The SHORT WAVE Magazine

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EXCLUSIVELY FOR THE RADIO EXPERIMENTER & TRANSMITTING AMATEUR

VOL. VII No. 1 MARCH 1949

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SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR & AMATEUR RADIO

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

Advertisement Manager: P. H. FALKNER

Assistant Editor: L. H. THOMAS, M.B.E. (G6QB)

Published the first Wednesday each month at 49 Victoria Street, London, S.W.1. Telephone: Abbey 2384. Annual Subscriptions: Inland 20s. Abroad 22s. post paid

AUTHORS' MSS.

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

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

EDITORIAL

Forward

This issue sees the commencement of Vol. VII of the *Short Wave Magazine*, so once more we may be permitted to comment on both the past and the future.

First, we must thank once again our wide circle of readers, at home and overseas, for the steady stream of messages of good will and encouragement which reach us almost daily. We have also to thank a lengthening list of trade friends for their support, which we hope to continue to justify during the coming year. Indeed, as we know, the advertising pages of the *Short Wave Magazine* are becoming of increasing value and interest to all sections of our readers.

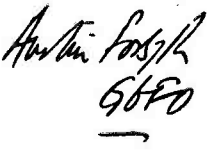
These remarks might perhaps suggest that we are happy in our work, and do not see much else that can usefully be done to improve the *Magazine*. Not so ; while we are certainly happy about it, our constant endeavour is to increase and extend the range of contents and to introduce such improvements as are possible.

To this end, an immediate step has been taken with the introduction of some new styles which will be observed in this issue. These amount to a further attempt to get more into the page without making it any less readable.

There is obviously a limit to this, and we would not consider adopting a type-face any smaller than that now used for the news-feature articles ; this style will in time become the standard setting for all articles, as it allows us to get about ten per cent. more into the page.

Given a period of peace, economic stability and lessening restrictions, we see every reason why the *Short Wave Magazine* should be able to show progressive improvement as the years roll on. At any rate, improvement will always remain our objective.

In the meantime, again our thanks to you for helping to make the present result possible—and we hope to retain your interest and support for the coming year.



This article deals in some detail with the practical problems of speech amplifier design, and will be of particular value to those about to embark on telephony operation. It may also help others having trouble with existing equipment. The unit described may be operated either as a modulator for a 30-35 watt transmitter, or as a sub-modulator for an installation running the full power.—Ed.

Speech Driver Unit

15-Watt Amplifier/Sub-Modulator

By W. R. JOSS (G2AJ)

IN pre-war days when the average British amateur used lower power than is usual now, the speech equipment necessary for phone operation was comparatively simple and inexpensive ; provided reasonable care was taken with the construction, in most cases it performed quite satisfactorily. The general standard of quality was probably higher than it is to-day, in spite of the fact that the cheaper types of microphone were in greater use. Now, the situation is a little different—we are all licensed in due course for 150 watts, and in order to control a carrier of this magnitude a modulator capable of delivering something of the order of 90 watts audio is necessary if the job is to be done efficiently. This of course assumes that anode modulation is used, which from the amateur point of view is the most satisfactory, as it permits the highest efficiency. It is true that where plate efficiency can be sacrificed grid, suppressor, screen grid or cathode modulation can be employed, thus effecting a considerable saving of audio power. It is not, however, proposed to discuss these methods here.

Design Considerations

With 150 watts of RF and more than half as much AF confined in a transmitter rack it should be appreciated that much trouble can occur unless due care is taken with the design and layout of the transmitter, especially in the early stages of the speech equipment. Many of the poor telephony transmissions which are heard on the bands to-day are probably due to carelessness and lack of thought in the layout of equipment. A very small amount of RF pick-up in the speech amplifier—particularly at the grid of the first stage, which is most susceptible to it—will cause over-loading, distortion in the low level audio stages and all sorts of other troubles. The ultimate effect on the air is only too well known.

There is also a form of regeneration which can occur in an audio system to cause a feed-back howl ; in such cases the gain control cannot be advanced very far without this howl building up, even though the amplifier may be perfectly stable when the RF section of the transmitter is not switched on.

The design of any speech equipment must be governed by the microphone to be used, but as a large majority of amateurs nowadays possess either a crystal or moving coil type it is proposed to consider the design of suitable equipment to succeed one of these. The equipment necessary can be divided into roughly three sections, *viz.* :

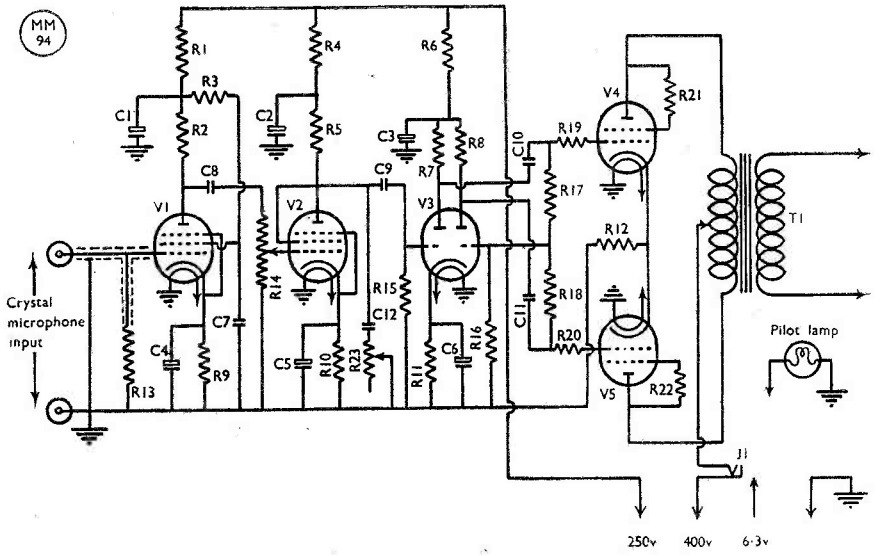
(*a*) Head amplifier or pre-amplifier.
(*b*) Voltage amplifier and driver stage.
(*c*) Modulator stage proper.

It is not advisable to have all the above on one chassis for obvious reasons, and two possible combinations exist. First, (*b*) and (*c*) may be combined, built on one chassis and mounted in the rack with the RF portion of the transmitter, while (*a*) can be constructed independently and placed in a convenient position on the operating table, the two units being connected with low impedance cable. Secondly, (*a*) and (*b*) can be combined in one unit, while the modulator stage (*c*) is built separately, or possibly along with its own power supply. It is considered that where possible (*a*) and (*b*) should be divorced from their own power supplies.

In considering the design of the following amplifier the points outlined above were borne in mind, and it is hoped that this unit will enable the newly licensed 'phone operator to start on the right foot. The amplifier contains (*a*) and (*b*), *i.e.* all stages up to the modulator itself. Provision is made for a type D.104 crystal microphone and the complete unit, which can deliver some 12-15 watts of AF, may be used as a low power modulator by the QRP man. In order to get away from the "American Complex," British valves have been used throughout, although the substitution of the former is not out of the question should the reader so desire.

The Circuit

The circuit, shown in Fig. 1, contains four



Circuit of the speech amplifier modulator

stages, the output or driver stage consisting of a pair of Osram KT66's running as triodes in Class AB_1. As the grids are never driven positive in this condition no power is consumed by the grid circuit and hence the preceding stage does not need to supply the power which is necessary in Class AB_2 operation. All preceding stages are therefore purely voltage amplifiers.

The input stage is shown in the circuit diagram as constructed for a crystal microphone, but if the reader wishes to employ a moving coil type the grid leak, R13, should be replaced by a suitable microphone transformer. With a crystal microphone the value of R13 has a certain bearing on the frequency characteristic, the lower frequencies being attenuated as the value is lowered. Several values of R13 were tried and eventually 1 megohm was decided upon. This value can be increased up to 5 megohms without more than a slight change in frequency response. The first stage is the well-known Mullard valve, the EF50, appearing in yet another role. This valve is generally considered to be for RF use, but the writer has been agreeably surprised with the results obtained when using it in AF circuits. The associated circuit is similar to any high-gain input stage and requires little comment, the only point being the high value of cathode by-pass condenser which is used in order to lose a little of the "top" which is usually prominent with a crystal microphone.

Table of Values

Speech Amplifier Modulator

C1, C2, C3 = 8 μF 350v wkg.
C4 = 50 μF 25v wkg.
C5, C6 = 25 μF 25v wkg.
C7 = 0·5 μF 350v wkg.
C8, C10, C11, C12 = 0·05 μF 350v wkg.
C9 = 0·1 μF 350v wkg.
R1 = 68,000 ohms
R2, R15 = 500,000 ohms
R3, R13 = 1 megohm
R4, R7, R8 = 56,000 ohms
R5 = 250,000 ohms
R6 = 6,800 ohms
R9, R11 = 1,500 ohms
R10 = 2,200 ohms
R12 = 250 ohms, 10 watts
R14 = 500,000 ohms, pot'meter.
R16, R17, R18 = 220,000 ohms
R19, R20 = 10,000 ohms
R21, R22 = 100 ohms
R23 = 25,000 ohms, pot'meter.
(All resistors can be ½-watt, except where otherwise stated)
V1, V2 = EF50, Mullard
V3 = ECC31, Mullard
V4, V5 = KT66, Osram
(American alternatives)
V3 = 6N7G
V4, V5 = 6L6G
T1 = Woden type UM.1
J1 = Closed circuit jack

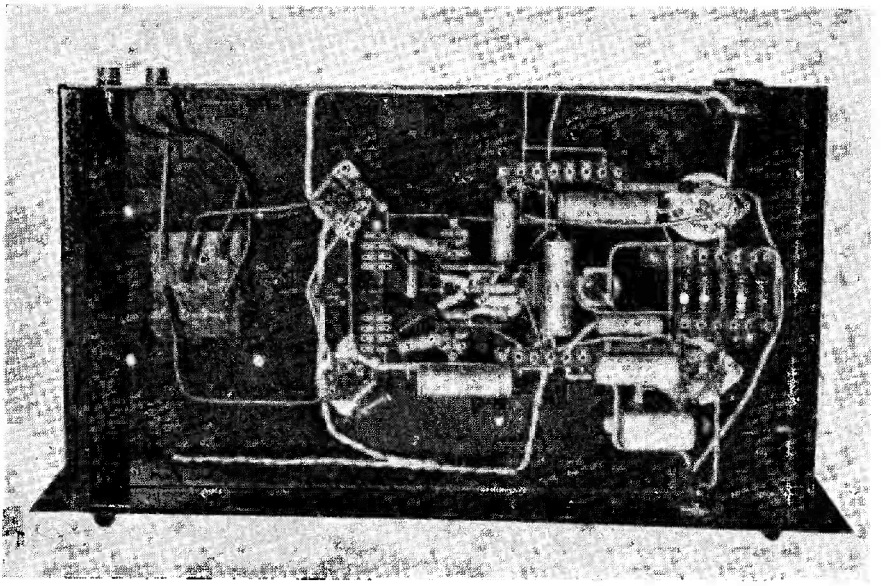
The input stage is resistance-capacity coupled to the second stage, again an EF50, but which by way of a change operates as a triode with the screen and anode strapped. Here again, the "maid-of-all-work" functions extremely well and considerable gain is developed. In

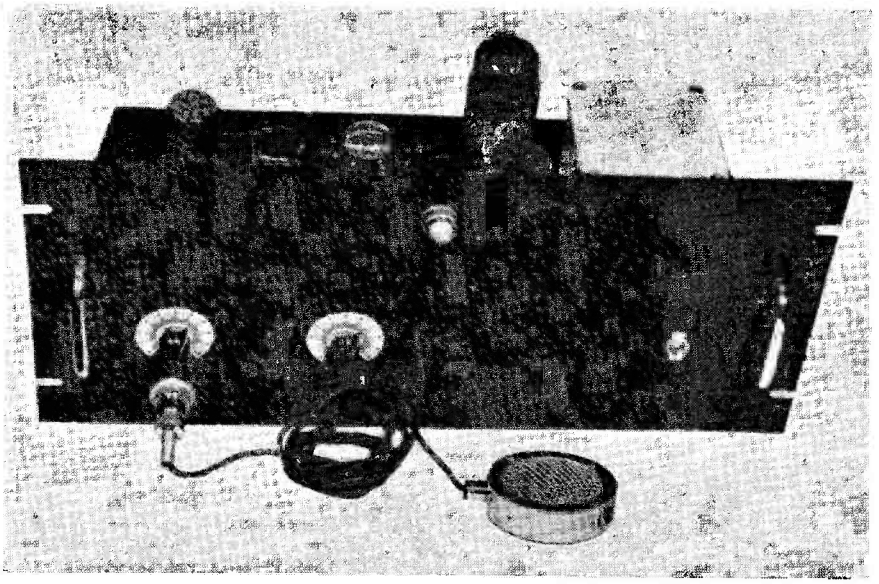
fact, the overall gain of the two EF50's is somewhat greater than that obtainable with the more usual combination of 6J7/6C5, this undoubtedly being due to the higher slope of the Mullard valve. The anode circuit of the triode contains a tone control, consisting of a ·05 μF condenser and a variable resistor, the two being connected in series between the anode and ground. This type of circuit provides a means of controlling the high frequency response of the amplifier, and the component values can be varied to suit individual taste. The maximum effect is secured when the resistor R23 is entirely out of circuit, thus leaving C12 directly connected between anode and ground. When selecting values of components for this type of circuit, the value of the resistor should always be large compared with the reactance of the condenser, so that when the resistor is all-in the effect of the condenser on the frequency response is negligible.

The third stage is a double triode, the Mullard ECC31, known to many by its Service designation, CV.181 or NR.73. It is similar to a glass 6N7, the two being directly interchangeable. This valve operates as a self-balancing phase-splitter, the first triode section functioning as a straightforward triode amplifier with the anode connected to the grid of one KT66 through a normal resistance-capacity circuit, while the second triode section, fed through the network R16-R17-R18, acts as a phase-inverter and produces a voltage at the grid of the second KT66 which is 180 degrees out of phase with that applied to the first. Where possible the voltage at each grid should be checked in order that equal drive be applied to each valve. A valve-voltmeter is the most accurate means of determining this, but if this is not available a pair of headphones connected alternately between each grid pin and ground will give a comparative indication as to the amount of drive being applied. Any serious misbalance should be apparent aurally. Where unequal drive is indicated a check should be made on the values of the components in the phase-splitting circuit, especially the resistors R17 and R18. These should be as near as possible identical in value, but if 10 per cent. tolerance resistors are used the error between the two values could be as much as 20 per cent., this being quite sufficient to cause unbalance. The same checks should also be made on R7 and R8, and C10 and C11.

The output stage has already been mentioned and most of the design data has been taken from the manufacturer's data sheet, which is readily obtainable. The latter recommends that 10,000-ohm grid stoppers be fitted on the grid pin of each KT66 and also that when operating as a triode the anode and screen should be connected through a 100-ohm resistor. Both these suggestions have been carried out. The output transformer is a

Under-chassis arrangement of the 15-watt amplifier.





General view of the 15-watt speech amplifier-modulator.

Woden UM.1, which has multi ratios available on both primary and secondary. The anode-to-anode impedance of two KT66's operating as triodes with 400 volts on their plates is approximately 4,400 ohms. This is easily matched into the primary winding of the transformer, while the secondary can be matched into the load presented by an RF amplifier, or into a 500-ohm line which can be used for feeding a high power modulator.

Construction

Little need be said on this subject as the general layout can be clearly seen from the photographs. The unit was built on a standard rack chassis with an 8¾ in. panel. The panel carries a screened 3-pin Amphenol socket for the microphone, the gain control R14, the tone control R23, together with a pilot lamp, HT switch and a meter jack. The latter provides a means of checking the current consumption of the two KT66's. A pair of chromium handles is fitted to facilitate removal from the transmitter rack. The rear of the chassis carries two small Belling-Lee coaxial sockets for connections to the secondary of the output transformer and an octal valve socket to carry power supplies.

Several small tag strips were used for mounting components under the chassis and the positions are shown in the appropriate photographs. All grid leads should be kept as short as possible and very great care should be taken in shielding the input, screened cable being used for connection between the Amphenol socket and the EF50, the 1 megohm grid leak being soldered right on the grid pin itself. Leads to the gain control, which is connected in the triode grid, should also be well screened.

Checking and Testing

The power feed required for the amplifier is 6·3 volts AC at 3½ amps and HT supplies of 250 and 400 volts. The latter can be taken from one power pack and suitable series resistors incorporated where necessary.

With no HT on the KT66's the early stages should be checked by using a pair of headphones. First insert the 'phones between the grid end of C9 and ground and switch on. With the gain control wide open a good signal should be audible which should be absolutely hum-free. If there is any trace of hum or distortion it is useless going further until this has been cured, as the slightest trace of either will be amplified many times in the later stages. Assuming all is satisfactory the 'phones should

Table 1

Valve	Anode Volts	Cathode Volts	Screen Volts	Anode Current
V1	110	1	35	—
V2	150	—	—	—
V3	150	—	—	—
V4/V5	380	30	—	120 (2 valves)

now be inserted between the grids of the KT66's and the push-pull input checked. The audio level here should be more than comfortable, and as before the hum and distortion should be negligible. As stated earlier, a check should be made to ensure that each grid is receiving an equal amount of drive. HT can now be applied to the KT66's and their anode current checked by means of the jack provided. With the gain turned low the phones can be placed across the output transformer but as the control cannot be advanced very far without damaging the eardrums such a test is not satisfactory. Another method of final testing is to use the amplifier to drive a high power modulator, or to operate it by itself as a low power modulator. By so doing any tendency for RF feedback should be observed and if this occurs a suitable condenser connected from the centre tap of the modulation transformer to ground may help in effecting a cure. The final tests should be carried out in conjunction with another station, as accurate reports on speech quality, hum and general stability are the only means of ensuring that the amplifier is operating correctly.

For assistance in testing the amplifier, Table 1 contains the approximate currents and voltages as measured on the original unit, using a Model 40 Avometer.

In Conclusion

It is hoped that the foregoing will serve as guidance for those who have just received or are about to receive their first 'phone permit, and that even the "old-timer" may possibly find something of interest. Time spent on the construction of audio equipment is never wasted and there is considerable satisfaction to be derived from building and operating a stable and efficient 'phone transmitter, which in itself is a good test of skill and technical ability.

The BC-610 Exciter

Modifications for Amateur Band Operation

By **F. E. WINGFIELD (G2AO)**

The BC-610 is a unit-constructed transmitter which was widely used by the Allies during the war for point-to-point working—and has often been heard since on the amateur bands. The Exciter section is a nice piece of equipment which can itself be operated as a 50-watt transmitter, with either crystal or VFO control. The article below will be followed later with some notes on the accompanying BC-614 speech amplifier-modulator.—Ed.

A NUMBER of these units, made by Hallicrafters, are now available on the surplus market; also, in the case of the exciter, the tuning units.

The BC-610 Exciter Unit

The Exciter chassis measures 12 in. × 17 in. × 5 in. and is shown in the photographs.

As it stands, the unit consists of a variable frequency oscillator (crystal oscillator, 6V6GT; buffer doubler, 6L6; and intermediate power amplifier, two 807's in parallel). It was designed to work over a frequency range of 2-18 mc, and later 1-2 mc. For 28 mc operation one of the available tuning units has to be modified.

There are three switched frequency ranges and any three tuning units can be plugged in at one time. Each tuning unit contains all the coils and condensers for each stage.

The oscillator stage is perhaps a little unusual at first sight and requires some explanation. It can be operated either as an electron-coupled VFO or as a crystal oscillator, the mode of operation required being selected by switch SW15, which is in the tuning unit.

(*a*) In the master oscillator (MO) position the circuit works as an electron-coupled oscillator, Fig. 2, the screen acting as the anode and isolating the output circuit from the frequency controlling tank circuit. The only difference is C1, Ch2, Ch9 and R35. Condenser C1 is included to keep the DC current from flowing through the cathode section of the tank circuit, but so far as RF is concerned it is a direct connection. R35 across Ch9 acts as a parasitic suppressor. The high RF impedance of chokes Ch2 and Ch9 forces the RF at the oscillator anode to feed back through the cathode section of the tank circuit.

(*b*) In the crystal control (Xtal) position, the circuit is a two-stage modification of the electron-coupled oscillator, Fig. 2B; the crystal has taken the place of the grid-cathode "tuned circuit" and the inductance (L) and condenser (C) are so chosen that their resonant frequency is lower than that of the crystal in use in any tuning unit. The plate of V8 (6V6GT) is

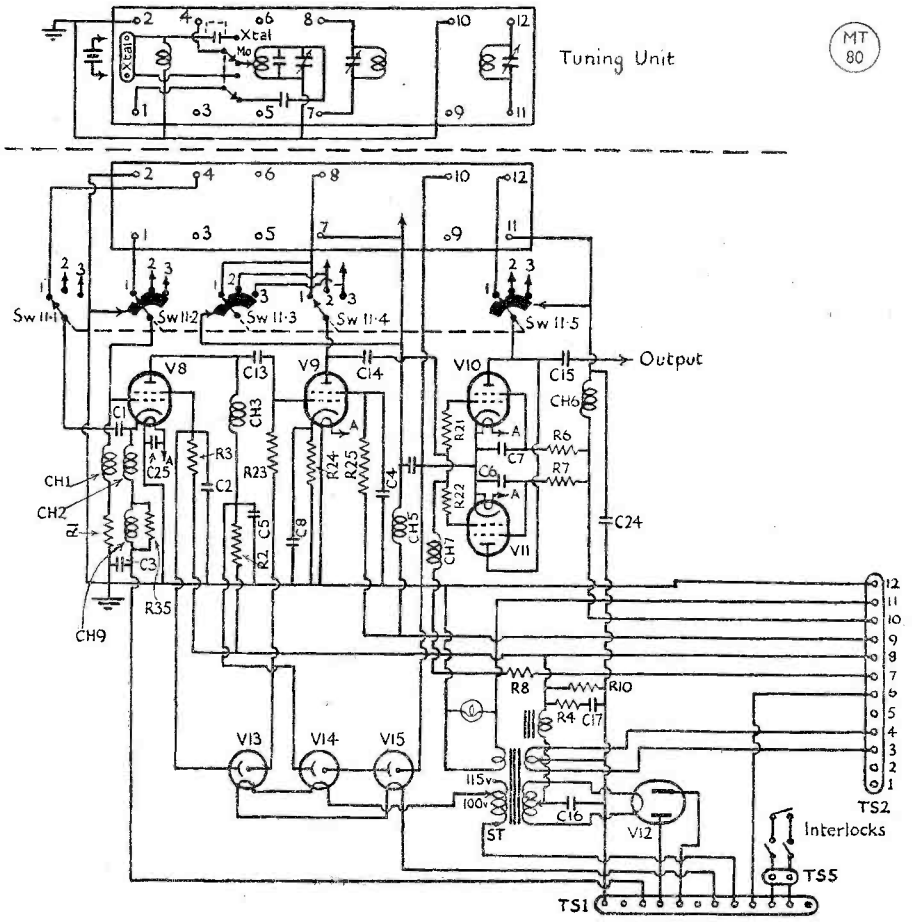


Fig. 1. Schematic diagram of the BC-610 Exciter chassis.

