has a heater rating of 6.3v. and 2.5A. The amplification factor is 2, and the slope is 7mA/V for each section. The maximum anode current and anode dissipation are 125 mA and 13 watts respectively, these values being for one triode section. The balance between the two triodes is good.

NOTE FOR OVERSEAS SWL's

Details of the BBC"s transmissions for listeners overseas are given in a booklet, *The BBC and its External Services,* produced by the Corporation, and available from Broadcasting House, London, W.1.

Thirty-nine high-power short-wave transmitters (50-100 kW) are now in operation. Two at Tebrau in Johore State, Malaya, are under the control of the BBC Far Eastern Service and relay to the appropriate countries.

Medium-wave transmissions to Europe from the United Kingdom are largely on 224 metres.

Certain of the BBC's European services are also re-broadcast by a high-power medium-wave transmitter at Norden in north-west Germany, with a medium-power relay in Berlin operating on the same wavelength, and are rebroadcast additionally over a VHF/FM transmitter in Berlin, where a large number of suitable receivers are in general use locally.

To provide an effective signal in the area to be served, directional transmitting arrays are used. The system appropriate for the particular direction, time of day, season and stage of the solar cycle is selected from a complex of no less than 177 aerials at the various transmitting sites. Even with this large number, it is impossible to meet all propagation conditions, and a continuous schedule of aerial conversion to different bands is necessary to ensure that programmes are radiated on the most easily receivable frequency. This process of aerial conversion keeps pace with the trend of conditions which, during 1956, permitted the use of the 11-metre band for transmissions to Africa and to South and South-East Asia for the first time since 1951. During the next few years the BBC will make regular use of the higher frequency bands for its External Services.

The use of the 11-metre band in particular enables BBC transmissions to escape the severe interference which affects many of the External Service programmes on the longer wavelengths. Some of this interference is due to the overloading and unplanned operation of the bands allotted to short-wave broadcasting, but much of it is caused by the deliberate jamming of certain transmissions of the BBC and from other free countries of the world. This jamming affects not only the transmissions against which it is aimed, but also the adjacent channels.

The BBC welcomes reception reports from overseas listeners, which should be addressed to: The Service Superintendent Engineer, Broadcasting House, London. W.1.

HALF-YEAR SUBSCRIPTIONS

Readers are reminded that we can accept subscriptions, at 15s. only, for a half-year of six issues. This ensures postal delivery of SHORT WAVE MAGAZINE for six months, and also permits full both-way use of BCM/QSL for the same period.

SMALL ADVERTISEMENTS

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.

APPOINTMENTS

EXPANDING COMPANY in Mitcham, Surrey, area, engaged in the nucleonic field, require a Radio Engineer for the final testing of electronic instruments. This position offers excellent opportunities of advancement for a man with a good practical background.—Box No. 1807, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

RADIO TECHNICIANS IN CIVIL AVIATION. A number of appointments are available for interesting work providing and maintaining aeronautical telecommunications and electronic navigational aids at aerodromes and radio stations in various parts of the United Kingdom. Applications are invited from men aged 19 or over who have a fundamental knowledge of radio or radar with some practical experience. Training courses are provided to give familiarity with the types of equipment used. Salary £561 10s., age 25 (subject to a practical test) to £671. The rates are somewhat lower in the Provinces and for those below age 25. Prospect of permanent pensionable posts for those who qualify. Opportunities for promotion to Telecommunications Technical Officer are good for those who obtain the O.N.C. in Electrical Engineering or certain City and Guilds Certificates. The maximum salaries of Telecommunications Technical Officers are: Grade III, £790; Grade II, £925; Grade I, £1,160.—Apply to the Ministry of Transport and Civil Aviation (ESB1/RT), Berkeley Square House, London, W.1, or any Employment Exchange (*quoting Order No. Westminster 5788*).

TRADE

TELEVISION INTERFERENCE: Receiver Filters —High-pass E.5037, 30/-; Low-pass E.5031, 30/-; Composite Band I/III, 49/6. Transmitter Filter E.5034, 80 dB, 1 kW., £6—Labgear (Cambridge) Ltd., Willow Place, Cambridge.

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

WANTED: BC-610 Hallicrafter, ET-4336 Transmitters and spare parts for same. Best prices.—P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

CONVERTERS! The RF26 unit makes the basis of an excellent converter for the HF bands, providing an ideal method of extending the coverage of surplus receivers and of improving the performance of older communication receivers. The following are modified from brand-new RF26 units, fully aligned and guaranteed: *De Luxe* model, 14, 21, and 28 mc output, bandspread facilities, EF50 RF and mixer stages for high gain and good noise factor, £7 10s. 0d. *De Luxe* two-band model, as above, but 21/28 mc only, £6 15s. 0d. Standard models "A" 20/30 mc, "B" 13/22 mc, EF54 RF and mixer stages, 7.5 mc output, £4 10s. 0d. Also special mobile models; s.a.e. for full details of all units, or quote on modifying your own units. Terms c.w.o., carriage paid.—G3FXB, 86 Cross Road, Southwick, Sussex.

SMALL ADVERTISEMENTS, TRADE—*continued*

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

LOTS OF GEAR to clear at guaranted lowest prices. Receivers, condensers, resistors (all in sealed polythene packs. Prices from ½d. Valves, meters, transformers, chokes. Some gear free.—S.A.E. for details and lists: G3ABG, John Morris, 24 Walhouse Street, Cannock, Staffs.