Table of Values

Fig. 1. The BC-610 Exciter Chassis

C1, C2, C3, C4, C5, C25, C26 = ·006 μF, 600 volt paper
C6, C7 = ·002 μF, 600 volt paper
C8 = 250 μμF, 1,000 volt mica
C13 = 150 μμF, 500 volt mica
C14 = 200 μμF, 600 volt mica
C16, C17 = 8·5 μF, 1,000 volt oil filled dual unit
C24 = ·005 μF oil filled 1,000 volt

R1 = 82,000 ohms, 10%, ½ watt
R2 = 5,600 ohms, 5%, 20 watt, W.W.
R3 = 15,000 ohms, 5%, 20 watt, W.W.
R4 = 750 ohms, 10%, 1 watt
R6, R7 = 20,000 ohms, 10%, 2 watt
R8 = 4,700 ohms, 10%, 2 watt
R10 = 40,000 ohms, 5%, 20 watt, W.W.

R21, R22 = 50 ohms, 10%, ½ watt
R23 = 330,000 ohms, 20%, 1 watt
R24 = 500 ohms, 10%, 10 watt, W.W
R25 = 50,000 ohms 10%, 2 watt
R35 = 100,000 ohms, 10%, ½ watt
Ch1, Ch2, Ch5, Ch6, Ch7 = 1 μH, R.F. Choke
Ch3 = 2·5 μH, RF Choke
Ch9 = 10 μH, RF Choke
LM2 = Tuning unit compartment illumination
T4 = Transformer. Primary 115-100 volt AC; Secondary (i) 5 volt CT, at 10·5 amp, (ii) 6·3 volt CT, at 3·5 amp, (iii) 5 volt CT at 3 amp
L1 = 6H, 250 mA
Sw11 = 4-pole 3-way ceramic

electron-coupled to the oscillator section ; the RF voltage appears across choke Ch3 and is coupled to the buffer/doubler stage by condenser C13. The screen voltage of V8 is regulated to 150 volts by V13 and the anode voltage to 300 volts by V14 and V15. Fig. 3A shows the oscillator circuit in its two modes of operation.

The buffer fraction bar doubler stage, V9 Fig. 3B, is self-explanatory; it operates as a buffer on 1-4 mc, and as a doubler from 4-18 mc. The 28 mc band is dealt with later as it was not incorporated in the standard frequency range. The output from this stage is capacity coupled by C14 to the intermediate power amplifier.

The intermediate power amplifier circuit, V10 and V11, Fig. 3C, is again self-explanatory. The output is normally taken from the ceramic bush between valves V10 and V11 through a condenser to the power amplifier. It should be noted that this stage operates as a doubler in the 14 and 28 mc bands.

The remaining components on this chassis are : T4, filament transformer (primary 100-115 volts AC) ; exciter supply rectifier V12 ; and exciter supply filter, consisting of C16, C17, L1, R4 and R10. The complete circuit of the BC-610 Exciter is shown in Fig. 1. Connections to the chassis are made by means of the tag strips TS1, TS2 and TS5. The coding of these are shown in Table I.

Amateur Band Tuning Units

To cover all bands from 1·7-28 mc, five tuning units are required, but only four are available in the amateur bands. The frequency coverage of each unit is as follows :

TU61	1·5-2 mc
TU49	3·2-4 mc
TU52	6·35-8 mc
TU54	12-18 mc

The circuits and frequency graphs are given in Figs. 5 and 6. Two TU54 tuning units are required, as one is needed for modifying to work on 28 mc.

Actually, it is not necessary, but merely convenient, to use these tuning units, so if they are not obtainable, others which are available may be modified from the information given in Fig. 5 ; so far as the writer is aware, the only difficult one is the Top-Band unit. For the convenience of "shoppers," remaining tuning units have the following frequency ranges :

TU62	1·0-1·5 mc	TU50	4·0-5·0 mc
TU47	2·0-2·5 mc	TU51	5·0-6·35 mc
TU48	2·5-3·2 mc	TU53	8·0-12·0 mc

BC-610 Adapted

On the axiom of the less work the better, the BC-610 will make quite a satisfactory 50-watt CW transmitter for 3·5 and 7 mc —or even 14 mc, by doubling in the 807's. The 1·7 mc band can also be used if the power is reduced to 10 watts.

The methods of mounting are best left to individual taste and station layout. However, one suggestion is ventured here. Mount the exciter vertically (tuning units horizontal) on a chassis behind a standard 19-in. panel. A rectangular hole is cut in the panel, through which the tuning units may be changed and adjusted. The additional components required may be mounted behind on the chassis and the wave-range switch brought out to the front panel by means of a right-angle drive.

For link output, join pin 9 of the tuning unit sockets together and connect a concentric cable between there and earth, the other end of the cable going either to the grid coil of a power amplifier or to an output socket. If one is available it is better to add a wafer to SW11, and switch the link outputs.

The power supply requirements and connections, together with a simple control circuit, are shown in Fig. 4. This requires only a twin screened lead to the operating position.

By using a modified tuning unit, straight-through operation may be obtained on 14 mc, but even with a modified unit the

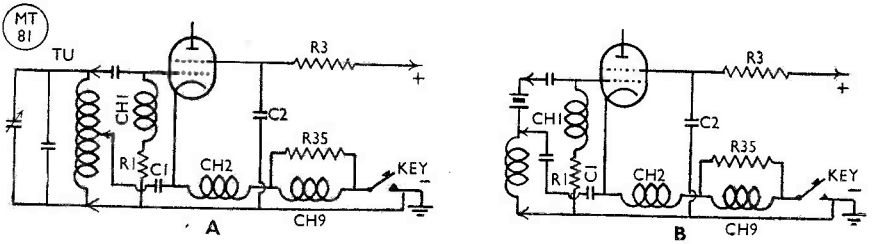


Fig. 2. (A) The modified Hartley oscillator for VFO control (B) Circuit arrangement for crystal control.

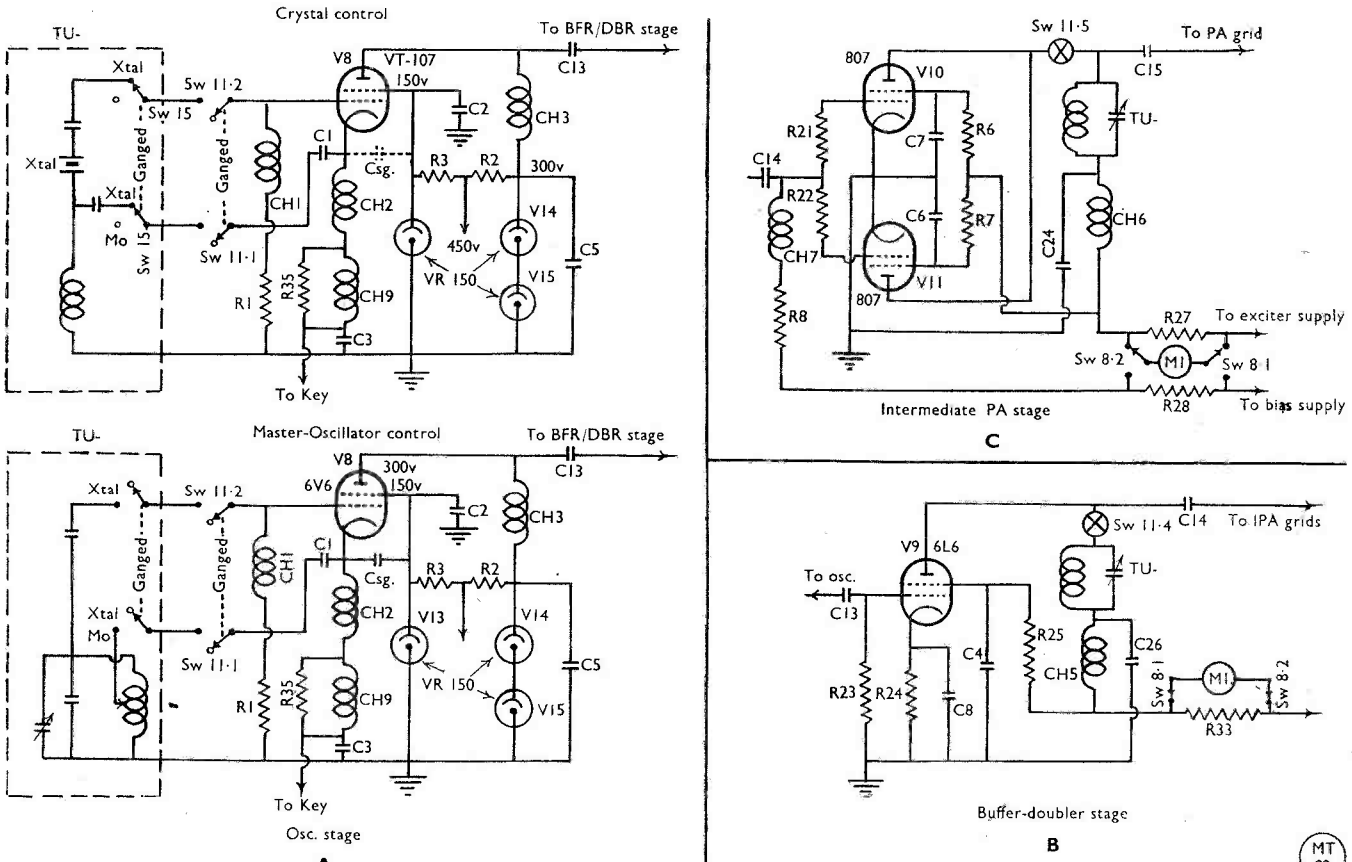


Fig. 3. (A) The oscillator circuit, as extracted. (B) The buffer-doubler section of the Exciter. (C) The IPA (Intermediate Power Amplifier, actually the output driver) of the BC-610 Exciter, using two 807's in parallel.

Table I

TAG STRIP CONNECTIONS

TS1

Lug No.		
1	Earth	
2	Blank	
3	Key	
4	Exciter HT transformer 435 volt R.M.S.	Centre-tap is earthed
5		
6	Blank	
7	115 volt AC (T4 primary)	
8	115 volt AC common line	
9	Bias line (Also Lug No. 6 on TS2)	
10	Interlocks (Also TS5)	
11	Interlocks	
12	Blank	

TS2

Lug No.	
1	Blank
2	Blank
3	5 volt, 10 amp
4	
5	100TH PA grid current meter and return Lug 6
6	Bias
7	IPA grid current meter and return to Lug 6
8	Exciter HT to meters (common)
9	V9 anode and screen current
10	V10 anode and screen current
11	6·3 volt AC for pilot lamp
12	Earth

807's still double on 28 mc. Details of the necessary modifications to the tuning units are given later, as these are dealt with as a separate item.

As a driver unit, there is more than enough drive available for a 150-watt triode power amplifier. One 807 should be removed if it is proposed to use a tetrode in the amplifier and some form of variable control provided so as to avoid over-driving the PA. As the appropriate filament voltage is available, 5 volts on pins 3 and 4 of TS2, it would be simple to use either 35T's or HK54's in push-pull, or a single 100TH.

With the original mounting suggested and a single-ended stage, the output from the 807's is very conveniently placed for capacity coupling, and the grid lead need not be more than 2 in. long, if the PA valve is mounted immediately above. A circuit for a single-ended PA stage is shown in Fig. 7, together with circuit constants and coil values.

So far, it has been assumed that both the internal VFO and crystal are to be used ; however, many may wish to employ their own VFO. To do this, some alterations have to be made to the tuning units. It should also be noted that the VFO of the BC-610 has a characteristic chirp, well known during the war ; it is not too bad on 3·5 and 7 mc but, higher, it is *definitely* noticeable !

Tuning Unit

It is proposed to cover as many aspects as possible on the modifications to these units, from conversion to 28 mc to the use of external VFO.

A total of two TU54 tuning units will be required, one for 14 mc and the other for modifying to operate on the 28 mc band.

Ten-metre Conversion. Remove the cover of one TU54 by means of the six screws on the right-hand side and ends (viewed from the crystal socket). Then proceed as follows :

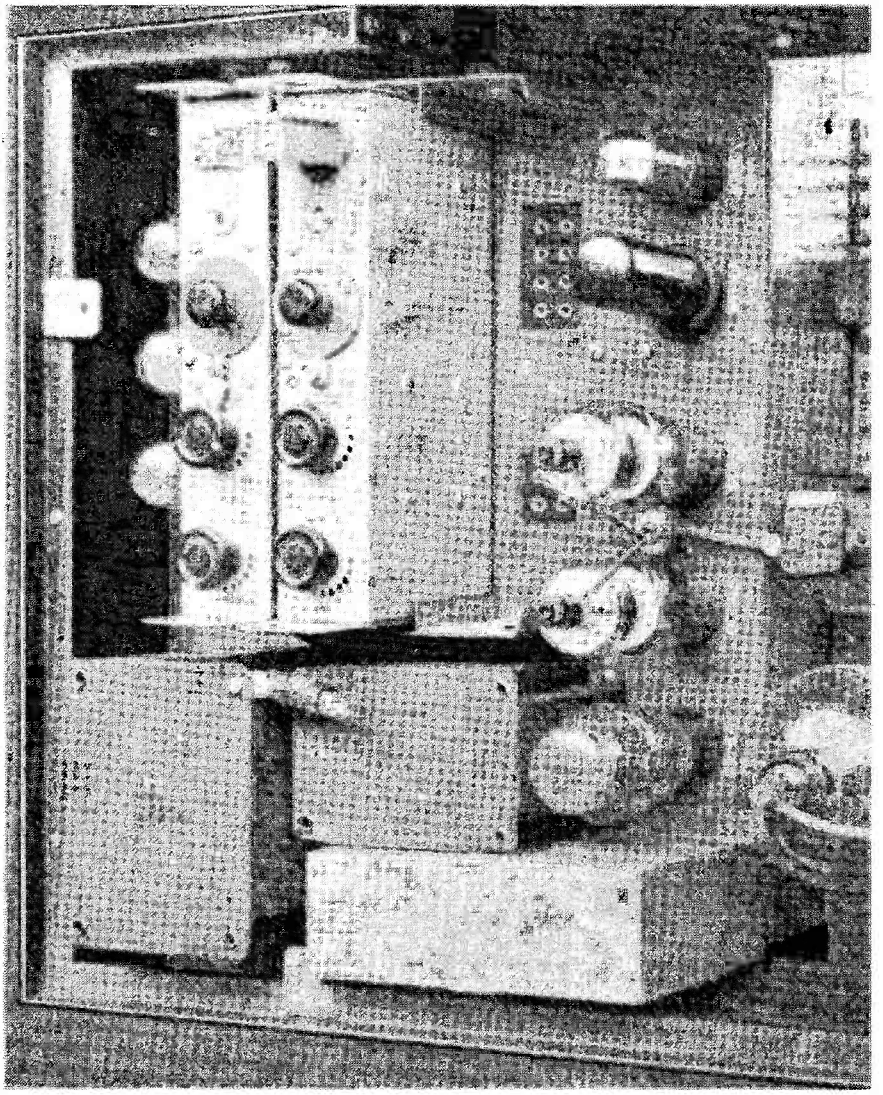
(i) Locate coil L42. Remove 25 turns from the bottom of the coil ; this may be done without removing the coil. If the crystal does not oscillate, remove turns until it does.

(ii) Locate coil L35. Leave half of the existing coil by removing the same number of turns from each end. Note the tap is not central, so that by this operation, the tap is approximately the same percentage of turns from earth.

(iii) Locate coil L36, which is mounted on a sub-assembly with coil L37 and their appropriate condensers. To remove this assembly easily, take off the knobs and then remove the four screws holding the paxolin condenser panel and two screws retaining the dividing screen. The connections to the plug-in base are the unsoldered. Remove coil L36. Take the same number of turns from each end until six are left. Remove the wire running from the stator terminal of C32 to the coil and replace with a 100 $\mu\mu$F ceramic condenser.

(iv) Coil L37. Remove this and replace with a 4-turn coil of the same diameter, and stretch out to original length ; the ends of it should be connected directly into pins 11 and 12 of the coil base. The other connections are made directly to the wires at the coil end. The wire size is not critical but should be about the same as the original. Join a lead from the rotor of C34 to the bottom of L37 (as viewed in the photograph) and connect a 75 $\mu\mu$F Ceramicon condenser between the stator of C34 and the other end of the coil.

(v) Make a one-turn link and place near the top end of the coil ; connect one side directly to earth and the other to pin 9.



Top view of the Exciter chassis.

Twenty-metre Conversion. To provide straight-through operation of the 807's on this band, repeat the modifications made to coils L42, L35 and L36 in ten-metre conversion. Leave L37 as it is but add loop output.

This now completes the set of coils for all bands with "internal MO and Xtal" operation. For best performance it is advisable always to place the tuning units for 14 and 28 mc operation in Channel I because of the shorter leads.

It is recommended that in these two tuning units, MO is only used for 'phone operation as the chirp is *very* bad indeed on CW.

External VFO

Amongst the numerous owners of BC-610 transmitters, the methods of adapting to external drive are various, all having their advantages and disadvantages according to personal ideas.

As the internal VFO is very good on the 40- and 80-metre bands, it is really only necessary to use the external VFO on the higher frequency bands. With this fact in mind and having a VFO with output on 7 mc, the system detailed below is considered to be the simplest and most efficient method and entails no major modification.

First, condenser C1 is removed from the exciter chassis and placed in the tuning unit, so that according to the bands used that number of ·006 μF mica condensers will be required. These should be placed between pin 4 and SW15 in the tuning unit in place of the wire joining these points. Join the cathode of V8 direct to pin 4 of the tuning unit socket. Rewind the internal VFO coil to resonate at 7 mc and wind a two-turn link on the cold end ; one side of the coil and the link are earthed, the other end of the link going to pin 5 (earth is pin 2). The hot end of the coil, in the case of TU53 and TU54, is connected to C50 as before, but R32 is removed ; in other units it is connected as the original. Connect the earthy end of Ch9 to pin 3 of the tuning unit socket. Join pin 3 in the tuning unit to SW15 in place of the wire from the VFO cathode

Table of Values

Fig. 4. External Circuit Arrangement

R1 = 10,000 ohms, wirewound pot. 10 watt
C1 = 16 μF, 350 volt working electrolytic
CH1 = 10H, 50 mA Choke
T1 = Transformer 230 volt Primary. 200-0-200 volt, 50 mA. Secondary (i). 6·3 volt 1 amp. Secondary (ii) 6·3 volt, 2 amp. Secondary (iii).
T2 = Auto transformer 230 volt-115 volt, 250 watt
T3 = Transformer 230 volt Primary ; 435-0-435 volt, 250 mA Secondary
M1 = 0-10 mA
M2 = 0-50 mA
M3 = 0-200 mA
LM1 = 6·3 volt pilot lamp
Ry1 = 6·0 volt AC coil relay 1M
Sw1 = DPST switch
Sw2 = SPST switch
V1 = 6×6
V2 = VR150-30
Ts3 = 6 lug tag board

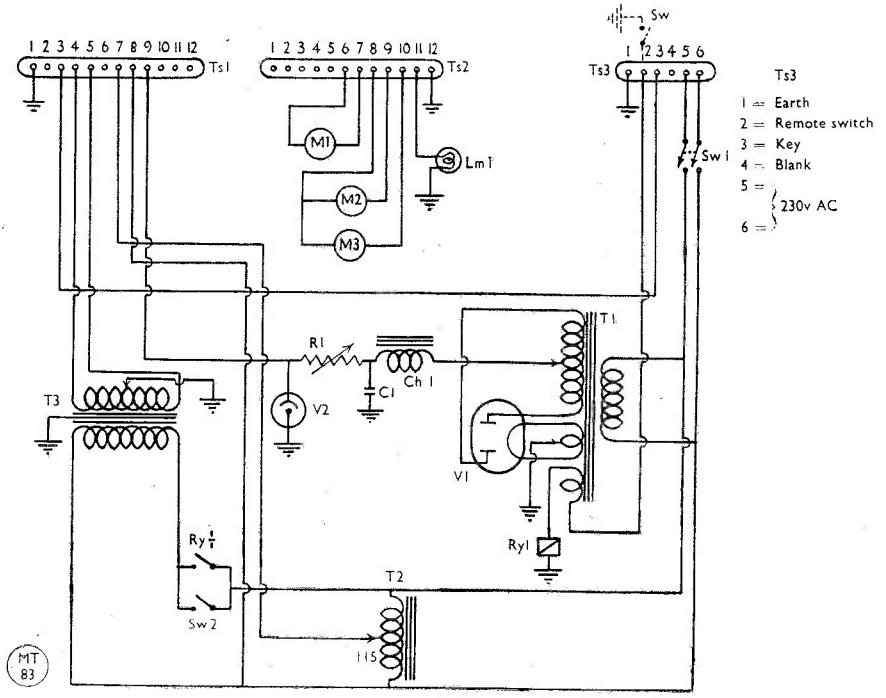


Fig. 4. External circuitry and bias pack for the Exciter.

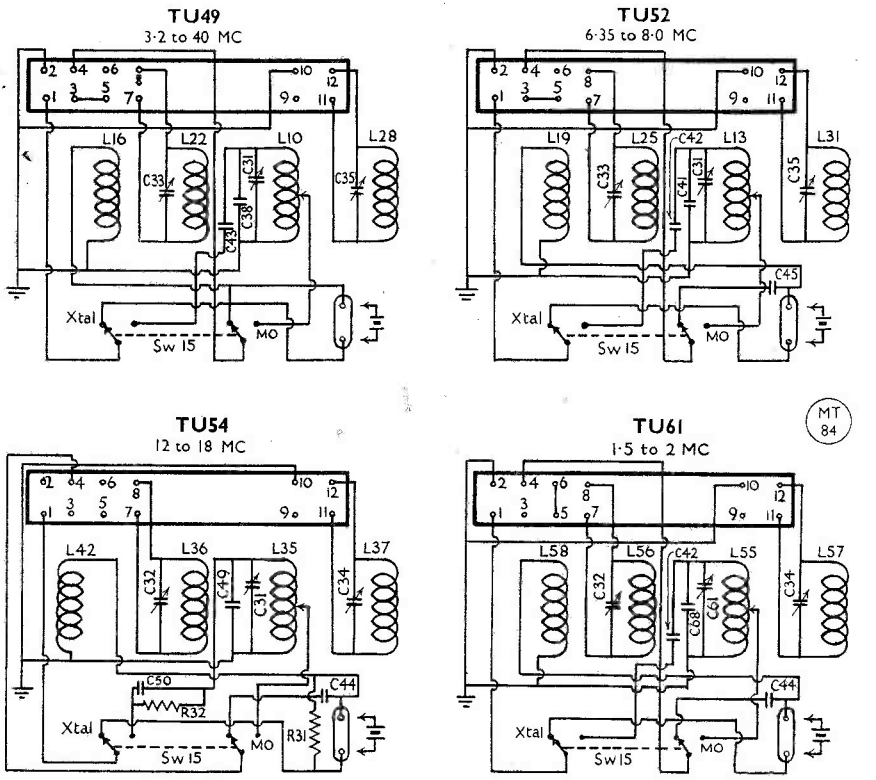


Fig. 5. Circuit arrangement o fthe various Tuning Units for the BC-610 Exciter ; they differ only slightly.

Table of Values

Fig. 5. Tuning Unit Circuits

Where parts are not listed under one TU, they will be found under another, parts being common.

TU49

C31 = 140 μμF var Johnson 140K8
C33 = 100 μμF var Johnson 100K8
C35 = 100 μμF var Bud MC1855
C38 = 135 μμF, 5% Ceramic, 500 volt
C43 = 50 μμF, 5% Ceramic, 500 volt
L10 = MO coil, 41 mH
L16 = Crystal coil 9·2 mH
L22 = Buffer coil 20·6 mH
L28 = I.P.A. coil 20·6 mH
Sw15 = D.P.D.T. switch

TU52

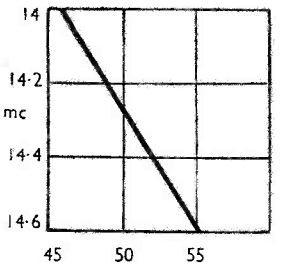
C41 = 185 μμF Ceramic, 5%
C42 = 40 μμF Ceramic, 5%
C45 = 400 μμF, 20% mica
L13 = MO, 8·1 mH
L19 = Crystal, 18·0 mH
L25 = Buffer, 5·66 mH
L31 = IPA, 5·66 mH

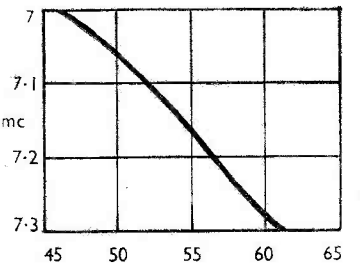
TU54

R31, R32 = 30,000 ohms, 10%, ½ watt
C34 = 190 μμF var, Bud MC1857
C49 = 65 μμF, 5%, Ceramic, 500 volt
C50 = 75 μμF, 5% Ceramic, 500 volt
L35 = MO, 12·7 mH
L36 = Buffer, 4·84 mH
L37 = IPA, 4·84 mH
L42 = Crystal, 14·3 mH

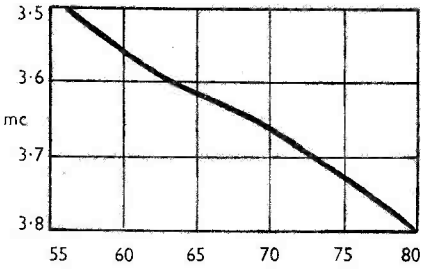
TU61

C32 = 140 μμF var, Johnson 140K8
C44 = 250 μμF, mica, 10%, 500 volt
C61 = 100 μμF var
C62 = 75 μμF, Ceramic, 5%
L55 = MO
L56 = Buffer
L57 = IPA
L58 = Xtal





MT 85



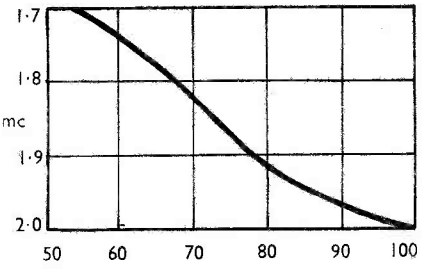
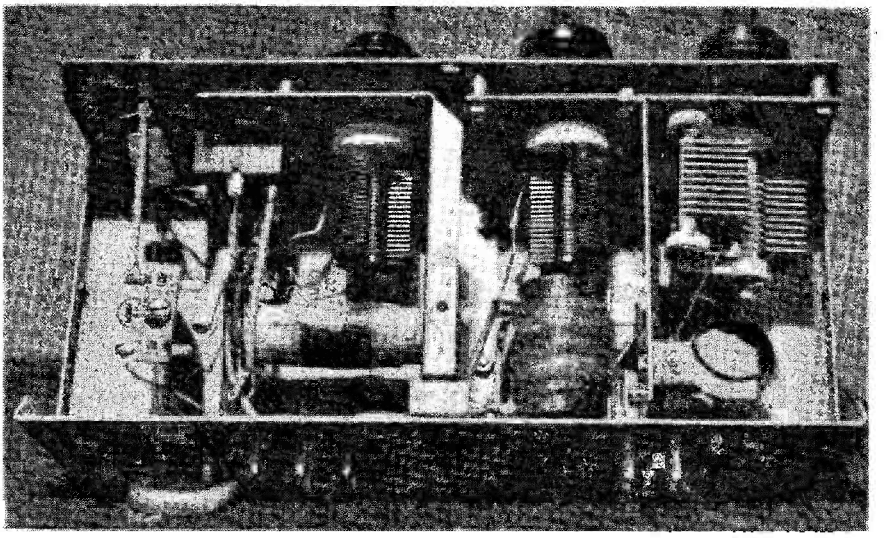


Fig. 6. Calibration curves for the Tuning Units.



All the Tuning Units for the BC-610 are similar ; this is the TU54.

Table of Values

Fig. 7. Power Amplifier for the BC-610 Exciter

C1 = ·002 μF, 20%, 600 volt DC mica
C2, C3 = ·05 μF, 20%, 600 volt DC paper
C4 = 5·5 μμF max var, 7,000 volt DC
C5 = ·001 μF, 10% low loss mica, 2,500 volt DC
C6 = 150 μμF per section, 7,000 volt DC var
C7 = ·002 μF, 5%, 6.000 volt DC mica
RFC1 = 1 μH, RF Choke
RFC1 = 2·5 mH, RF Choke
M = Suitable meter
L1 = 3·5 mc, 24 turns, 16SWG enamel covered, 3¼ in. dia, length 4¼ in. CT (C388A)
L1 = 7 mc, 18 turns. 16SWG enamel covered, 2¼ in. dia. length 3¼ in. CT (C390A)
L1 = 14 mc, 12 turns. ⅛ in. tube, copper, 2¼ in. dia. turns spaced ¼ in. CT (C448)
L1 = 28 mc. 4 turns. ⅛ in. tube, copper, 2¼ in. dia. turns spaced ¼ in. CT
L2 = 3·5 mc, 2 turn variable link at centre
L2 = 7 mc. 2 turn variable link at centre
L2 = 14 mc, 1 turn variable link at centre
L2 = 28 mc. 1 turn variable link at centre

Note: The bracketed numbers are Baker and Williamson coils available on the surplus market.

tap. Connect the coaxial cable from the VFO (external) between pins 5 and 2 on the tuning unit socket.

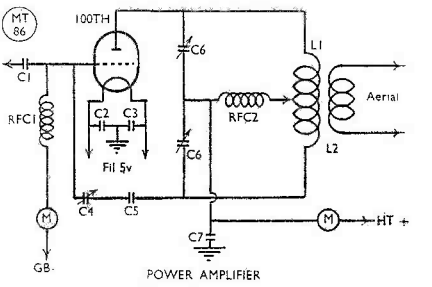


Fig. 7. RF Power Amplifier stage for the BC-610. The valve shown is a 100TH neutralised triode.

The MO-Xtal switch on the unit is used as before; that is, MO equals external VFO.

Before concluding this section, it is worth noting that the tuning units can be used as very compact VFO exciters by building them into the rest of the circuit.

Grid Dip Meter

Construction and Operation

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

Description of a simple radio tool for which there are many practical applications. The Grid Dip Oscillator considerably extends the range of usefulness of the absorption wavemeter.—Ed.

THIS is a piece of equipment which will be found most useful by all who do any test or constructional work. With its aid, much time can be saved, particularly when the frequency coverage of tuned circuits under test is an unknown quantity.

The circuit is given herewith. It is simple, consisting of a straightforward triode oscillator, with provision for indicating changes in grid current. As described, a magic-eye is employed for this purpose and is recommended because of its sensitivity and instantaneous response. The unit may be simplified if a micro-ammeter is used instead of the magic-eye. In this case, a meter of 500 micro-amps (or less) full scale deflection is inserted between R2 and earth, R1 being deleted.

The principle on which the wavemeter works is as follows: With V1 oscillating, grid current will flow through R1 and R2, producing a negative voltage at the grid of the magic-eye tube, causing the shadow to close up. Any disturbance of the tuned circuit—for example, bringing it near another circuit tuned to the same frequency—will result in a reduction of grid current and the shadow angle will vary accordingly.

The foundation of the wavemeter is an Eddystone diecast box. The magic-eye should be sunk into the box, to improve readability, if necessary fitting a small external shroud to screen off direct light. If a miniature type of valve is used for V1, it can also be enclosed in the box by the exercise of some ingenuity, but this is by no means essential.

A long 3-core cable should be fitted for feeding in power supplies. The heater consumption is 0·6 amperes, the HT just a very few milliamperes; an HT supply of 150 volts is normally adequate, although up to 250 volts may be used if more convenient.

Using the Wavemeter

With no HT or LT applied, the unit can be used as a simple absorption wavemeter, indications of resonance being obtained by variation of anode current in the valve associated with the circuit under test.

The real benefit is obtained when the wavemeter is energised. Circuits may then be tested for frequency coverage without power

Table of Values

Grid Dip Absorption Meter

C2, C3 = 100 $\mu\mu$F silvered mica
R1 = 10,000 ohms, ½ watt
R2 = 47,000 ohms, ½ watt
R3 = 100 ohms, ½ watt
R4 = 20,000-33,000 ohms, ½ watt
R5 = 2 megohms, ½ watt
R6, R7 = 1 megohm, ½ watt
V1 = 6J5, L63, EC52, 955, etc.
V2 = EM34 or equivalent

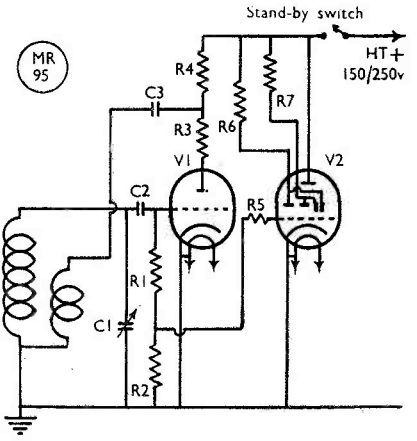
List of Parts

	Eddystone
1 Diecast Box	Cat. No. 650
1 Ceramic Microdenser (C)1	Cat. No. 585 or 586
1 Direct Drive Dial	Cat. No. 595
1 Coil Base	Cat. No. 707
Coils as required	Cat. No. 706
2 Valveholders	

being applied to the receiver, transmitter or whatever it may be. This is a decided advantage when testing on circuits which normally will not be made to oscillate at all, *e.g.* the RF stage of a receiver.

As an example, let us take a multi-stage transmitter. The wavemeter is set to oscillate at, say, 7 mc and brought near the crystal oscillator coil. Rotation of the CO tuning condenser should result in a flicker of the magic-eye, indicating the resonance point. If no flicker is obtained, reverse the procedure. Set the CO condenser first at minimum, then at maximum, and vary the wavemeter tuning to secure indications of the frequency coverage of the circuit. The discrepancy will then be obvious, and adjustments can be made accordingly.

The following stage can be tuned up on, say, 14 mc and so on. Finally, the PA tank and



Circuit of the Grid Dip Oscillator, which takes the ordinary absorption wavemeter a stage further.

aerial tuning can also be roughly adjusted. When the transmitter is finally switched on, only minor adjustments should be necessary and there will be the satisfaction of knowing that the harmonic frequencies selected are correct. Receivers and other equipment can be lined up beforehand in a similar way:

The ten degrees at the high frequency end of the various ranges on the wavemeter should not be used, as grid current is liable to vary when the L/C ratio is very high and fluctuations in the magic-eye indications may be observed, irrespective of normal operation.

RF Balance

Neutralising Circuitry

By **W. VINICOMBE (GM8RV)**

FOR the purpose of this short note, it is assumed that the reader has had some experience of neutralising an RF stage. It is hoped that the more knowledgeable will excuse the simple manner in which it is portrayed.

A circuit built by many amateurs is shown in Fig. 1(A). It is neutralised with plate voltage off. When the HT is switched on, symptoms of instability are noticed. The grid current will invariably go up instead of down. The valve may run hotter than the load warrants. There may be inexplicable jumps in the metered currents and unwanted RF may be observed.

The circuit redrawn, as Fig. 1(B), may help to make this apparent. The sketch, captioned "Why" is not truly balanced. The capacity between grid and plate (dotted condenser PG) is normally neutralised, but how about the plate to filament or earth (dotted condenser PE)?

By adding a small variable condenser (N/P) as shown in Fig. 2(A), it is possible to effect almost perfect neutralisation. Again redrawn as at Fig. 2(B) and captioned "Why not," there is shown a bridge, with two fixed and two variable values. By carefully manipulating these variables a balance is assured and the valve and circuit under consideration will be perfectly stable.

This condenser (N/P) is connected between the plate coil and earth and therefore subject to all the electrical stresses in the anode circuit; the insulation resistance and spacing should be equal to dealing with four times the anode voltage at least. The capacity depends upon

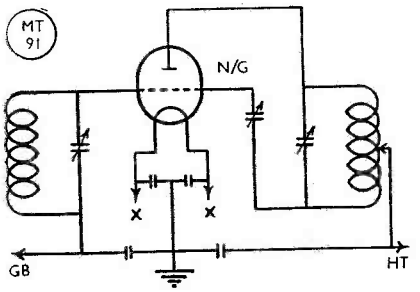


Fig. 1A.

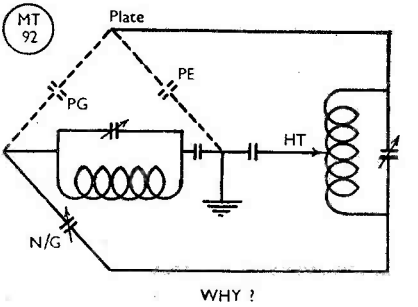


Fig. 1B.

the valve being stabilised, and should be about twice the anode-to-filament capacity of the valve, as shown in the manufacturer's data sheet.

To help those in difficulty, a small tuning condenser with ceramic insulation was used at GM8RV. The spacing was quadrupled, using two fixed and one moving vane. In place of the terminals, small stand-off insulators were screwed on, the whole being mounted on the chassis with the rotor plate earthed—the other connection being obvious. Where a split-stator condenser is employed for anode tuning, N/P may take the form of a metal plate (with rounded edges—to resist corona) mounted on a suitable bracket, and placed near the correct stator section. Adjust as may be required.

Procedure and—

Neutralisation is accomplished as follows: With condensers N/G and N/P at minimum, HT off and drive on, search is made for RF in the tank coil, using an absorption meter or neon lamp. RF will be at maximum when the coil is tuned to resonance. Increase capacity of N/G until this indication disappears. Check by swinging tuning condenser. When RF is no longer apparent, attention should be given to the grid meter. Kicks in grid current will be observed as the plate tank condenser is swung through the point of resonance. Continue the adjustment of N/G until these kicks cease.

—Precautions

It is at this point that the transmitting amateur ceases his efforts and is satisfied—but tune the signal in on the station Rx; swing the anode condenser as before, and the note in the receiver will be heard to vary considerably. Once more condenser N/G should be adjusted. Now condenser N/P should be brought into service. By careful manipulation of this capacity, a setting will be arrived at where the note in the receiver is perfectly stable, no matter what the position of the tank condenser.

Switch on the HT. It will be found that no further adjustments are necessary. The valve will appear harder to drive, but in fact this is not so. All the power into the grid is being used to the best advantage, as evinced by a cooler valve and no RF in places from which it should be absent.

The foregoing remarks apply to the triode which is so popular and also to the cheaper type of tetrode, many of which should be neutralised as a matter of course.

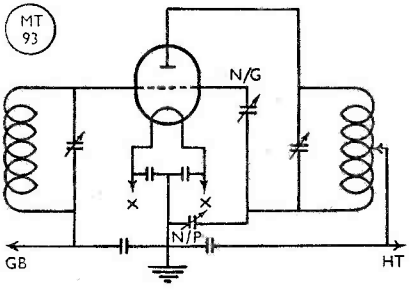


Fig. 2A.

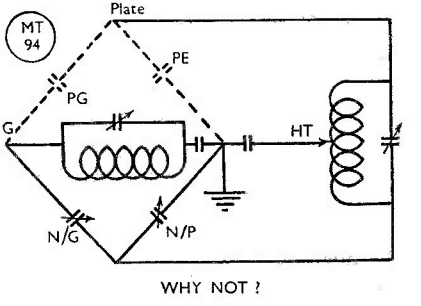


Fig. 2B.

DX COMMENTARY

CALLS HEARD, WORKED & QSL'd

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

Greetings once more, in this season of Contests, Sunspots, Pirates and Phoneys. It is with the latter that we shall deal first, with the idea of dismissing unpleasant subjects early in this Commentary. Pirates and Phoneys have always been with us, but they are certainly on the increase, and there must be some reason for it, although it has eluded us up to the present.

Pirates are stations who allot themselves a moderately honest callsign indicating their country of origin, although they have no licence to operate. As such they are a nuisance to the authorities and probably to the local licensed amateurs (if there are any), but they don't worry the DX fraternity in the rest of the world. Phoneys are those queer types who choose either a DX or a non-existent prefix and proceed to get in everyone's way and tread on everyone's toes, and we can't think of a single good word for them.

The 80-metre Racket

Now of course we have to admit at once that last month's remarks on the 3·5 mc band were unduly optimistic, and that 80 per cent. of the "DX" up there was the work of one phoney, or just possibly more than one. But we are inclined at the moment to the opinion that KH6IJ, KL7GH, VP8CH, VS9AN, VS6AJ, VK7YL, ZS1M, ZS1T, YA3B, YJ2FF, AC4YN and the bogus VK5KO were all the work of *one* busy little man. He must have enjoyed himself a lot, and in a way he did a crooked good turn by stirring up an enormous amount of interest in the 3·5 mc band. If he reads this, however, he will know our opinion of him—which the Editor obviously wouldn't print—without going any further. There is no great personal animosity here, because the only one of all that bunch that we worked was "VK7YL"; but on behalf of all the chaps who were taken in we should like to tell him that he is a – –(Censored ! *Ed.*) The phoney-situation apart, however, the interesting thing is that the several genuine contacts which have been made prove that real DX can again be worked on 3·5 mc.

The trouble has not been confined to 3·5 mc. On 14 mc we have heard things like EZ4BB, ZP3O, and other similar Jabberwocks. And the worst manifestation of all has been the notorious "CZ2AC," who is being claimed by lots of people as a new country worked, but must henceforth be deleted from their lists. Some have even had a QSL from this station, supposedly in Monaco !

One of the first to work CZ2AC was G8PL (London, N.W.3), and he sends us a letter from HB9GP, which we quote verbatim : "I can tell you with exactitude that the whole story about CZ2AC is the work of a very bad pirate. With this call operated a long time Ernest Knecht, Neugasse 20, St. Gall, Switzerland. The Italian lady, Miss Monsinis, is working here in Switzerland and her home address in Italy served only for QSP of QSL cards. All the delivered cards are wrong ; the QTH is Switzerland and the operator is not a lady, it is a pirate. The Swiss Radio Service discovered CZ2AC and punished him ; for all that he was since again identified. May this letter be an orientation to you."