BAIRD Portable Tape Recorder, new condition, working order, £19 10s. 0d. (o.n.o.); brand-new 931A, 829, 35/- each ; four 6J6, 20/-; new (8) 6AG5, 27/6 ; six EF50, 15/-. Post extra.—Box No. 1809, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR-100, brand-new condition, unmodified, complete with Marconi Manual 8in. speaker, circuits for noise limiter and S-meter. Can be delivered. £20 (o.n.o.). WANTED: SX28A, Commander, AR88.—Hayes, 7 Western Terrace, Northampton.

DST-100 RECEIVER with power pack; needs slight attention. Offers for R.1155 Receiver, modified ; buyer collects.—Boustead, 17 Woodlands Crescent, West Benwell, Newcastle-on-Tyne.

GRUNDIG-RECORDER TK5, six months old, 6 tapes, £45 (or nearest offer).—A. J. Hawkings, Jun., Greengates, North Petherton, Somerset.

THE ONLY RME-DB23 Preselector in England? Five bands, minimum gain 25 dB, brand-new ; first £25.—G3AAE, 18 Fairfield Way, Barnet, Herts. (*Barnet 6703*).

HRO COILS, set of 9, RF25 units, SCR522 Tx/Rx. Meters, 807, VR150/30, 6SN7's, etc.—W. Shaefer, 230 Walsall Road, Bridgtown, Cannock, Staffs.

AR88LF, perfect condition, with original manual, £45 0s. 0d.; R.1155, internal power supply and output stage, dial light, bandspread, S-meter, external converter for 10 and 15 metres, perfect condition, £13 10s. 0d.; Army Sender, Type 12, complete and perfect, £12 10s. 0d.; 19 Set, Tx/Rx, complete with power pack, etc., perfect, £10 0s. 0d.; 22 Set, Tx/Rx, complete with power pack, etc., perfect, £5 10s. 0d.; "Resistance Movement" Mk. III Tx/Rx, mains or battery, complete as issued, all spares, key, phones, xtals, etc., £10 0s. 0d.; BC XXX 1.5-3 mc, brand-new, £30 0s. 0d.; Car Radio (Masteradio), 12v., £8 10s. 0d.; 8-mm. Ciné Camera, Bell Howell, perfect, £10 0s. 0d.—Barn Cottage, Walberton, Arundel (*Phone Eastergate 367*).

SALE: 805's (2) with holders, £2 pair ; Labgear wideband multiplier, 50/- ; E5023/B (Pi-network), coil turret, 35/- or £4 pair ; also 50+50 $\mu\mu$F 1500v. split stator with swinging link 10m. coil and base ; Eddystone 8+8 $\mu\mu$F butterflies (2), 2/6 each.—GW3CIJ, 7 Tynyrheol Avenue, Tonna, Neath, Glam.

SMALL ADVERTISEMENTS, READERS—*continued*

OFFERS! FOR SALE: R1155 Communications Receiver, with power pack/output stage, speaker, complete with official manual; also R1155 Receiver with circuit. All in best condition; carriage extra.—Evans, 1 Pleasant View, Fochriw, Glam.

BARGAIN.—FOR SALE: 19 Set Tx/Rx, modified for AC mains; tuning unit, F/S meter and phone monitor in matching case, perfect working order. £15 (o.n.o.). — C. Stelfox, 3 Wilton Way, Dalston, London, E.8.

WANTED: Top Band CW and phone Tx; must be cheap. Also all-band Rx, *e.g.* CR-100.—Cpl. A. D. Bailey, Radio Servicing Flight, R.A.F. Valley, Anglesey.

MCR1: Miniature 5-valve battery communication Rx; covers 15-2000 metres; coils, phones. Offers?—A. Cooper, 8 Puers Field, Jordans, Nr. Beaconsfield, Bucks.

LABGEAR LG300 Tx, with Labgear power unit/modulator, complete, new, £130; Eddystone 750 Rx, mint, £48. WANTED: Collins 75A Rx.—Box No. 1806, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

813 40/-; 805, TZ40, 316A, 15/-; 826, 35T, 10/-; 24G, 6L6G/M, 7/-; 6K7G, 6K8G, 6B8G, 3/-; 1C5, 958A, 957, 1291, 6J6, 4/-. (Most valves unboxed but guaranteed); 813 bases, 5/-. Filt. Trans. pri. 230, 240, 250v., sec. 10v. 5 amps., 20/-; 80-ohm 50-watt carbon resistors for ATU, 2/6; 4 μF 1500v. condensers, 5/-; Command Receiver, BC453-B (190-550 kc) with valves and coils for BC conversion. 25/-; Wilcox-Gay VFO and Manual, 60/-; Q.C.C. crystals 7060, 7072, 7104, 7112, 7145, 7171, 7200, 7244, 7289 kc. Please add postage under 20/-. Labgear L.P. Filter required.—Bloxam, 114 Highfield Lane, Southampton, Hants.

T.C.S. TRANSMITTER 1.5-12 mc, £9; Receiver, £5; two-metre transmitter and xtal, £2; VCR139A and 'scope case, £1; 2 kV. EHT Transformer, 17/6; 6v. Vibrator Pack, 25/-; meters from 3/6.—J. B. Armstrong, 32 Hillfield Place, Aberporth, Cardigan.

AMATEUR SELLING UP: All gear, mainly good quality components, to be cleared at very low prices before sailing in November.—Write for list: Box No. 1808, Short Wave Magazine, Ltd., 55 Victoria Street, S.W.1.

HAM GOING ABROAD.—For Sale: Mackay Marine Radio; 1,000's of spares, etc.; going cheap; s.a.e., please, for list.—R. Innes, 23 Institution Road. Fochabers, Moray.

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PANDA PR120V, low pass filter, xtal microphone, £85; CR100, £15. Both mint. Buyer please collect.—J. D. Loader, 40 Parkwood Road, Wimborne, Dorset.

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