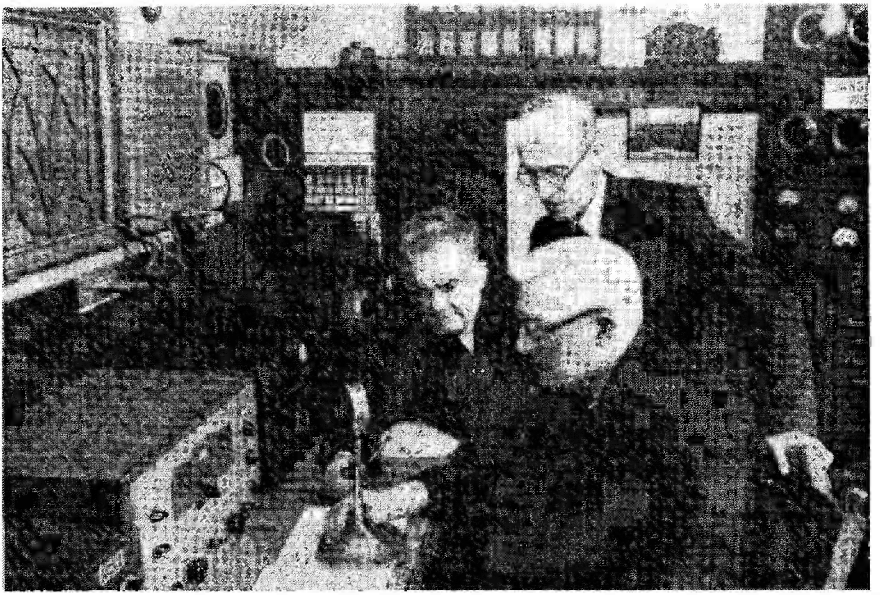
G CALLS HEARD OVERSEAS

Most G stations, and particularly those licensed fairly recently, are interested in seeing where they have been heard in distant parts. We should therefore be very grateful if overseas readers would be good enough to let us have for publication lists of G's heard on 1·7, 3·5 and 7 mc—the 14 and 28 mc bands are not so important, as DX results are to be expected on these frequencies.

So that's the story of the Super-Phoney, who not only gives you a new "country" but QSL's to prove it ! Comment would be superfluous. As G8PL says, "after *this*, all information is strictly E. and O.E. and without prejudice ! "

Contests and All That

With the ARRL Contest half over and BERU just about to begin, week-ends are becoming sleepless affairs for the keen types. Conditions being as good as they are, it is



Group from Yorkshire. G6NP's station (with himself on the microphone) ; G6PL, who has just collected his 5,000th QSL card (behind) ; and G2SU, who has been at it since 1911, to G6NP's right. G6NP is active on 1·7 mc as well as on the DX bands.

impossible to snatch a wink of sleep during the whole 48 hours without losing lots of points. In the ARRL Contest, especially, there was no time of day or night at which one couldn't work strings of W's ; from midnight onwards 7 mc teemed with them ; in the early hours one could use 3·5, 7 or 14 mc ; 14 mc still held them until nearly lunch-time, when the 28 mc band opened wide and kept open until quite late in the evening. By that time 14 mc was howling with W's again. For the one-operator station this is no longer a Contest but merely a test of endurance and snappy operating.

Top of the World

Congratulations to GI6TK (Belfast), whose phenomenal score of nearly half a million in the *CQ* DX Contest last November has made him the World's Highest Scorer ! We must find out whether he slept at all, or whether he just contracted for a week in bed *after* the Contest. Incidentally, talking to 'TK recently he told us that he has worked 66 countries on 3·5 mc, of which 50 are *confirmed.* His score on 7 mc was 91, and his post-war total was 225 countries. And while we are up among the astronomical figures we hear that W1FH has 213 countries *confirmed.* Others who have worked more than 200 include W6VFR, W2BXA, W6ENV, W6PFD, W8HGW, W6ITA, W6EBG and, in among all these California Kilowatts, our own G2PL ! It's a pity that some of the G operators are too modest to come forward with their scores ; sufficient to say that we know of a GI, a GM, a GW and two or three G's (never appearing in any lists) who are round about the 200 mark or above. At the same time we should like to make it quite clear that anyone who has worked over 100 is fully entitled to read this column ! As a matter of fact, even Arabackle, with 23 confirmed, reads it occasionally.

All Bands Open

And so to the month's DX. Starting with 7 mc, we hear from G5FA (London, N.11) that he has worked all W districts, VE7, OX, VK, TF, HZ and LZ. LZ3SD gave his full QTH, which appears in the list. G2AVP (Stradishall) offers VP4TZ (0010), ZL's (0830), VE7AKA (1000), KP4KD (2130), ZC6UN (1700), CO8OH (2300), and has heard KM6AK (0830), HC1FG (0815), KC6EA (0700), VP3AA (2045), XE2CB (0840) and KH6FG (0845).

G5GK (Burnley) has pulled in ZC8, HZ, VQ2, VQ4, HK, TI (phone at 0830), UI8 and a doubtful OQ4 ! An interesting pair from G3ATU (Sunderland) are VK3ABM/MM, just leaving Birnie, Tasmania (25 watts, 1930)

and YI1FC (said to be RAF Habbaniya).

G6HL (Shepperton), who was a victim of the phoneys last month, says that this organised piracy puts a most unpleasant twist on Amateur Radio and makes him wonder if we'll have to introduce an identification system soon. His best on 7 mc this month (subtracting the phoneys) were VE7, ZL, HZ1JE (2000), VQ5JTW (1900), FF8GP (1845), TA3AV (1800) and LZ6AB (1820). The last two cause a slight twitch of the eyebrows. G6HL is just off to Canada for two years on posting and hopes to have a VE2 or VE3 call shortly.

G6PJ (Sheffield), using 70 watts, has worked VK, ZL, KH6, VP8, UF6, VO and EA8 on 7 mc.

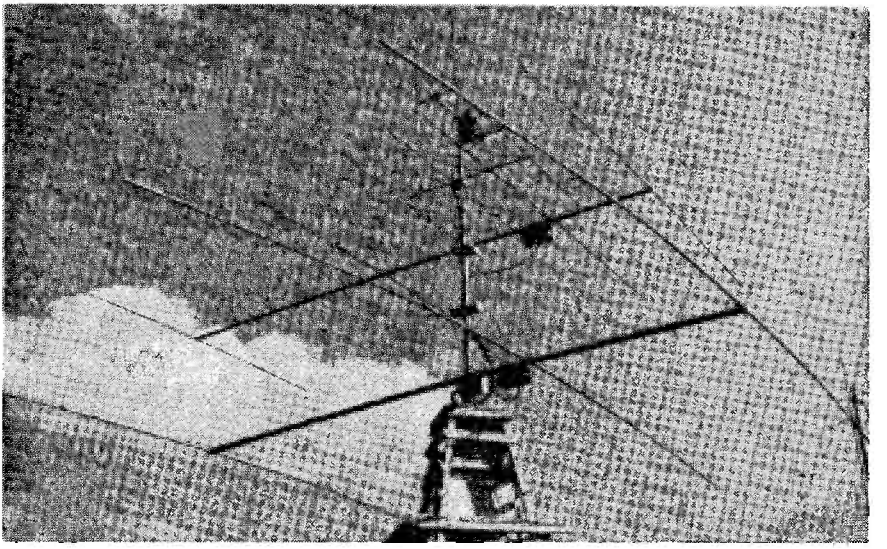
The 14 mc DX

The nicest arrivals on 14 mc have been KH6VP/VR4 and FO8AC, both of whom have been worked by practically everyone except your Commentator. FO8AC seems to be best between 0800 and 1000, but was also heard during the ARRL Contest at 1900. KH6VP/VR4 was roaring in during the sunspot period at the end of January ; he was 579, watery, and literally the only signal on the band on one occasion. Repeated calls only brought him back calling CQ again—quite the most depressing thing that can happen to a DX man. Another nice one, not so widely publicised as yet, is W6DLX/KW6, heard at midday with a long queue of W5's and 9's on the hook. We haven't yet heard from a G who has worked him.

G2WW (Penzance) has been very active on 14 mc phone with CO, HZ, OX, TI, VP4, VP9, VQ2, YK, ZD1, ZD2, ZS3 and lots more. He tells us that MO1A, who may have caused some head-scratching, is ex-MD1A with a new prefix allotted on January 29. (QTH in list). From G6HL comes news of a 14 mc QSO with TA3FAS (G6ZO on the key !), and also FF8GP (1315), XZ2MM (1525), HE1CB (1050).

G3ATU (Sunderland) asks us to correct last month's statement that he worked VQ1CUR. To his sorrow, he merely heard him. But he *did* collect KH6VP/VR4. (The operator of the latter, by the way, is ex-W7BE.) G5GK added the VR4 and FF8 to his score. G4CP (Dudley) pushed up to the fine total of 170 countries on 14 mc with FO8AC, FF8GP and HL1BJ. G3DO (Sutton Coldfield) added the FF8 and HE1CB, and, on phone, HV1A and VP2KM. HE1CB, by the way, says "QSL *via* CT1FS," so the eyebrows are busy again.

G3DER (Compton Bassett) has collected some nice DX including VK9NR and KZ5CP, but says he is haunted by people with notes like someone shaking a tin can full of nails whenever he finds a weak DX station to call. He adds that he counted one DA sending 42 CQ's before his call !



The very fine composite beam arrangement at W1BB, Winthrop, Mass., who was one of our earliest collaborators in the *Magazine* pre-war DX tests on 1·7 mc. This array carries beams for 14, 28, 50 and 144 mc.

FOUR BAND DX

Station	Countries Worked					Power
	14 mc	7 mc	3·5 mc	28 mc	Total	
ON4JW	178	68	24	2	180	45/75
G4CP	170	45	1	64	171	150
G8IH	164	55	14	27	172	7/150
G2WW	155	31	21	76	165	60/150
G6QB	149	64	30	106	174	150
G2VD	149	41	22	66	157	150
G2AVP	146	54	28	24	155	25/120
G3DO	141	37	16	91	171	150
G3ATU	140	55	24	41	151	10/150
GC2CNC	134	52	8	61	162	10/50
G3AKU	124	38	25	13	131	30
G6HL	123	70	29	123	159	150
G5GK	116	87	10	4	182	150
G5FA	114	79	17	8	126	100
G2DLJ	112	36	24	19	115	120
G5WC	112	49	1	12	114	45
G2AO	111	34	29	32	120	150
G8IP	110	33	13	59	127	3/150
G8VB	105	39	44	50	127	150
G6XL	105	41	13	35	127	75/100
G3BDQ	105	26	18	1	107	25/150
G3ACC	102	5	19	2	102	150
G8VG	96	48	17	24	117	60/75
G2YS	96	22	21	25	107	150
G8QX	95	17	12	63	120	150
G6BB	84	21	2	23	102	Phone 80
G5HH	81	37	22	27	98	25/75
G4QK	73	22	19	2	77	100
G3FNJ	68	24	19	34	86	150
G2VJ	59	12	4	41	84	25/150
G2DHV	58	24	12	2	61	25/60
ZB1AR	50	29	26	20	60	10/25
G2BJY	47	24	4	82	106	25
G2HIF	42	9	6	30	64	150
G3DOG	33	24	3	1	42	Phone 25
GW3ECH	32	5	7	6	36	25
G3COJ	31	21	1	50	83	75
G6OM	28	30	20	55	87	?
G8PG	26	28	10	1	38	1½/14
G3EIZ	25	20	30	1	93	25

From Overseas

Salutations to ON4JW (Brussels), who goes to the head of the Four-Band Table this month with his score of 178 countries on 14 mc. Jules finds them *all*—this month FF8GP, FO8AC, YK1AF and KH6VP/VR4 have all fallen into his bag. Fine work, 'JW.

Very nice to hear from Ben Wallich (still G6BW, not ex-G6BW, because he has retained the call). But he now wields the new call ZL1GN, and his QTH is in the list.

VQ4CUR (Kenya) tells us that he was in VQ1 for only three days. He worked for six hours, and with his 12-15 watts raised 36 countries in 124 contacts on 7, 14 and 28 mc. A stout chap and a stout effort, too ! He says his receiver was the poorest part of the gear (a 1-V-1) and the aerial was only a 66-ft. Marconi. 'CUR remarks that even in Kenya it's hard work listening through the din that comes on when he calls CQ or even signs VA, but adds that it's good practice for the CQ, ARRL, BERU, SARL, VK/ZL and VERON Contests ! Among the "rare bods" he has been hearing on the bands are VU9 (Nepal), VK9, VK8, KM2, ZD9, VU4 and DK1. He has raised 139 countries on 28 mc, but hasn't yet raised Europe on 7 mc, which grieves him.

From EK1DP (ex-G3ADP) comes news of Tangier. EK1DI, whose trouble used to be that he came up on the sound-track at the local cinema, solved the problem by moving. EK1DI and 1DP are both QRX on 7 and 3·5 mc with 9 watts to 6L6's, and 'DP says if G's would look round the band instead of collecting on 7005 kc they might find a new country.

ZB1AR (Malta) sends a list of G's heard on 3·5 mc and asks us to mention that during BERU he will be on 3·5 (nights and dawn) and on 7 mc (evenings and early mornings). Frequencies 3512 and 3550, 7010 and 7025.

G. Stanton (ex-G3AJX and GM3AJX) also writes from Malta and sends a list of Calls Heard on the *Top Band*, which is reproduced at the end of this feature. He is going to continue listening on that band between 2200 and 2300 GMT. He says a 3·5 list would be too bulky to publish, and he finds 7 mc just as noisy as it is at home. He hopes to be on the air on 28 and 14 mc when suitable accommodation has been found.

Harold Owen of ZD4AM sends another of his 7 mc lists, but says that conditions have been very poor down there. The only two new countries worked in January were IS and FF8, but he heard KM6AD/KW6.

MD4GC (ex-ZC6JG) writes from Mogadishu, Somalia, to say that MD4JG has now closed down but, with MD4TH out there, he hopes to be taking some of the DX load, using

a 15-watt CW outfit on 7 and 14 mc ; MD4GC also expects to get going with QRO phone in due course—we shall be listening !

VS2CP (ex-G2HAG and VS1BK) arrived in Johore and was told he would have to share a bungalow with another European. It turned out to be VS2CH ! 'CP says conditions are so upside-down there compared with home that he is still in a daze whenever he listens. The "locals" are KA, PK, all the VS's, Chinese stations galore, J's and J9's, KG6 and so on. VS2CP's gear, at the time of writing, was "somewhere in Malaya," and he was thinking of trying to locate it by radar. QTH in list.

Australian OT

We were surprised to find, in a recent QSO with VK2AGW, that he is ex-G2KG and GW3BHG. As 2KG (no prefix) he says that he gave Gerry Marcuse (G2NM) his first phone QSO—on 1000 metres in 1919 ! 2KG gave up Amateur Radio in the early 1920's and was in VK for many years. He was licensed again as GW3BHG in 1947, but has now returned to VK once more, and puts a beautiful signal out from VK2AGW.

DX on 3·5 mc

This is where we stick the eyebrows down with insulating tape and tread warily. First, G2WW has worked MF2AA for a new one on the band. G2AO (Malvern) found VK5KO, worked him, and then confirmed the contact by working him on 7 mc later. And G2AVP worked VK5KO on *four bands* on January 31 —the first Four-Band with VK in one day that we have yet heard of officially.

G2VV (Hampton) raised VE1 and W2 on 3·5 mc with the Type A Mk III described in the December 1948 issue of the *Magazine*. The final is, of course, a 7C5 ! Time was 0015-0045, and this should at least be a record for the "smallest transmitter" on 3·5 DX.

G8US (Bideford) asks us, for the purpose of keeping the story straight, to say that VK5KO's second G QSO was a *multiple* one with G3ACC and himself, at 1930 on December 16. G3EIZ (Liverpool) has worked VK2RA and the genuine VK5KO. Apart from VE's, nothing else of interest, so he migrated to 7 mc. G2VD (Watford) says he can cope with the dispirited or even triumphant CQ-DX'ers, but gives up in disgust when an F8 plays gramophone records on 3510 kc ! GSBGH (Leeds) makes a similar remark about Continental phones in general.

G8VB (London, W.5) is a missionary who persuades DX stations to come up on 3·5 and give the boys a new country ! It worked with ZB1AR, MT2E, MF2AA and MF2AC ; and 'VB is now looking out for ST2AM, ET3AF, HZ1AB, SV5UN and SVØWF, all of whom have promised but have not yet shown up. Yet with all the good DX on the band G8VB says he has never known such a bad season for the Westerly DX.

28 mc

'VB has also been very active on 28, on which band he has put his total up to 50 in a very short time. He remarks that on one occasion he heard five or six W6 and W7 stations coming in at 0130—of all the strange times !

G2AVP has been busy on "ten" with MI3AB, ZB1AR, ST2AM, FE8AB, KZ5EL, KR6AZ, and many other choice pieces. 'AVP says that when he had an MD2 suffix he used to get his DX cards in without difficulty, but now he's a G again he can't extract them from YR5's and the like. But better, as he puts it, a spot of home comfort and a low return of QSL's than bags of cards *plus* millions of flies and tea made with goats' milk.

Among the better ones out of a long list of 28 mc DX from G6HL are VP3TR (1345), HH1HB (1240), W7KMV/Iwo (1010), ET3AH (0915), YN1HB (1310), SV5UN (1025), YK1AF (1210) and OA5AB (1400).

Tailpiece from G6BB (Streatham), who says, "After I'd got the Four-Band idea you can't guess what a thrill I got from working my first F8 on 28 mc ! " Well—

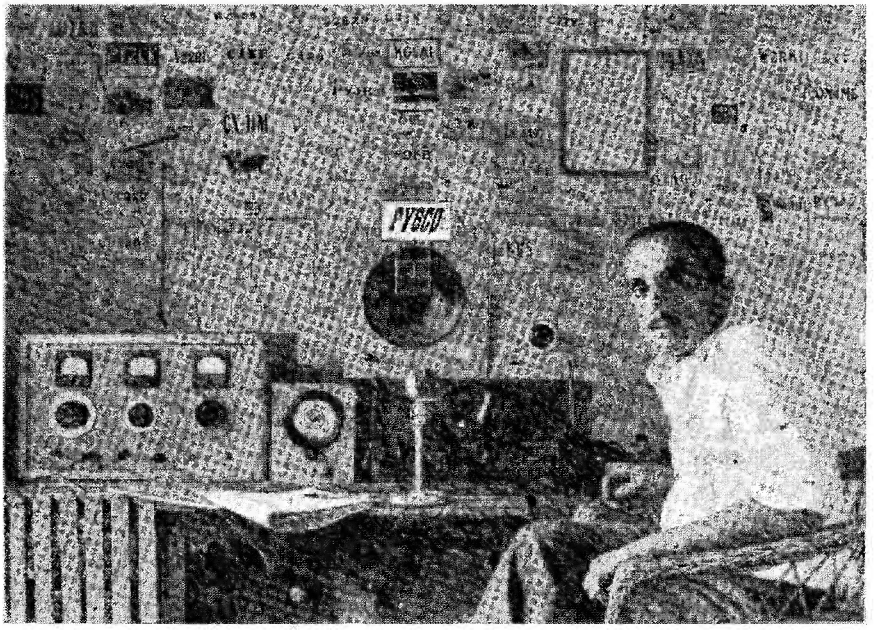
The Top Band

G3BYY (London, E.9) suggests that various

ZONES WORKED LISTING

POST WAR

Station	Z.	C.	Station	Z.	C.
Phone and CW			Phone and CW		
ON4JW	40	180	**G2YS**	35	107
G6QB	40	174			
G8IH	40	172	**G5WC**	34	114
G4CP	40	171	**G8PL**	34	109
G3DO	40	171			
G2WW	40	165	**G2BJY**	33	106
G2AVP	40	155			
G8IP	40	127	**G3FNJ**	32	86
			G3BNE	32	82
G2FSR	39	162			
G2VD	39	157	**G3ACC**	31	102
G3BI	39	146			
G4AR	39	131			
G2AO	39	120			
G5MR	39	115			
G6PJ	39	85			
			Phone only		
G3ATU	38	151			
G3AKU	38	131			
G5FA	38	126	**G3DO**	37	137
G8KU	38	116			
			G8QX	35	120
G3DAH	37	113			
			G3DAH	34	99
GC2CNC	36	162			
G6BB	36	102	**G6CB**	31	87
GM3CSM	36	99	**G2VJ**	31	84



PY6CO, Salvador, Brazil, sent us this one. His Tx is VFO-Exciter driving a pair of 813's, screen modulated with a pair of 6L6's. The receiver is a BC-348 with pre-selector.

people talking about flying balloons on 1·7 mc had better find out all about the appropriate regulations if they don't want to cross the path of the Ministry of Civil Aviation. If the balloons fly above 200 ft. they have to carry so many gadgets that it would be easier, on the whole, to stick up a mast that height ! By the way, G3BYY and also G2CIW (Brentwood) have received the Bulgarian scrounge-cards mentioned last month. They are all worded alike—"I have heard much your famous xmitter . . . I have the problem to build low power transmitter and have much need of good capacitors . . ." As no time, date or frequency is ever stated, and as the spaces for "Rainograph, Snowograph, Fogograph, Lightningsgraph, Moon Reaction, Cosmic Rays" and so on are not filled in (and as G2CIW works on VHF only !) these reports can be put along with some of the phoneys we have already mentioned ! But the one we saw certainly did give us a good laugh . . .

Miscellany

G2VV suggests that some of the "highly technical blokes" heard on phone might with profit read the first chapter of one of the handbooks. He has been hearing some frightful stuff among the inter-G contacts on 28 mc in the evenings, but says that 7 mc is such a bedlam that many remarks are lost in the QRM, which is probably a Good Thing.

G5MV (Scarborough) is an OT who, after 1400 phone contacts on 7 mc, was enticed back on the key by this Commentary ! (Or so he says . . .) Since then, on 14 mc, he has worked 121 countries in 40 Zones, so he seems to be pounding away to some effect. He is very surprised at the "T7 or worse" notes heard from G's. G6PJ says his chief moan is about the steady squeezing down of the CW areas, particularly on 28 and 3·5 mc.

G3FNJ (London, N.W.6), after several QSO's with SV1VS/MM in all parts of the world, recently had a personal one aboard S.S. *Nereus* in the Royal Albert Dock. 'FNJ tells us about W1FH and his "213 confirmed" and adds that Charlie *still* sends the H in his call with anything between 6 and 8 dots ! Maybe that's what brings them in ?

G3ECX (London, S.E.12) pleads for the recognition of our hobby *as* a hobby and not a cut-throat competition, and says, "When I start getting as hot under the collar as some of your correspondents I shall drop my rig into the nearest pond and take up tiddley-winks." But we *have* known people get quite hot and sticky over tiddley-winks . . .

DX QTH's

AG2AG	APO 209, US Army, Trieste, F.T.T.
EK1AD	Spanish P.O. Box 2, Tangier.
FO8AC	c/o Radio FZP, Papeete, Tahiti.
HZ1AB	*via* W8UMQ (*Station in Saudi Arabia*).
I1YAT	Apiari Street 4, Trieste.
KG6IC	6254 ABU, APO 264, Unit 1, c/o PM, San Francisco. (*Station on Iwo Jima.*)
LZ3SD	Stoianov, Korab 25, Sofia, Bulgaria.
MO1A	13/18 Royal Hussars, MELF 6.
OQ5RA	Box 271, Leopoldville, Belgian Congo.
VP9T	S/Sgt. S. Weiss, HQ 137 Sqdn. AACS, APO 856, PM, N.Y.C.
VS2CH	BM/CQJ, London, W.C.1.
VS2CP	Phil Zeid, Linden Estate, Scudai, Johore.
VS7LA	Cpl. L. Adams, SHQ Sigs, RAF Koggala, Habaraduwa, Ceylon.
W6CAL/TA	Voldar, 243 Ataurk Bivari, Ankara.
YR5A	Box 326, Bucharest, Roumania.
ZB1AR	Sgt. Watson, REME Workshops, APO. Malta.
ZE2KH	Box 390, Salisbury, Southern Rhodesia.
ZL1GN	Ben Wallich (G6BW), c/o National Bank of N.Z., Box 18, Auckland.

G5GW (Torquay) has not radiated a signal since 1939 and probably will not for the next six months, but his call is being pirated on 3·5 mc. . . . GM3DNQ (Aberdeen) has just migrated to 14 mc and one of his first QSO's was AG2AG, whose QTH he sends along for the list. . . . G3CGC (Eastleigh) says, "Let one's station be recognised by the 'fist.' I have done a lot of listening lately and have never heard such putrid Morse in all my puff. The first law of operating should be engraved on the front of all receivers—There are no bad Morse *readers*, only bad *makers*." We heartily agree, but would suggest that there are so many *good* wielders of bug keys nowadays that it's impossible to recognise them all by their fists any longer. We could mention a dozen who sound just like automatic Morse, and there is *no better Morse than that*, fist or not ! (Or don't you agree ?)

G3AKU (St. Ives) says the Four Band Table has shown up the large number of people who hardly use 28 mc ; he thought he was pretty slack on the band, but his twelve countries put him halfway up the list !

G6AT (Hampton Hill) disapproves of the use of 3·5 mc for DX, and calls it "organised misuse of frequencies," saying that we should choose our frequencies from those available in relation to communication requirements. 'AT, in particular, doesn't see why one G shouldn't work another between 3500 and 3510 if he wants to.

Well, as he says, it's a point of view . . .

And that seems to be about the lot for this month. Next month's dead line is first post on the 15th, which will give plenty of time to send your letters, scores, moans and groans to DX Commentary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. So back to the DX again, but remember—there's always Tiddley-Winks ! 73 and BCNU.

G CALLS HEARD OVERSEAS

1·7 mc

G. Stanton (ex-G3AJX), c/o RN W/T Stn., Dingli, Malta.

G2BCX (559), 2DTD (559), 2QT (559), 3AEX (559), 3AMF (559), 3BYF (559), 3BVJ (549), 3YF (559), 4AU (559), 4DC (559), 5MY (559), 5WW (559), 6BQ (559), 8JI (559), 8JM (559), 8VR (559), DL2IY (559). (*Rx : SX*28). *February* 5, 2230-2300.

7 mc

ZD4AM, West African Cacao Research Institute, Tafo, Gold Coast Colony.

CW : G2ATM/A (45), 2DHR (45), 2HHB (44), 2PL (55), 3COX (44), 3ECB (44), 3EGR (44), 4ZZ (568), 5GK (578), 5MY (56), 5RI (34), 6BS (54), 8TK (56), GI3ZO (55), GW3CRX (558), *Heard*, 6-20 *January*. *RS in brackets, T9 unless otherwise stated. Rx : R.*107.

WINTER CALL BOOK

Of 340 pages, the latest *Radio Amateur Call Book* contains 224 pages of W/K amateur station callsigns with addresses, the remaining 116 pages covering the rest of the world. The general layout has been slightly changed, in that countries are now listed in alphabetical order of prefixes instead of by country names —which is a convenience when looking up a callsign in a hurry. All countries are also given their Zone number identification. The British amateur stations listed run to 41 closely printed columns and show all those appearing in "New QTH's" up to and including our issue for December, 1948.

FIRST CLASS OPERATORS' CLUB

With the elected F.O.C. membership now standing at 200, in all parts of the world, it is proposed to have a new and up-to-date address list printed for circulation to all members. So that this will be an accurate record, those having any corrections to the existing lists are asked to inform the Honorary Secretary immediately.

On the subject of membership, it is of interest to add that though there are several cases of brothers becoming members, with the election of ZL4GA the Club now has a father and son on the register.

Contests and DX

GI6TK has distinguished himself by winning the Bratten Trophy, and at the moment of writing is also thought to be the leading station for the world in *CQ's* DX Contest—a fine performance indeed.

In another field, GW8WJ worked VK5KO, on schedule by challenge, using but 8 watts on 3·5 mc. Still on the DX theme, three overseas members

President :
GERALD MARCUSE, G2NM

Hon. Secretary :
Capt : A. M. H. FERGUS, G2ZC

(AP5B, VK9NR and VS7BJ) ask for contacts with G's and especially with F.O.C. stations in this country. VS7BJ is on 14074 kc after 1800 GMT, and the other two are on 7, 14 or 28 mc about 0700-0800.

Club Subscription

With the greatly increased size of the Club, the heavy cost of postages on the regular Circular Letters, and other incidental expenses necessarily involved in the proper management of the Club's affairs, the membership was circularised on the question of an annual subscription to meet these charges. As a result, the Committee has decided that it should be two shillings, payable on January 1 every year.

Election Notice

In accordance with the Rules of the Club, the following are declared elected to the active membership list of the F.O.C. :

R.E.C.Collings,DL2CH (B.A.O.R.)
A. F. Frame, ZL4GA (Dunedin)
J. D. Smith, G3DOZ (Ealing)
J. D. Wightman, G3AH (Manchester)
J. Elias, ON4JW (Brussels)
A. E. Parsons, G3AIX (Sutton Coldfield)
S. H. Pattison, GI5UW (Dunmurry)
J. D. Lutterot, PAØLUT (Alkmaar)
J. A. Whiteley, G6QA (Rochdale)
D. N. Biltcliffe. G6NB (Chertsey)
V. Clark, W4KFC (Annandale, Va.)
J. Bradbury, G3AUR (Bradford),

All correspondence regarding the First Class Operators' Club should be addressed direct to the Honorary Secretary, Capt. A. M. H. Fergus, G2ZC, 89 West Street, Farnham, Surrey.

GESTURE IN THE HOUSE

When the new Wireless Bill was being discussed on second reading in the House of Lords on February 8 last, Lord Sandhurst put in a word for the British amateur. The gist of the noble lord's comment was that amateur transmitters suffer severely from interference of the kind the Bill seeks to abolish ; that they are a valuable asset to the country ; and that amateurs require protection far more than the ordinary listener.

It is not often that the worth of the amateur is publicly recognised in such terms—and it is almost certainly the first time that Amateur Radio has been mentioned to so august an assembly.

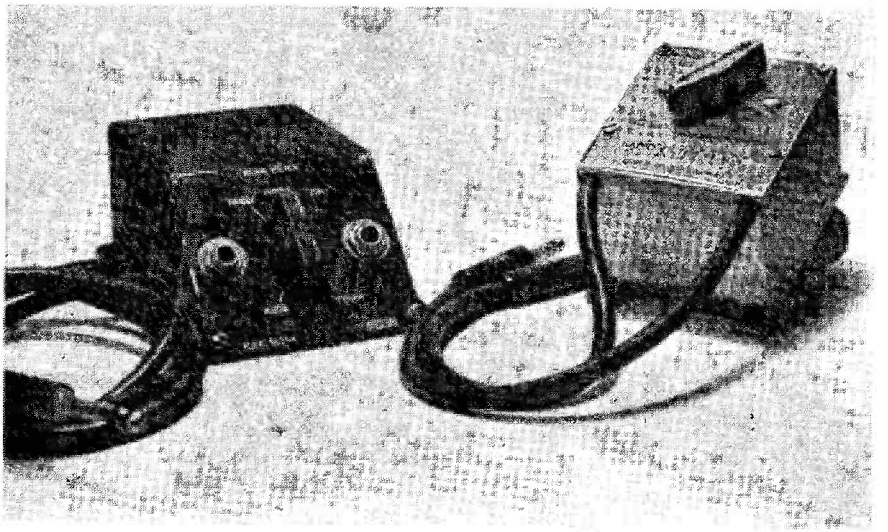
RADIO AMATEURS' EXAMINATION

In connection with the next R.A.E.—to be held in May, and for which entries should already have been sent in—we are running a series of articles in our *Short Wave Listener*. This series is based upon the paper for the last examination, and the treatment is a set of model answers to the questions. The February and March issues cover preparation and the first answers.

CARDS HELD

We have a card or cards waiting for the stations listed below. Please send a large stamped addressed envelope to BCM/QSL, London, W.C.1, and they will be forwarded. And if you want your callsign, name and address to appear in our "New QTH's" page, please mention it at the same time.

G2CIL, 2CLG, 2CVD, 2FWZ, 2JT, 2TO, 3AJR, 3ATC, 3BBM, 3BTB, 3CMQ, 3DTB, 3DYB, 3ECS, 3EDJ, 3EHQ, 3EHZ, 3ESC, 3EWZ, 3KO, 5QG, 5QI, 6QY, GM3BXV, 3DIE, GW3CGW.



More on Audio Filters

Design Data, and Performance of Surplus Units

By W. A. SPARKS (G3DGJ)

There is a great deal of solemn argument and discussion about the built-in selectivity of communications receivers. One of the easiest ways of getting some useful additional discrimination is to apply it at the output end.—Ed.

PROBABLY one of the most interesting developments of recent months to the DX operator has been the use of audio filters. The word "development" is used loosely, since such filters were a feature of radio receivers of a bygone era and so far as amateurs are concerned only went out of favour with the introduction and evolution of single-signal superhets with their crystal filters. However, the selectivity accepted ten to fifteen years ago is hardly enough for to-day and, especially for the CW operator, discrimination measured in *tens* of cycles is required. Audio filters are capable of giving this degree of selectivity and their use would probably be more commonplace now if the majority of amateurs realised how simple they are to design and build.

Types of Filter

Audio filters may be one of two types. First, those which have fixed rejection and depend upon the BFO to inject the required signal at their particular acceptance frequency, and secondly, those which may be tunable over a particular range of audio frequencies.

The purpose of these notes is to describe a few such types, beginning with what is known as the Radio Range filter. Two different versions of this filter have been available as surplus in the country ; one is the FL8, and another which has no marking except "Range Filter." These two very useful items are shown in the photograph.

The Service application of these filters was mainly limited to Beam Approach systems (SBA) in which the marker signals are generally given by modulated notes of about 1000 cycles. Voice transmission superimposed on the same carrier frequency was also given and the filters had three switch settings : Position 1 being range marker signals only ; Pos. 2, voice signals only ; Pos. 3, filter out of circuit.

Fig. 1 shows the curves resulting from the use of positions 1 and 2 of the selector switch. Position 1 is obviously of great interest to amateurs since it provides a very steep rejection on either side of the nominal frequency, which is approximately 1,025 c.p.s.

The unit is quite easily introduced into the Rx circuit by plugging it into the phone socket, and transferring the phones to the socket so marked on the filter. One disadvantage of these filters is that, being so sharp in the audio

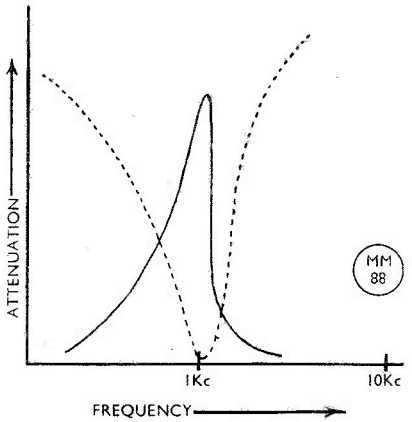


Fig. 1. Curves obtained for the surplus units discussed in the text.

range, they give a peculiar ringing tone to the signal, a note which is difficult to copy for long periods due to its monotony.

Design of Filters

Filter design is often taken to be an electrical engineer's job, but basically it is relatively simple since the formulae have already been evolved and design data are easily obtained by substitution.

A simple single-section low-pass filter is shown in Fig. 2. The use of a low-pass filter is to be recommended since notes below 1,000 c.p.s. do not have much interfering effect and cutting off the lower notes produces a tone which is not comfortable to read over long periods. The design data are shown below :—

Rx = Load resistance (phones)
F_2 = Cut off frequency
F_3 = Frequency at which maximum attenuation is desired.

Then for Fig. 2 $L_k = \frac{R}{\pi F_2}$ $C_k = \frac{1}{\pi F_2 R}$

$M = \sqrt{1 - \left(\frac{F_2}{F_3}\right)^2} = 0{\cdot}7$

With a value of M = 0·7 a good match of input impedance over the pass-band of the filters can be obtained.

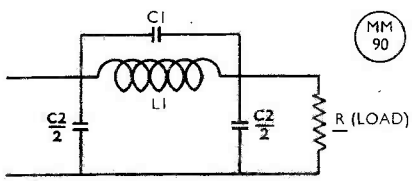


Fig. 3. The M-section filter.

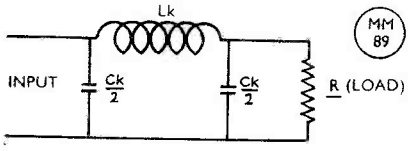


Fig. 2. Constant K-section low-pass filter.

Dealing with the simplest type shown, as in Fig. 2, a curve similar to B in Fig. 4 is obtained. This shape of curve is good for phone reception but if possible a steeper side to the rejection should be obtained and in order to produce this a type of filter known as the "M derived filter" is used. This is most suited to CW use, since it reduces to maximum attenuation a frequency only a short distance away. The calculation of the value of M gives a fixed value of $\frac{F2}{F3}$ of about 0·7, since 0·7 × 0·7 = 0·49, 1−0·49 = 0·51, and $\sqrt{0{\cdot}51}$ is approximately 0·7. This means that in order to have a fixed cut-off frequency of 800 cycles, which is that recommended for CW working, the frequency of maximum attenuation has to be approximately 1,100 cycles ($\frac{0{\cdot}8}{1{\cdot}1}$ = ·7 approx.)

Using an M-type filter, it is possible to obtain rejections of the order of 60 dB down at about 300 cycles away. A suitable calculation for such a filter is given later.

For the simpler type of filter the two calculations are (*a*) for CW operators (*b*) for telephony operators. For CW it is :

$L_k = \frac{R}{\pi F_2} = \frac{2000}{3{\cdot}14 \times 800} = 0{\cdot}8$ H approx.

$C_k = \frac{1}{\pi F_2 R} = \frac{1}{3{\cdot}14 \times 800 \times 2000}$ 0·2 μF approx.

This gives an inductance value of 0·8 Henry, and a capacity value on either side of $\frac{0{\cdot}2}{2} = 0{\cdot}1$ μF.

For phone use, a cut off frequency of 3 kc is suggested as suitable, for reasonable intelligibility. Then :

$L_k = \frac{R}{\pi F_2} = \frac{2000}{3{\cdot}14 \times 3000} = 0{\cdot}21$ H approx.

$C_k = \frac{1}{\pi F_2 R} = \frac{1}{3{\cdot}14 \times 3000 \times 2000}$
$= 0{\cdot}0535$ μF approx.

This gives an inductance value of 0·21 Henry and a capacity value either side of $\frac{0{\cdot}0535}{2}$ = approx. 0·027 μF.

This type of filter is termed "Constant K" and will have a characteristic curve as shown in (B) Fig. 4.

In order to improve the performance, still further the M-derived filter as shown in Fig. 3 can be used and values for this are as follows: (For CW use as before)

L1 = 0·7Lk = MLk = 0·7 × 0·8 = 0·56 Henry

C1 = 0·267Ck = 0·053 μF

C2 = 0·7Ck = 0·4 μF, or 0·2 μF each side.

The resultant curve is shown at A in Fig. 4. By using two such filters in series the effect becomes more pronounced, since the resultant

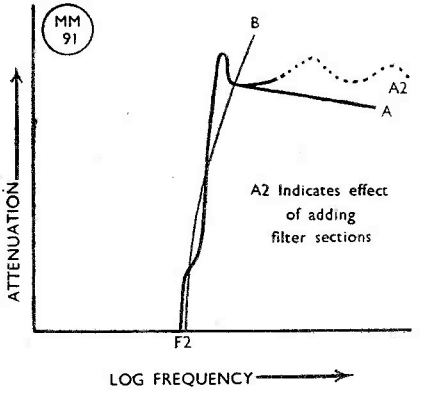


Fig. 4. Curves for the filters shown in Figs. 2 and 3.

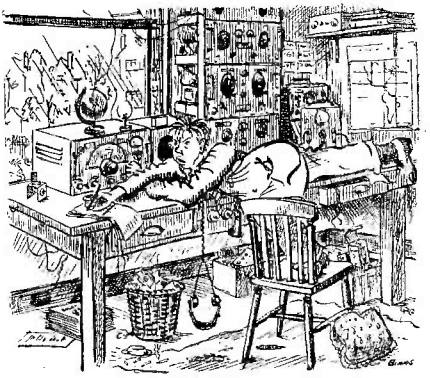
attenuation is additive. The tendency for the curve to fall back from the frequency of maximum rejection is limited and consequently a much quieter background is obtained. Signal-to-noise ratio improves considerably when using the audio filters. By the proper choice of C1 and C2 in the M-derived filter, the cut-off and maximum rejection frequencies may be altered to suit individual taste by suitable switching.

A source of supply for the required inductances is the high frequency (ex-Govt.) power units now on the market; those operating in the range 800-1,000 c.p.s. offer some suitable components. Only highest quality condensers should be used and the bridging condenser in the M-derived filter *must* be mica.

In commercial units toroidal coils are used but these are very difficult to make without specialised equipment. Good results can be obtained with normal inductances providing very careful shielding is allowed, especially around the coils.

The purpose of these notes may appear more theoretical than practical but the proof of the pudding is in the eating. If any reader has an ordinary LF choke of about the values mentioned above, substitution will easily enable the other values to be found and the frequency of cut-off determined.

The whole point is that audio filters enable signals to be copied through interference which even the best crystal filter cannot cope with, and it is therefore well worth while taking some trouble with a unit which can be introduced on the output end of the receiver, without any internal modification of the set itself.



Worrying out the maths!

DX ZONE MAP

This is a five-colour great circle map of the world, centred on London, showing the Zone areas (with prefix lists for each zone), printed on heavy linen-backed paper, with a time scale in GMT and giving accurate bearings and rough distances of all parts of the world from London—on the scale used, this means it is good for any location in the United Kingdom. The size overall is 21 in. by 35 in., handy for wall-mounting. You get all this for 6s. post free, of the Circulation Manager, Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1.

AFRICAN AIR RESCUE

The *East African Standard*, dated February 9 tells how VQ4SC and VQ5JTW were instrumental in getting help to an R.A.F. Anson crashed on Mt. Elgon in Uganda. VQ5JTW called VQ4SC on February 1, to tell him where the Anson had been located; VQ4SC passed the message to Air Traffic Control at Eastleigh (Nairobi) and thereafter the duty officer went on to VQ5JTW's own frequency and worked him direct. The two operators concerned have received the thanks of the R.A.F. for the part they played in this incident. VQ4CUR sent us the notes.

Power Pack Design

PART II

By P. E. LEVENTHALL, B.Sc. (G3CJJ)

When smaller amounts of HT power are required, voltage stabilisation is not usually obtained by means of a choke input filter but by making use of one of the peculiar properties of the neon lamp.

If a neon lamp is connected in the circuit of Fig. 5*a* and the resistance P varied a series of corresponding values may be obtained for the potential across the lamp and the load current. If these values are plotted as a graph a curve similar to Fig. 5*b* is obtained. It is seen that when the load current varies between 30 and 70 mA the output voltage remains substantially constant (between 190 and 194 volts). This simple apparatus may be used successfully to stabilise the HT supply to a VFO, valve-voltmeter or superhet oscillator circuit.

It is worth noting that it is not necessary to use one of the commercial stabiliser tubes, as an ordinary neon lamp is quite satisfactory and much less expensive. It will be necessary to remove the resistance which is sometimes found in the base of the lamp.

The lamp should then be connected in the circuit of Fig. 5*a*, and the characteristic curve plotted as in Fig. 5*b*. The value of P should be chosen so that the voltage across the lamp at the normal load is the mean of the extreme voltages for which the stabilisation holds. For instance, for the lamp of Fig. 5*b* the working voltage is 192 volts. P is generally between 500 and 10,000 ohms.

As no close control is maintained during manufacture, it is necessary to carry out this process each time a lamp is to be used as a stabiliser, since similar types of lamp vary greatly in their characteristics.

A better degree of stabilisation can be obtained with the series valve voltage stabiliser, Fig. 5*c*.

The neon lamp in this case is used to maintain the cathode of V2 at a potential of about 100 volts positive to earth. The point X is positive to earth, and thus the grid potential of V2 is the difference between this potential and the potential across the lamp.

Suppose that for some reason the output tended to decrease. This could be due to an increase in load current or to a decrease in the supply voltage. Then the point X become less positive with respect to the earth line and hence the grid of V2 becomes more negative. The anode current of V2 then decreases, and the voltage drop across R4 decreases making the anode of V2 more positive and the grid of V1 *less* negative. This reduces the impedance of V1 and causes an increase in the output compensating for the original decrease.

A reverse effect occurs, of course, when the output voltage tends to increase for any reason.

The change in potential across the anode load R4 of V2 is greater than the change at X, due to the amplification of the valve, and the greater this amplification the greater is the variation for which compensation can be obtained.

The slider X is used to adjust the output voltage to the required value.

Suitable valve types for V1 are a PA1, PX4 or 2A3, while V2 can be any high gain RF pentode such as 6J7 or 6AC7. A beam tetrode could be used for V1, if desired.

The author would like to suggest a simplified circuit in which the valve V1 acts both as rectifier and regulator valve, Fig. 5*d*. The operation is similar to the preceding circuit.

It is not generally realised that a stabilising system greatly increases the smoothing of the supply. Since the ripple is simply a cyclic change in the output voltage, it is clear that the stabilising system will take hold of this and iron it out as it would any variation of output, thereby considerably increasing the smoothness or purity of the DC supply.

Obtaining Grid Bias

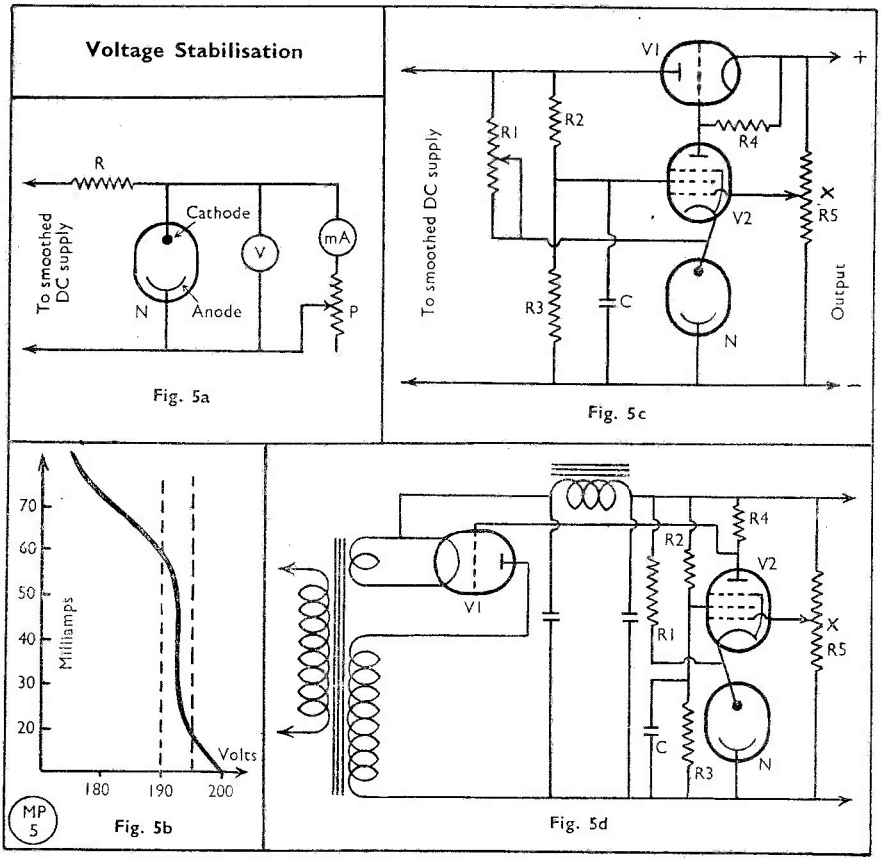
The next section of the power unit which requires our attention is the negative bias supply, and it is proposed to describe briefly the various systems, listing their advantages and disadvantages.

Battery Bias

This is simple, convenient and stable. The battery tends to be forgotten, however, and this may have disastrous consequences when the end of its life approaches.

Cathode Resistor

This method is well known and simple. The bias increases as the cathode current increases and this may be disadvantageous



in certain cases. Unless the resistor is thoroughly decoupled, negative feedback may be obtained. The bias voltage is subtracted from the total HT voltage and therefore reduces the anode voltage available from a given power pack.

Grid-leak Method

A simple and inexpensive method used for radio-frequency stages. If the drive fails the bias is removed and the anode current may rise to dangerous proportions.

Separate Power Pack

A small power pack of conventional type may be built up and should be provided with a heavy bleeder resistance.

The bias obtained in this way, when applied to a valve, is independent of changes in the current through the valve. This system tends to be expensive in its initial cost but is very satisfactory and is often used.

Table of Values

Fig. 5

R1	=	500,000 ohms
R2	=	40,000 ohms
R3	=	50,000 ohms
R4, R5	=	250,000 ohms
C	=	1·0 μF

Drop across a Component

The smoothing choke in the HT supply may be placed in the negative lead Fig. 6*a*. The point A is now negative with respect to the HT line, by an amount equal to the voltage drop across the choke. If the choke is left in the positive lead a resistor may be placed in the negative lead and various voltages obtained from this by the use of tapping points on the resistor. Bias obtained by this method is proportional to the load current.

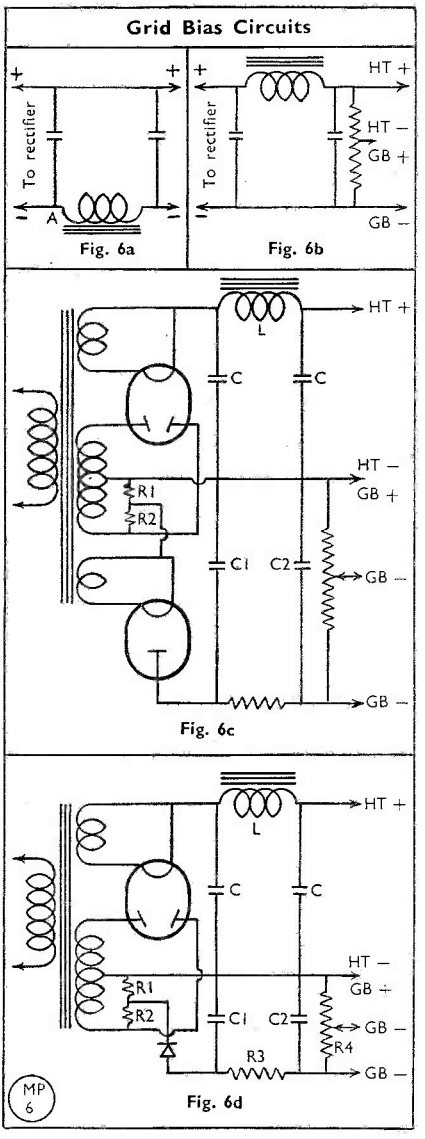


Fig. 6a

Fig. 6b

Fig. 6c

Fig. 6d

Voltage Divider

A voltage divider used as shown in Fig. 6*b* will provide a negative bias voltage which increases as the load current increases. This method is very similar to that above.

In the writer's opinion by far the most effective method of obtaining a stabilised bias supply is shown in Figs. 6*c* and 6*d*.

If the heater winding is not available for the extra rectifier Fig. 6*d* may be used.

This system is particularly valuable for use with modulators or any valves requiring high bias voltages. If the cathode bias system were used the bias voltage would have to be added to the output of the HT supply, necessitating larger transformers and higher voltage condensers, whose extra cost would be more than the cost of the few components required for this system, which has the added advantage of being perfectly stabilised.

L and C are the usual HT smoothing components. R1 and R2 are suitable values to give the required GB voltages.

R3 is about 10,000 ohms and R4 can be 25,000 to 50,000 ohms. If the power supply is to be used for a push-pull stage another potentiometer can be connected across R4 to give two adjustable voltages. C1 should be about 1 or 2 μF and C2 as large as possible (with adequate working voltages of course).

The Voltage Divider

Occasionally, the amateur experiences difficulty in calculating the values of the arms of a dividing network for supplying voltages of lower value than that available from the power pack (or battery).

The calculation is made as below. Suppose we require four different voltages lower than the output from the power pack. Let them be V*d* volts at current I*d* amps, V*c* volts at current I*c* amps, V*b* volts at current I*b* amps and V*a* volts at current I*a* amps. V is the output voltage from the power supply. See Fig. 7*a*.

Then, the current through R1 is simply the bleeder current I*i*, *i.e.* that current which flows when no power is taken from the tappings. Therefore, R1 = V*a*/I*i*, by Ohm's Law, since V*a* is the voltage across R1 and I*i* is the current through it. The voltage across R2 is V*b* − V*a*, and the current through it is I*i* + I*a*.

$$\text{Therefore, } \mathbf{R2} = \frac{Vb - Va}{Ii + Ia}$$

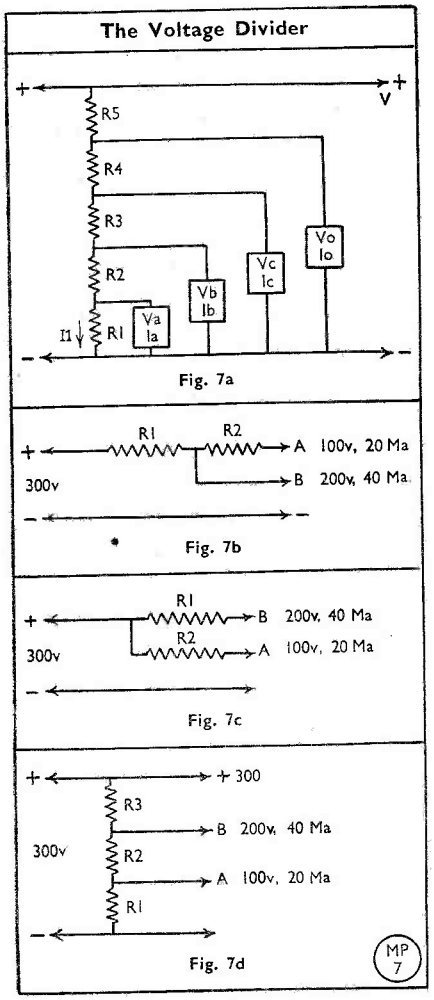
The voltage across R3 is (V*c* − V*b*), and the current through it is (I*i* + I*a* + I*b*)

$$\text{Hence, } \mathbf{R3} = \frac{Vc - Vb}{(Ii + Ia + Ib)}$$

$$\text{Similarly, } \mathbf{R4} = \frac{Vd - Vc}{(Ii + Ia + Ib + Ic)}$$

$$\text{and } \mathbf{R5} = \frac{V - Vd}{(Ii + Ia + Ib + Ic + Id)}$$

This may be continued as far as re-



quired to give any number of tapping points.

The wattage rating of the resistances used is found by multiplying the current through the resistance by the voltage across it. A suitable margin should be allowed for safety.

The regulation of a voltage divider is poor and the voltages at the tapping points will vary when the load on any tapping point is changed. However, the regulation of an ordinary series dropping resistor is much worse, and the voltage divider is to be recommended.

An example will illustrate this. Suppose that from a 300-volt supply we require 200 volts at 40 mA, and 100 volts at 20 mA.

(*a*) Using series voltage droppers, Fig. 7*b*, **R**1 carries (40 + 20) = 60 mA and drops 100 volts. Therefore, **R**1 = 1667 ohms.

R2 carries 20 mA and drops 100 volts ; therefore **R**2 = 100/20 × 1,000 = 5,000 ohms. Suppose the load at B increased from 40 to 50 mA. Then the voltage drop in **R**1 would increase by 16·67 volts, and the two output voltages would each decrease by this value.

If separate dropping resistances were used as in Fig. 7*c*, **R**1 would have to equal 2,500 ohms and **R**2 equal 10,000 ohms. An extra 10 mA taken from the 200-volt tapping would cause a decrease at this tapping of 25 volts, the 100-volt tap remaining unaltered.

(*b*) Using a voltage divider, Fig. 7*d*. Let the bleed current be 30 mA. Then **R**1 = 3,333 ohms, **R**2 = 2,000 ohms and **R**3 = 1,100 ohms.

If the load current from B increased by 10 mA to 50 mA the voltage at B would decrease by 11 volts, as this is the extra voltage dropped by R3 due to the increase in current. The voltage at A would become 89 volts instead of 100.

It is clear that while none of the methods for obtaining voltage taps is ideal, the voltage divider possesses less disadvantages than the other methods.

In Fig. 7*d* the current taken from the 300-volt line does not affect the voltage at the tappings, except in so far as the stability of the power pack itself is concerned.

The greater the bleed current allowed, *i.e.* the lower the values of the resistances used, the better will be the regulation.

Heater Supplies

There is very little to be said on the subject of heater supplies.

The centre-tap of the heater winding should not in general be used, as it is more satisfactory to centre-tap at the valve socket.

If any heater winding is not being used it should be earthed at the centre-tap in the interests of hum reduction.

Safety Precautions

The voltages used for radio apparatus —particularly transmitters—are dangerous if proper precautions are not taken, and nothing should be skimped when dealing with high-voltage supplies.

It is advisable to use double-pole

switches in all mains leads to apparatus, both to isolate the mains and to prevent a circuit remaining alive due to unsuspected earth contacts.

At least two fuses are necessary to protect a power supply circuit—one in the mains lead and one in the lead to the HT centre-tap. Full details on fusing were given in the *Short Wave Magazine* for April 1946. That article also deals with RF filters which should be added to the power supply as a matter of course, and not merely after trouble has been experienced through RF in the mains.

If a power supply is to be used as a general purpose unit and not mounted in a rack, it should be built into a louvred metal case. An amplifier case is ideal for this and suitable cases can be obtained as Government surplus for about 5s. each.

All transformer cores should be connected to the metal case which should then be earthed. To connect all metal parts to the case and then fail to earth it is worse than useless.

Meters should have a breakdown potential greater than any which may be applied to them. Otherwise they must be mounted back from the metal panel on an insulated panel. A piece of glass or perspex should be placed in front of the meters so that it is impossible to come into contact with either the case of the meter or the adjusting screw.

One aspect of safety precautions generally overlooked lies in lifting heavy apparatus such as power supplies. Severe ruptures can be caused by overloading one's body and assistance should be sought when heavy gear is to be moved. The safe way to lift weights is with the arms—and not the body muscles—taking the strain.

XTAL XCHANGE

Notices under this heading are free, and should be sent in on a separate slip headed "Xtal Xchange—Free Insertion." There are some simple rules: (*a*) Crystals outside the communication bands should not be offered, unless they are 100-1000 kc substandard bars; (*b*) Such bars should be of certified accuracy; (*c*) In the case of other crystals, it should be stated whether calibration certificates accompany them; (*d*) All negotiations arising from notices appearing in this space must be conducted direct.

G2NS, 26 Southlea Avenue, Southbourne, Bournemouth, Hants.

Has QCC 7034 kc crystal, with holder and certificate; also 7012 kc ex-A.M. crystal, holdered but with no certificate. Wants 3504-3512 kc crystal, holdered.

G3BGH, 375 Harrogate Road, Moortown, Leeds.

Has Bailey VF2 3557 kc fundamental crystal, giving variation 14228-14272 kc. Wants similar crystal 3503 kc fundamental.

G3COI, 59 Darlington Street, Wolverhampton.

Has QCC 1800 and 7040 kc crystals, certificated. Wants similar crystal 3·5-3·6 mc.

G3CQX, 31 Field Road, Stainforth, Nr. Doncaster, Yorks.

Has QCC Type P5 3549 kc crystal. Wants frequency 7000-7050 kc.

G3CWX, 123 Church Road, Low Fell, Gateshead,9, Co. Durham.

Has 7002 and 14367 kc crystals. Wants frequencies in CW area 3·5 mc band.

G8PF, 10 Martin Grove, Morden, Surrey.

Has 200 kc bar, 455 kc crystal for AR88, two 500 kc crystals in 3-pin holders and two 500 kc in 2-pin mountings. Wants 1000 kc bar for BC-221, and frequencies 8010-8110 kc.

DX OPERATING MANUAL

All that can be conveyed by the printed word about DX working, in seven chapters, with prefix-country and country-prefix lists showing zones in each case. The *DX Operating Manual* is by L. H. Thomas, G6QB, who for long has been well known for his "DX Commentary" in the *Magazine* each month. Price of the *DX Manual* is 2s. 8d. post free. Remit to the Circulation Manager, Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1.

NEW MULLARD TYPES

Of particular interest to those working on the UHF's, the Mullard ME1001 is a disc-seal triode capable of giving a half-watt of RF on 10 cm. (3,000 mc) for a DC input of ten watts. The QQZO4-15 is a new directly-heated RF twin-tetrode, rated for 15 watts output at 185 mc.

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VHF BANDS

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

Fiveband Club Dinner—
Two-Metre Activity—
Individual Reports—
Five-Metre Final QSO Party

OUTSTANDING event of the month without any doubt whatever was the Fiveband Club Dinner on January 29. Held in the Euston Tavern, London, this dinner brought together 61 VHF enthusiasts and we are sure that 60 of them will want us to record, first of all, their grateful thanks to the other one, who organised the whole show. He, of course, was Maurice Mason, G6VX, the Club's London area representative. It was a wonderful get-together, and we were pleased to see that a large number of non-members accepted the invitation to come along. General opinion expressed to us since the dinner, over the air and in letters, is that it was one of the best amateur gatherings ever organised in this country.

The weather unfortunately prevented several —including G2NM, G4RD and G6FO—from reaching London, and for that we were very sorry.

A number of the Midlands members were present and three out of our four area representatives were there to meet members and arrange still more Club functions. Prior to the dinner a number of pieces of amateur constructed VHF equipment were on view and our thanks go to G2AJ, 2FKZ, 2NH, 3BPM, 3CU, 3HT, 4IG, 5CD, 6VX and 8IG who were good enough to bring these along. G2IQ also sent his new convertor, but much to our regret it failed to reach the meeting.

As Club members will be aware, the London group, under the direction of G6VX, have started a scheme for the accurate measurement, over the air, of frequencies in the 144-146 mc band. Due to various causes, the actual frequency radiated may differ by up to 30 or 40 kc from that obtained by multiplication of the figures marked on the crystal holder; hence this frequency-checking service is of value to the crystal owner himself and further, it enables a list to be circulated to all members which will greatly assist in the calibration of a new receiver or in finding a desired station. In order to extend this service still more, two specially constructed crystal calibrating units were the subject of a draw at the Dinner, the recipients having to undertake to use them for the purpose outlined above. One of these went to G5PP in Coventry and this should produce a better coverage of the northern stations in the next frequency list. The other lucky man was G4DC.

After dinner your conductor had the opportunity of outlining the policy of the Club, and of stressing that our one aim is to encourage VHF activity and so to further knowledge of these frequencies. Anyone who can assure us that he has that same purpose in mind is welcomed as a member. Then followed a session of photography (some of the results of which appear in these columns) and later a series of informal talks by a number of those who had brought equipment; G5CD on his 440 mc CG doubler; G2FKZ on a 440 mc wavemeter and a 440 mc RF amplifier; G3CU on his 144-440 mc tripler; and G6VX on his crystal-controlled convertor. G6VX also made some suggestions regarding the ZB convertors, particularly the need for an additional oscillator.

Two-Metre DX Working

Worked	Station
Over 350 miles	G2IQ, G5BY
300 to 350 miles	G2BMZ, G2MA, G3DMU, G4LU, G6WT
250 to 300 miles	G2XC, G6OS, G8DM
200 to 250 miles	G2AJ, G2CIW, G2OI, G3DEP, G5MQ, G5RP, G5TZ, G6DH, G6PG.

In order to complete the record of an outstanding event it only remains to give the call signs of those present: G2AAN/A, 2AJ, 2ANT, 2AUA, 2CIW, 2DHV, 2FKZ, 2HDY, 2MR, 2NH, 2UJ, 2WS, 2XC, 2YL, 3ABA, 3AHB, 3APY, 3BLP, 3BOB, 3BPM, 3CGQ, 3CU, 3CWW, 3EHY, 3FD, 3HT, 4DC, 4IG, 5CD, 5DT, 5JU, 5KH, 5LQ, 5MA, 5MI, 5PP, 5PY, 5VY, 5YM, 6CB, 6HD, 6JK, 6NK, 6OT, 6SC, 6VA, 6VX, 6YP, 8IG, 8KZ, 8LY, 8PX, 8SK, 8SM, 8WV and GI6TK. L. C. Blanchard and D. T. Bradford, members of the VHF Listeners' Club, were also there to represent our SWL fraternity, and apologies for absence were received from several well-known VHF operators.

Country Meetings

Other meetings, which we hope will be

equally successful, are being organised in the Oxford and Nottingham areas. The Oxford meeting is arranged for Saturday, April 23, at the Roebuck Hotel, Market Street, Oxford, at an inclusive charge of 10s. The organiser is E. Wake, G5RP, Old Gaol House, Abingdon, Berks. G5RP will be getting into touch with members in the South-West regarding this meeting, but those outside the area who wish to be there (and we hope it will be many) should write to him direct enclosing a stamped addressed envelope. The other area representatives will be kept informed of the arrangements.

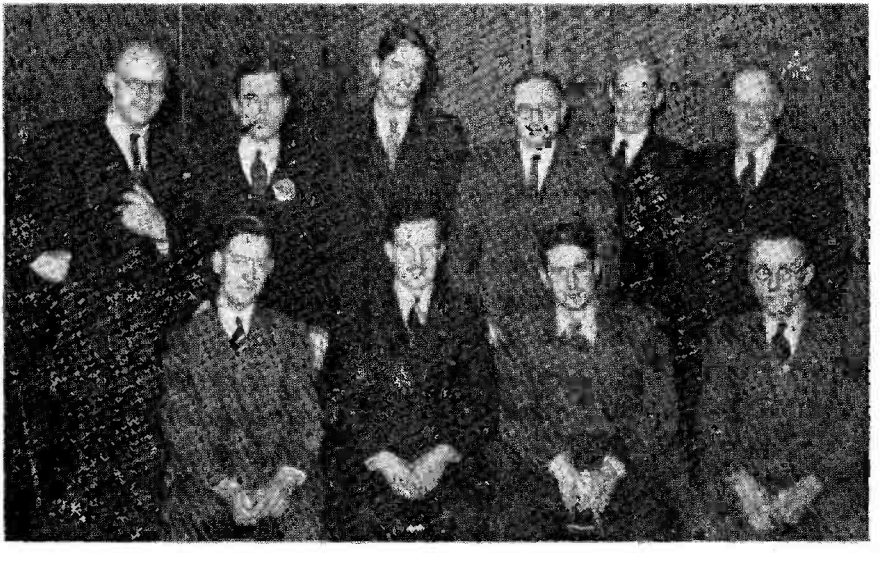
Later in the summer, G3APY will be getting up a meeting for the Midlands and, again, any outside the Midland area who are interested should let G3APY know and full information will be sent as soon as it is available.

The Month's Activity

When we looked round the table at the Fiveband Dinner we could not help but wonder why, with all the VHF talent represented there, we were continually hearing complaints of lack of activity on the VHF bands. We feel that there is in fact much more activity than appears at first sight. How many London stations, for instance, would be aware that on many evenings during the past few weeks as many as eight stations have been on the air in and around the Portsmouth area? Similarly, a few evenings ago we were astonished to learn, after listening round on a band empty except for locals, that there were 12 stations operating at the time in London.

Several factors seem to be involved in this. In the absence of inversions and such-like, 2-metre conditions produce a markedly shorter range than five metres. We say this in spite of a number of assertions that the reverse seems to be the case. Up to horizon distances equal powers in the aerials can produce a stronger field strength on 2m. than on 5m. but once the signal reaches the diffraction area, strength decreases much more rapidly on the higher frequency. In addition, hills are much more serious obstacles as the wavelength is decreased. These comparisons are made on the assumption that equipment (which includes aerials as well as transmitters and receivers) is equally efficient on both frequencies and unless this is so, or very nearly so, statements that a certain path is better on 145 mc than 60 mc, or *vice versa*, mean nothing.

In general, 144 mc receivers are undoubtedly improving, but several correspondents appear to think that possession of a crystal-controlled convertor means that their receiver is above reproach. To our own way of thinking the crystal-controlled oscillator comes *last* in the list of requirements for an efficient 145 mc receiver! It makes for ease of operation; that weak fading signal can be held; you



The 420 mc group at the VHF Club Dinner. Front, l. to r., G3APY, G3CU, G5RP, G2FKZ; Back, l. to r., G5JU, G6HD, (?), G5PY, G2WS, G5CD.

The VHF Century Club group, all of whom have cards confirming two-way contact with 100 or more VHF stations. Front, l. to r., G5MA, G2XC, G6VX, G5PP ; Second Row, l. to r., G5JU. G3ABA, G2CIW, G2MR, G3CGQ. G5PY, G3APY, G2AJ ; Back Row, l. to r., G5LQ, G3CWW, G6HD, G2HDY, G4IG, G2NH, G8SM, G5RP, The present total membership of the VHF CC is 44.

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

know exactly where it will come back again when it fades out ; no need to start searching in case the oscillator has drifted—*But* all this will not help one iota if the DX signal is not reaching the mixer above noise level. So please give priority to the RF and mixer stages, and hot them up even if you have got a CC oscillator. Most experienced VHF men know all this, but we mention it for the benefit of those few who do not.

Some excellent designs for RF stages have appeared in the *Short Wave Magazine* during recent months, so there should be no difficulty in finding something suitable.

On the aerial side, with increasing feeder losses as frequency goes up, the need for correct termination becomes more important, as the extra losses due to standing waves on the feeder are determined to a large extent by the loss which exists under matched conditions. The effect of aerial change-over relays should be investigated, but we would remark here that the relay at G2XC (at which most of our visitors frown !) makes less than 1 dB difference.

Returning to the subject of this month's activity, it has been pleasing to find new stations on the 144 mc band and to hear others being called. There are certainly more 2m. stations operating in the neighbourhood of Portsmouth than ever we had on 5 metres, and there are signs that this is happening elsewhere. Conditions have been somewhat above those of the previous month. But it is difficult to decide what conditions should be called "average." The first week of February produced one or two good spells for N-S working, while G6DH has been maintaining regular contacts across the North Sea to ON and PA. Nothing approaching the conditions of November last have been experienced since, however.

Aurora reflections were apparent on January 25, but activity was low on 5 metres and the only report comes from G2AOL (Otford) who worked G3AVF (Torquay) at 2225 GMT with his beam somewhat west of North instead of on the direct-path route to the south of West. G3AVF was speaking at S9 *plus* with characteristic aurora note, which G2AOL describes as "an exaggeration of the usual W6 watery DX tone." Previous to this contact G3AVF and G2AOL had kept a schedule for nearly two months with no results at all. It also gave G2AOL his 100th station on five metres.

Station News

An interesting letter from GC2CNC says he is on 145 mc and would like the South Coast stations to keep watch for him between 1900 and 2100 GMT. He has only heard one signal on the band and that in late December. GC2CNC is also interested in 420 mc work and would like information on Tx and Rx circuits for use on that band.

New 2-metre activity in the North includes G6TG in Scarborough, making a point of operating in the 144 mc band nightly at 2200. G2ADZ (Oswestry) continues to be a regular performer and has provided G3DA and G3BY with some contacts. G2ADZ still finds G5BM an astonishing signal at 80 miles. The evening of February 3 was particularly good in Oswestry and G2ADZ worked several London stations as well as hearing G2XC ! He will be adding an 829B to the Tx soon, but for the moment his main interest is in improving the Rx. His neighbour G4LU comments on the improved activity and conditions during the past month, and has found the foggy weather to coincide with the peak periods. He wants a new layer to reflect the signals from Glamorgan and Somerset at a steep enough angle to get them over the intervening hills ! Alternative scheme is to shift the hills !

On the East Coast G3DMU (Scunthorpe) has been putting out a good signal and in addition to some excellent contacts with the south of England worked F8NW during the good spell in November.

G3EHY (Banwell) in Somerset has been hearing quite a number of local 2m. signals as well as some DX, and comments that several stations in his area are putting out 2m. signals but do not appear to have 2m. receivers ! He found January 27 to be an outstandingly good evening, best signals being G5MA and 5MI. A 6-ele. stacked rotary beam has recently been erected, and has given very promising results even at a height of only 15 ft. G3EHY suggests some special activity at week-ends, such as the Activity Periods we used to run on five metres, so just to see what happens—make an extra effort to be on 2m. as much as possible during the week-end March 12-13, starting at, say, 1800 on the Saturday.

G6DH has been carrying out some tests with G8AO who has a five-element beam on his ship running up and down the East Coast. Signals have been heard up to 80 miles or so in spite of indifferent conditions. Others on in Essex include G2WJ (Dunmow) operating off batteries and with a 5-ele. beam, and G2CIW (Brentwood) who now has an 829 PA.

G5LQ (Chiswick), now 144·24 mc, disagrees with the suggestion that G's should confine themselves to the HF section of the band. As he points out, there are certain dangers possible as a result of such a policy and it is as well to make full use of the facilities granted us. The only snag is that it is difficult to search the whole band 144 to 145 mc thoroughly in a reasonably short time, and we feel it would be a pity if the communication band procedure of working only stations near one's own frequency were to be repeated on the VHF bands. Use of the searching signals QHL, QLM, QMH, QML, may well become essential before long.

TWO METRES

COUNTIES WORKED LIST

Worked	Station
25	G2AJ, G2AXG
23	G2IQ, G3APY
22	G4LU
20	G5NF
19	G2CIW, G2NM
18	G5BY, G6PG
17	G2XC
15	G8XZ, G8QX
14	G2NH, G3DMU, G5BM, G5RP, G6LK

G5MR (Felpham, Sussex) was accidentally omitted from the list of VHF Century Club Associates last month ; Sorry, OM. He has 95 cards to date. Work is being carried out on a CC convertor and G5MR hopes to be coping with DX before long. G5MI (Wimbledon) has added a 6J6 push-pull RF amplifier to his Rx line-up, so that he now has *two* such stages, giving him large front gain. His 16-ele. beam unfortunately came to an untimely end in the February gales. Prior to this, G5MI was finding it possible to receive signals from up to 40 to 50 miles at Q5 irrespective of weather conditions. This is in fair agreement with our own experience. On five metres the consistent range was more like 60 miles. As a result of the Dinner G6CB acquired two of his missing 25 cards for the Century Club. He says he only wants twelve more dinners to get the rest ! G6CB is on 144·36 mc and adds support to G5LQ's plea for more LF end activity. His power output, at present, is 3 to 4 watts, and he is there most evenings.

G8KL (Wolverhampton) weighs in to say that he has got himself organised again for

VHF working, and will be putting Staffs. on 144 mc for a lot of people down South ; he mentions that he still has no neighbours on the band, which makes testing and lining up more difficult. From Scotland, stalwart GM3OL (Dumfries) reports himself in, as having made his first 2-metre phone QSO with G3BW (Whitehaven) S9 both ways on February 13. So G3BW has a collaborator at last ; GM3OL is running an 829 PA with a 6-ele. c.s. beam.

The Last Month on Five

By the time you are reading this the last month of amateur operation on our old five-metre band, which has been the source of inspiration for all VHF work in this country,

National Grid References

G2CIW	51/590937	G4LX	45/246683
G2NM	41/803044	G5BY	20/688388
G2XC	41/670069	G5TZ	40/497891
G3APY	43/490568	G6HD	51/377692
G3CYY	45/242693	G6PG	51/524736
G3DEP	40/585924	G6UW	52/452578
G3EJL	41/415154	G8LY	41/566006
G3LV	41/665002	G8WC	41/671011

will have come round. We have been asked to suggest that all who still have 58 mc equipment should make an effort to be on as often as possible during the month. G2NM (Bosham) intends to be up on five *every night during March*, while a number of the South London stations are to stage a QSO Party on five metres, beginning at 1900 on March 31 and lasting until midnight. G2NH, 2MR and 5MA are winding up with a three-way at midnight to celebrate many years' consistent activity on the band.

In order to make the most of the limited station density on the five-metre band may we suggest that maximum activity periods each evening during the month be 1930-2000 and 2230-2300.

In Conclusion

Please remember to try to be on two metres during the Activity Week-end, March 12-13, and if you can possibly manage it join in the 5-metre Farewell QSO Party on March 31. In addition, please let us have your five-metre scores, counties and countries, up to date so that we can produce the final tables next month. One or two listeners occasionally send us interesting letters and lists of calls heard, but as much as we appreciate these, space considerations debar their discussion in this column. A separate VHF news column for SWL's appears in our *Short Wave Listener* every month, conducted by our colleague A. A. Mawse ; we know he will be very glad to have reports from listeners and to make use of them in his column. Reports for the April issue of the *Short Wave Magazine* should reach us by March 18, latest, addressed to E. J. Williams, G2XC, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. With you again on April 6.

Activity Periods

144 mc : 1900 to 2030 daily.

Special Activity Weekend—March 12/13

58 mc Farewell QSO Party—March 31.

IF THE CAP FITS . . .

From Derby & District Amateur Radio Society's excellent little magazine *G3 Experimental Radio Derby*—G3ERD being their callsign—we take the following, with due acknowledgments to D.D.A.R.S. and the contributor concerned :

"First remember that your neighbour the old hand may not be particularly interested in your line on Amateur Radio ; so be careful about giving him a long technical harangue—he probably knows it all in a practical way, and may confound your theories by demonstrating that the thing works, contrary to the boloney in the gen book. And when you are visiting his station, don't fiddle with his knobs and switches, especially if OM is QRO and on VFO. And don't rummage in OM's drawers, or borrow his books. When you get your own call, don't regale OM with a long detailed word-picture of your first QSO with PA ; just mention it. If OM is interested, he'll *ask* for details. And when *you* start up on VFO, don't take it for granted that OM is pleased to hear you wobbling on his frequency ; he may be keeping a sked or trying to work some DX himself. It will just burn him up if *you*, of all people, spoil his chances with an OZ on 1·7 mc. And remember that your signals are always S9 *plus* to the locals. If you can remember all these things, you'll find OM quite a useful chap to know."

Excellent advice—and an indication of the high standard of some of our Club magazines, most of which are produced under considerable practical difficulties, generally overcome by the enthusiasm of the unthanked, nameless members nominated to run them.

Radiovision Commander

The New Amateur Band Communications Receiver

Magazine Test Report

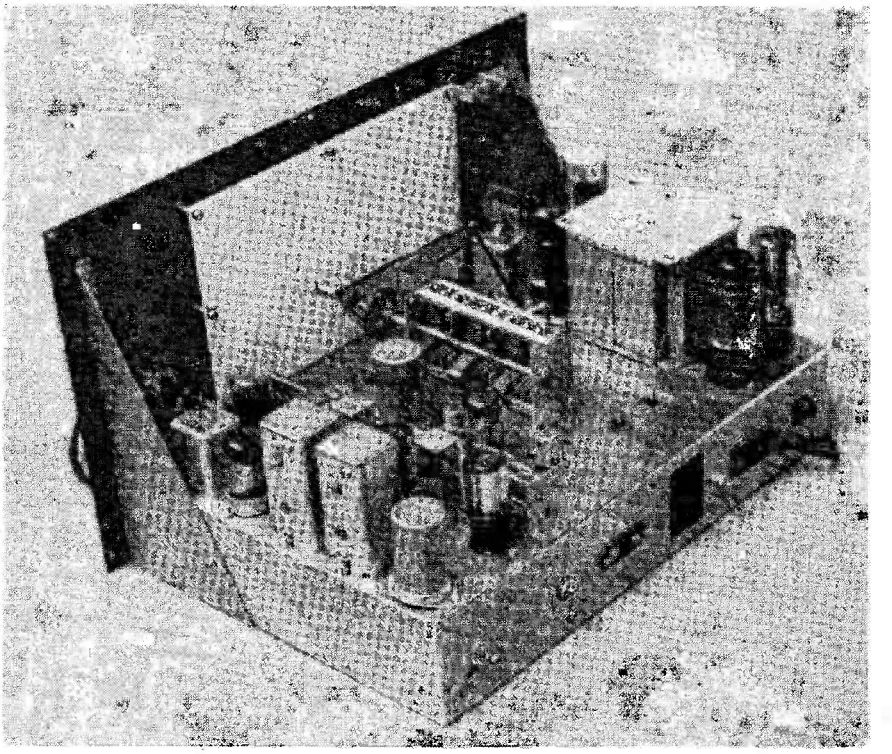
FOR some weeks we have had a production model of Radiovision's new "Commander" running under test conditions—on the bench and in operation over the air.

The Commander represents an attempt to give the British amateur a communications receiver which will do him justice and of which he can be proud. Let it be said straight away that Radiovision have attained these objectives.

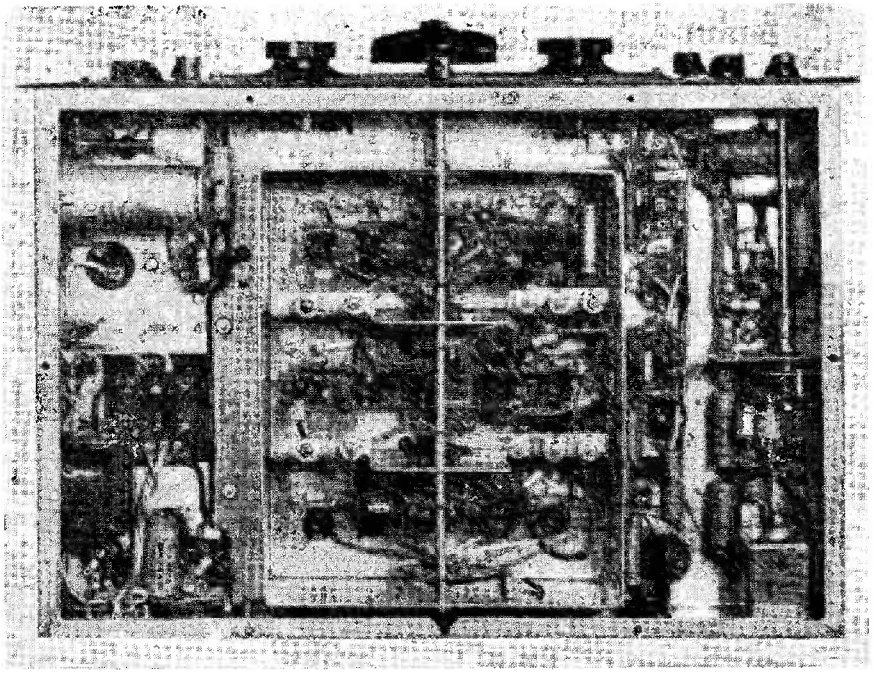
Main Design Details

This receiver is a 9-valve double-conversion superhet (11 valves including rectifier and voltage stabiliser), giving complete coverage from 1·7 to 31 mc, in five switched bands. These are: 1·7-4·0 mc; 4·0-7·6 mc; 7·6-15·0 mc; and 15·0-31·0 mc, with 21·0-21·45 mc separately selected within the latter range.

Outstanding feature of the tuning pack is the provision of wide-scale electrical band-spread on five amateur frequency ranges: 3·5-3·8 mc; 7·0-7·3 mc; 14·0-14·4 mc; 21·0-21·45 mc; and 28-30 mc. This is achieved by means of a double-section three-gang condenser, with a "Bandspread-General Coverage" switching arrangement. Having brought in the required frequency range on the band switch proper, setting of this second control selects the tuning capacities to give either general coverage on that range *or* full spreading of the corresponding amateur band.



Rear chassis view of the Commander. The two-section 3-gang condenser is clearly visible. The chassis is bright finished and all parts are easily accessible.



Underneath the Commander. Power section on left, RF chassis centre, IF/Audio section on right. First grade components, some specially designed for this receiver, are used throughout.

Thus, the same tuning control performs both functions, the dial being suitably engraved for each. As is usual, the only range upon which true electrical bandspread is not possible is 1·7 mc—but at that frequency the Band 1 general coverage is quite wide enough to give close tuning.

The tuning mechanism and dial arrangement is without doubt one of the best yet seen in an amateur communications receiver. It is smooth, positive and accurate, and frequencies can be read off closely on all bands.

Another circuit feature of particular interest is the provision of an independent oscillator trimmer control, brought out to the front panel, which enables the band edge to be accurately spotted on the dial by reference to the usual frequency standards. Again on the RF side, an aerial trimmer permits the input circuit to be peaked up with a wire of any length, and is another factor of importance in obtaining the utmost efficiency.

In regard to selectivity, by the use of a double-IF arrangement (1·6 mc and 100 kc) three selectivity settings are available: Broad, 10 times down at 4 kc off; medium, 10 times down at 2½ kc; Sharp, 2 down at 1 kc off, to 1,000 times down at 5 kc. In the "sharp" position, the selectivity is exceptionally good and shows the true "Q5'er" effect. For CW working at this setting, it is possible to get single-signal ("one side") reception by proper adjustment of the main tuning with the BFO control, which operates on the second IF channel.

Other Circuit Features

A series noise-limiter is incorporated which is adjustable towards the limit of suppression; this is quite effective on noise peaks and should give adequate suppression in bad locations.

The figures to be expected for sensitivity are 1-2 microvolts in for 50 milliwatts out; signal-noise ratio, 10 microvolts in giving better than 20 dB; image rejection, 30 dB at 30 mc to 70 dB at 2 mc.

AVC is applied to the RF, first and second IF's and second mixer, and will hold the output level for very wide variations in signal input. An illuminated S-meter is of course fitted, with S9 set for 100 microvolts and each S-unit calibrated for 6 dB steps.

General Comments

The receiver as a whole is very well built, the mechanical and electrical design is excellent, with good appearance, well placed

controls and easy operation. The gain, both on RF and audio sides, is such that one always feels the receiver has plenty in hand. The switching is quiet and positive and frequencies can be set up quickly and accurately. The "send-receive" switch does not produce a frequency change after a stand-by period—a failing of some receivers, necessitating readjustment of the signal on tune after a spell of transmitting.

Overall stability is good, and after a short initial warm-up period, test signals were held within audio beat on 28 and 14 mc for hours at a stretch. The designers have given particular attention to the problem of RF coil and trimmer design and it can fairly be said that the drift is quite negligible.

The Commander is lively and good-looking and will perform excellently on all bands. We can confidently recommend it to anyone wishing to possess a modern communications receiver incorporating all those features which experience has found to be either necessary or desirable on the amateur bands.

Variable Bias Pack

Easily-Constructed Unit

By **J. B. ROSCOE, M.A. (Oxon.) (G4QK)**

A BIAS pack capable of giving a variable bias voltage is a useful piece of gear for experimental work. Any ordinary pack can, of course, be fitted with a potentiometer and used for this purpose, but if the current drain is at all heavy the potentiometer must be large, and correspondingly expensive. The obvious solution is a stabilised variable supply, but for those who wish to avoid this complication the circuit shown here is suggested.

It will be seen to consist of a normal full-wave rectifier arrangement, but using two tetrodes instead of a double-diode. The valves are used as combination rectifiers and voltage droppers, their impedance being controlled simply by the potential at their grids. In this way, it is possible to control a fairly heavy

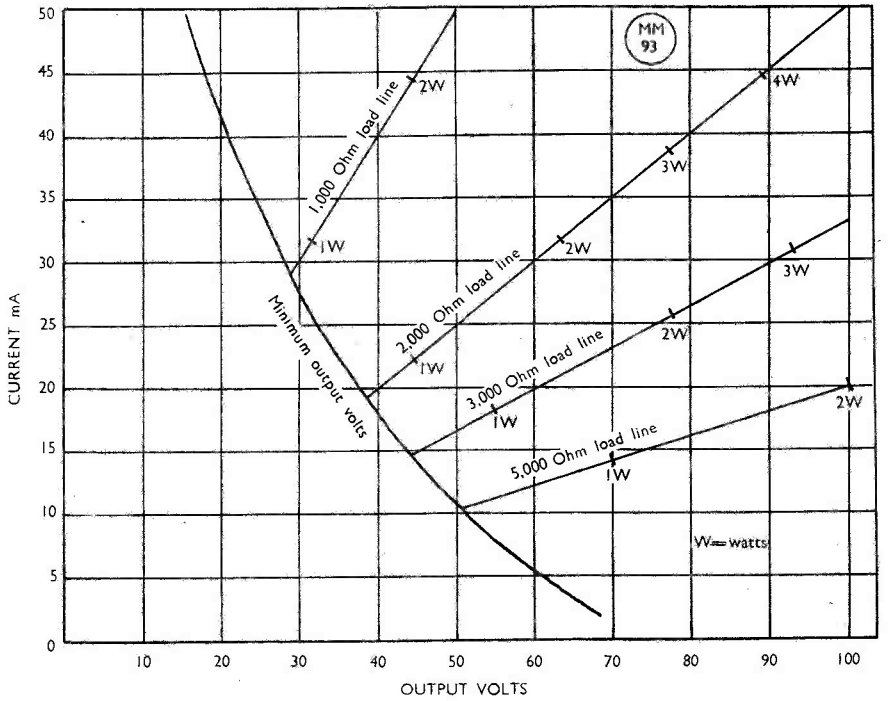


Fig. 2. Some load curves obtained with the bias supply unit.

current, which is desirable for stability of supply, with a 1-watt potentiometer.

Practically any type of power valve will do, the requirements being simply cathode emission and anode dissipation. If tetrodes are used it is advisable to connect the screens to the anodes through small resistors, as shown, to prevent the screens overheating. In the writer's case the valves used are KT63's, as two of these were available, and were unlikely to find any other use. The KT63 is rated at 8·5 watts anode dissipation: when run at 300 volts 50 mA, *i.e.* 15 watts for the pair, the anodes gave no indication of overheating.

Equally, the transformer requirements are not critical. Practically any transformer with two 4-volt LT windings will give 2 amps. comfortably: provided, therefore, that one of the windings is centre-tapped, it will be possible to use 6L6's or 807's in this circuit. The writer's transformer is the usual receiver type, giving 300 volts on load. This is, admittedly, rather more than necessary. The minimum voltage obtainable under various loads was plotted, and from this curve the load required for any range can be found. The bleeder current is usually kept at 50 mA, which is enough to swamp small changes in the external load, due to grid-current and so on.

The writer has not given the matter any deep consideration, but it seems probable that this circuit may be expected to contribute some extra smoothing, and a measure of peak-clipping on surges.

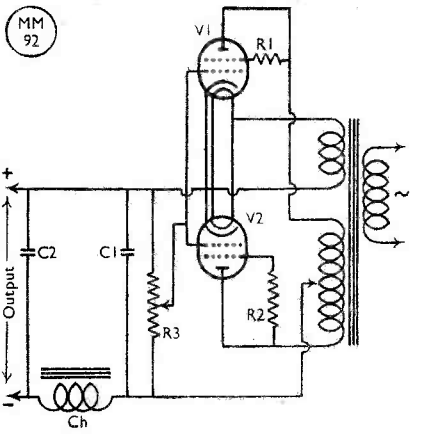


Fig. 1. Circuit of G4QK's bias pack, in which the low-wattage potentiometer R3 controls the output voltage. Almost any type of valve available can be used in the rectifier position.

Table of Values

Variable Bias Pack

C1	=	8 μF
C2	=	16 μF
R1, R2	=	100 ohms, 1 watt
R3	=	50-100,000-ohm potentiometer
Ch	=	Smoothing choke
T	=	Transformer
V1, V2	=	KT61, KT63, KT66, 6V6, 6L6, 807, or others of similar type.

"PSE QSL"

If you want SWL reports on any particular transmissions, let us have a notice for this feature in our *Short Wave Listener*. "Pse QSL" remains unique as the recognised channel for obtaining reception reports, and each month we print upwards of 50 such requests from operators all over the world. Give band(s), method, times of operation, brief details of report required, and address for QSL's. It is understood that all useful and accurate reports received through "Pse QSL" are confirmed by card to the SWL concerned.

MULLARD FREQUENCY CHART

For all who want to know exactly how the Atlantic City Conference allocated the radio frequency spectrum by regions and services, a chart is available designed to give the information in the easiest and quickest way possible. Printed in sixteen colours, it measures 2 ft. 6 in. by 3 ft. 4 in., and is suitable for wall mounting. The cost of this Frequency Spectrum Chart is 6s. 6d. post free, of the Communications Division, Mullard Electronic Products, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

DISTRIBUTOR SUPPRESSORS

Belling & Lee offer two types of suppressor for fitting to the distributor HT lead. Type L.1274 (1s. 6d.) for a cut lead, and Type L.630 at 2s. for screwing into the distributor head. Traders can obtain an attractive three-colour show-card mounting 24 L.630 suppressors, or 48 in a labelled carton. Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex. Everybody should have one fitted.

ERIE PRICE REDUCTIONS

Big price reductions are announced for the Erie range of fixed resistors, carbon track potentiometers, vitreous resistors and the Erie "Ceramicons"; the cuts vary from 25 to as much as 50 per cent. over a wide range of items. The new price lists are obtainable direct from the Sales Dept., Erie Resistors, Ltd., Carlisle Road, The Hyde, Hendon, London, N.W.9.

Here

Index, Volume VI

The Index inserted as a loose supplement in this issue shows, among other interesting things, that during the past year we published as paid work material from no less than 75 different contributors; a great many of them were appearing in print for the first time.

During the twelve months' period, our outside contributors produced between them 90 main articles, of the total of about 200 different subject headings in the *Magazine*.

B.O.T.C. Dinner

The proposed Old Timers' Dinner has been arranged for Friday, May 20, in London, at an inclusive charge of 10s. per head. G2NM will be in the chair. All members of the British Old Timers' Club, at present totalling 138, have had sent them a circular giving full details; if by any chance it has not appeared, will the member(s) concerned please drop in a card straight away.

A number of acceptances for May 20 have already been received and we should be glad to have all reservations as quickly as possible, so that those organising the dinner can proceed with the arrangements.

And we are glad to welcome the following as nine new members of the B.O.T.C.: Dr. J. R. Wortley-Talbot (G6WT), 1908; A. J. Hills (G3RC), IXU in 1912; A. O. Milne (G2MI), 1924; G. E. Prance (G5RN), 1924; L. J. Fuller (G6LB), 1924; J. Blake (G5BC), 1926; A. L. Clare (G6AX), 1928; T. A. Whiteley (G6QA), 1928; and R. Jardine (G6QX), 1928. These will be added to the next Club address list circulated.

Binding Vol. VI

Arising from our note in this space last month, about getting the year's issues bound, we have been asked by L. Swistun, 49 Belgrave Road, London, S.W.1, to say that he is able to undertake binding at 6s. per volume, c.w.o. and postage. Readers interested should write direct to the address given, also saying whether they wish the advertisement pages to be retained.

Identify, Please!

This is an exhortation to all 1·7 mc operators, whether using CW or 'phone. The

and

reason is that for the SWL's who follow the amateur band commentary in our *Short Wave Listener* we are running "Top Band Counties Heard" as one of the contests for 1949. It involves the positive identification of 1·7 mc stations *and* their counties, so it would help a great deal if 160-metre operators would make a practice always to sign over with the name of the county—using the accepted abbreviation for it when on CW. Incidentally, this contest is producing long lists of very interesting 1·7 mc Calls Heard in the *Short Wave Listener* each month.

Correction Note

In G5RZ's article on the Valve Voltmeter in our January issue, R3 in Fig. 3 should be 1·5 megohms; "R5, R6" in this table should read R1, R2, each 5·6 megohms. In Fig. 4, C1 and C2 should be transposed.

Corrections for the circuit of G3AAG's Broad Band Exciter (p. 861, February) are: Valve to right of V2 is V1; C24, C25 in series in the grid of V1 should be ·001 μF; the "C24" decoupling the anode of V1 is ·01 μF, and the "C25" driving the grid of V2 is ·0001 μF; V3 element connections should be as for a 6SK7, with the earthed heater pin joined to the valve shield; V3 cathode should be taken to earth through a 2·5 mH RF choke, to complete the DC return; for "R19" in the table of values read R9, and for V1 read 6J5; valves to the right of V4 are V5, V6, with V7 as the output stage (lower right), in the circuit diagram.

Then G6VX remarks that he would be a clever chap who could make the lid fit his converter chassis—that dimension on p. 885, February, should be 4 $\frac{8}{16}$ in., *not* 3 $\frac{8}{16}$ in. as given.

Finally, some wag says that the "yardstick" on p. 978 should have been marked jolts at the top—to which we can only reply that colts also kick.

For us, it remains a hard and confusing life!

German Nationals

We have been officially informed from the Bipartite Control Office, Frankfurt, that it is expected licences will have been issued to about 500 Germans by the beginning of this

There

month; technical and Morse examinations have already been held, and callsigns allocated in the sequence DL1AA-1ZZ, to be followed by DL3, DL6-Ø. So good luck and every good wish to the emancipated DL's.

It is also understood—but not officially confirmed—that our happy "Allies" on the other side of the Curtain are licensing German nationals in the Soviet Zone in sequence from US1KAA—but *they* have to QSL via Box 88!

NEW QTH's

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

G2ALB A. W. James, 82 Fernside Road, Poole, Dorset.

G2BVM K. Pearce, High Street, Ixworth, Bury St. Edmunds, Suffolk. (*Tel : Pakenham* 348).

G2CGF S. G. Griffiths, 38 Romney Road, Hayes, Middlesex.

G2CLN J. F. Gwynne, 12 Sylvia Avenue, West Heath, Birmingham 31.

G2FAD F. R. Jupp, 35 Brading Road, Brighton, 7, Sussex.

G2FRH H. B. Sanders, 34 High Street, Tring, Herts.

G2HHT A. Williams, 6 Park Avenue, Carlton, Nottingham.

G3BLL R. A. Valler, 38 London Road, Kingston-on-Thames, Surrey.

G3BMD C. B. Pretty, 52 Regent Road, Leicester.

G3BNZ E. A. Knight, 132 Elgar Avenue, Tolworth, Surbiton, Surrey.

G3BPI J. Hunter, 27 Milton Avenue, Highgate, London, N.6.

GW3CDY R. W. Roberts, 1 Parc-y-Dre, Ruthin, Denbighshire.

G3CIZ S. D. Matthews, 2 Alexandra Road, Lindley, Huddersfield, Yorks.

G3CML L. H. King (*ex-XAFU*), 14 Clarence Street, Bramley, Leeds, Yorks.

G3DCL D. L. Kings, 97 Lodge Road, Redditch, Worcs.

G3DDD V. De Coene, Ingleside, Jarvis Brook, Sussex.

G3DMK R. Frarey, 3 Somme Lines, Catterick Camp, Yorks.

G3DOK R. W. Macgillivray, 19 Max Road, Liverpool, 14.

G3DRQ W. F. Freestone, 81 Orpen Road, Sholing, Southampton.

G3DWY B. Carr, Aston House, Prestwich Park, Prestwich, Lancs.

G3DZA V. E. Andrews, 15 Bearwood Hill Road, Winshill, Burton-on-Trent, Staffs.

G3DZT J. H. Beamand, 80 Friezland Lane, Brownhills, Walsall, Staffs.

G3EAQ R. A. Davis, 63 Alexandra Road, Southend-on-sea, Essex.

G3EAQ/A R. A. Davis, 4 The Valley, Porthcurno, Penzance, Cornwall.

G3EFQ E. D. J. Kingsbury (*ex-D2FQ*), 200 Halfway Street, Sidcup, Kent.

G3EGN W. E. Benson, 69 Brighton Street, Heckmondwike, Yorks.

G3EGP A. J. Bridgens, 1469 Pershore Road, Stirchley, Birmingham, 30.

GM3EHI J. Mathieson, 31 Reid Street, Bellshill, Lanarkshire, Scotland.

G3EKR G. W. Wilson, 27 Rosewood Terrace, Rosehill-on-Tyne, Northumberland.

G3EKX N. J. Birkett, 75 Fowler Street, Derby.

G3EKZ D. E. Blacklock, B.Sc., 30 Surrey Street, Ryde, Isle of Wight.

GW3ELE J. B. Morris, Monkton, Ashfield Road, Newbridge, Mon., S. Wales.

G3ELJ C. Crisp, Claypole, near Newark, Notts.

G3ELW W. J. Roscrow, Gweal-An-Top, Redruth, Cornwall.

GW3ELX S. F. Payne, 2 Risca Road, Crosskeys, Mon., Wales.

G3ENH F. C. Hartles, 74 Hawkesley Mill Lane, Northfield, Birmingham, 31.

G3ENQ R. D. Nicol, 3 Cray Avenue, Orpington, Kent.

G3EOD J. D. Brown, 37 Bradford Road, Brownhills, Walsall, Staffs.

GM3EOJ C. F. Sherrit, 73 Union Grove, Aberdeen, Scotland.

G3EPV R. D. Emes, 56 Shakespeare Avenue, Arnos Grove, London, N.11.

GM3EQC D. Hendry, 30 Maxwell Street, Fochabers, Morayshire, Scotland.

G3EQL G. Haring, 121 Bradbury Road, Olton, Birmingham, 27.

G3ERG J. Pickup, 16 Portman Road, Liverpool, 15.

G3ERK K. J. Forrest, B.Sc., 22 Highfield Drive, Chester Road, Sutton Coldfield, Warks.

G3ERR J. A. Edwards, 1 Braemar Gardens, Hendon, London, N.W.9.

G3ERU D. R. Church, 22 Edgehill House, Loughborough Road, Brixton, London, S.W.9.

G3ERV A. R. Mee, Greenhaven, The Drift, Royston, Herts. (*Tel : Royston* 3362).

G3ESB A. D. Hitchcock, 38 West Road, Spondon, Near Derby.

G3ESV Rev. F. Ness, M.A., Upholland College, Wigan, Lancs.

G3ETH J. L. Goldberg, B.Sc., Elm Lodge, Elbow Lane, Formby, Lancs.

G3ETI I. Macwhirter, 16 Queens Avenue, Great Meols, Wirral, Cheshire.

G3EUH G. E. A. Newbery, 57 Belgrave Road, Ilford, Essex.

G3EUK R. W. Curtis, 30 Livingstone Road, Oldfield Park, Bath, Somerset.

G3EVL K. J. Foskett, 19 Pattison Road, Child's Hill, London, N.W.2.

G3EVT R. J. Mutton, 157 Evesham Street, Redditch, Worcs.

G3EVV F. J. Hill, 13 Staffordshire Street, Peckham, London, S.E.15.

G3EWP A. B. James, Cherryll, Mossley Corner, Congleton, Cheshire.

G3EXI C. Cave, 161 Grangehill Road, Eltham, London, S.E.9.

G3FZL G. M. C. Stone, 35 Elsie Road, East Dulwich, London, S.E.22.

G3ZP R. E. Greene, Grenor, Runnymede Road, Ponteland, Newcastle-upon-Tyne. (*Tel. Ponteland* 450).

G5MB W. H. Lamb, 34 Freshfield Road, Heaton Mersey, Stockport, Cheshire.

G8LQ E. Porter, 191 Aragon Road, Morden, Surrey.

CHANGE OF ADDRESS

G2AXU K. Mallett, 23 Bexley Lane, Sidcup, Kent.

G2AYC S. E. Vanstone, Chandos Lodge, Stoke Road, Fetcham, Surrey. (*Tel : Bookham* 167).

G3AQQ J. Kelsall, No. 3 Bletchley Park, Bletchley, Bucks.

G3BQS K. Chorley, 6 Calton Road, New Barnet, Herts.

G3BWQ S. H. Iles, 101 Dovercourt Road, Horfield, Bristol, 7.

G3DNT B. N. Gregory (*ex-D2AQ*), 2 Pinfold Estate, Tideswell, Via Buxton, Derbyshire.

G3DVL F. Harrop, 6 Hartfield Avenue, Brighton, 6, Sussex.

G3ZY J. R. Tweedy, 13 The Woodlands, Rothbury, Northumberland.

CORRECTION

G4MM J. M. Miller, 51 Toothill Road, Loughborough, Leics.

G6QC E. T. Pethers, 24 Brand Hill, Woodhouse Eaves, Loughborough, Leics.

The other man's station

G8IL

This neat living-room outfit is owned and operated by J. R. Letts, G8IL, at 16 Canadian Avenue, Salisbury, Wilts. First licensed in 1936 in the London area, operation began from Salisbury on the post-war resumption of amateur activity.

The equipment shown is a 120-watt CW/Phone transmitter for the 7, 14, 21 and 28 mc bands, with provision for remote control and switching on three bands. The operating position is at a writing desk (not shown) to the left of the RME-69 receiver; under this is the 6F6-6L6 VFO unit, derived from a Meissner Signal Shifter—the forerunner of all VFO's. The calibration standard is a 100 kc crystal oscillator.

The main transmitter in the enclosed 4-ft. rack is entirely home-built. The bottom section carries the 600- and 12,200-volt power supplies; next comes the smoothing equipment, relays and associated rectifiers; in the third section are the 300-volt power unit, speech amplifier and modulator; the top shelf carries the RF unit.

For telephony operation, a D.104 crystal microphone works into a 6J7-6SK7-6F6 speech amplifier, driving a pair of 807's in AB2 as modulator; in the interests of quality, 30 dB of negative feed-back is applied in the 6J7-6SK7 section, with a stabilised power supply for the 807 screens.

On the RF side, an 807 BA/FD drives a 35T as PA, the latter coupled through 200-ohm open-wire line to an aerial tuning panel at the operating position and close to the aerial lead-in point. Aerial-change-over is by relay in the feeder line.

One of the chief interests at G8IL is aerials; a 45-ft. mast with a 14-ft. rotary head is used for holding various horizontal or vertical arrays, with separate 33-ft. and 66-ft. wires permanently available for comparison purposes. Results achieved, with activity equally divided between CW and 'phone, reflect a well-designed and operated station; 152 countries in all Zones worked post-war on 28 mc phone; WAZ and DXCC certificates; and WAS on 28 mc. G8IL is now building for 144 mc working, so we look forward to hearing more from him in the near future.

THE MONTH WITH THE CLUBS

FROM REPORTS

The slight chaos caused by the Contest now seems to have subsided and Clubs are settling once more into their winter routine—although most of them are keeping an eye cocked towards the summer programme.

This month's date-line was on the tight side, so it is good to see that 28 Clubs have reported in time for it.

Next month we are glad to say that there is more time, and the deadline will be first post on March 15. Please address all reports to Club Secretary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1, and please also bear in mind that we are always glad to see photographs of meetings, club rooms, club stations, or outstanding examples of gear built by members.

And now for this month's reports :—

Reading Radio Society.—On January 8 Mr. F. Ruddle gave a talk on Broad Band Converters ; on the 29th Capt. F. Benbough gave an instructive talk on Line Communications. The March programme comprises a talk on Pulse Transmission by Dr. Lemon on the 12th and the Annual General Meeting on the 26th.

Wirral Amateur Radio Society.—Recent meetings have included the final talk in the series on Radar, a Junk Sale and a visit to Speke Airport. The two March meetings are on the 9th and 23rd, both at the YMCA, Whetstone Lane, Birkenhead.

Malvern & District Radio Society.—This club recently held a film show of somewhat historical significance, as the "main feature" was the NFD Film of 1937. Members were a little shocked at the primitive appearance of the gear compared with to-day's standards. An interesting travel film about Sweden was also shown.

Gravesend Amateur Radio Society.—At the AGM Mr. E. J. Bonner (G8LZ) was elected President for 1949, and the secretary's and treasurer's reports were considered highly satisfactory. Every Wednesday there are lectures on Receiver Design and Elementary Principles, and a Morse session is also held each week. Prospective members will be welcomed at the Club Room (30 Darnley Road) any Wednesday evening.

Wandsworth & District Radio Club.—Welcome to this newcomer to our ranks ; the March meeting will be held on the 9th at Earlsfield Men's Institute, Waldron Road School, Garratt Lane, S.W.18. For further information please contact the Hon. Sec. (QTH in panel).

Solihull Amateur Radio Society.—At a recent meeting G6FK of Wolverhampton gave an interesting talk on Radar ; the talk scheduled for a forthcoming meeting is on the subject of a 10-metre Rotary Beam. Meetings are held fortnightly at The Old Manor House, the Club Headquarters. For Secretary's QTH see panel.

Radio Society of Harrow.—Recent activities have included the AGM and a joint meeting with Edgware, at which the President, G4GB, demonstrated 2-metre gear. Prospective members are welcome at the Club Room, 206/208 Kenton Road, Harrow, every Tuesday evening from 7.30 to 10 p.m. Note address of new Hon. Sec.

West Middlesex Amateur Radio Club.—This club continues to flourish and is attracting enthusiasts in a variety of subjects. Recent meetings have been devoted to a lecture on Valves by Mr. S. R. Claudot, and a discussion on Amplifiers by club members. A Junk Sale and a VHF Evening are also scheduled. Meetings are on the second and fourth Wednesdays, 7.30 at the Labour Hall, Uxbridge Road, Southall.

Brighton & District Radio Club.—The new club station, G3EVE, is now active on 1·7, 3·5 and 7 mc phone, and reports of reception will be welcomed. Meetings are held every Thursday at St. Mary's Hall, Bread Street, Brighton, 7.30 p.m. The second Thursday of the month is set aside for a visiting speaker ; in February, Mr. D. H. Budd of the GPO E. in C.'s Department spoke on TVI and BCI.

Clifton Amateur Radio Society (London, S.E.).—Recent events have been the New Year Party, a discussion on Station Layout and Design, some lively debates and a Junk Sale. Membership is increasing, and new members will always be welcome at the New Cross Club Room, where meetings are held every Friday. Secretary's QTH in panel.

West Somerset Radio Society.—The AGM was held at the end of January as the conclusion to yet another very successful year's activity. Plans for 1949 include a Field Day in the Bridgwater/Taunton area, an expansion of the VHF and Television sides of the club's interests, and, it is hoped, an increased interest in quality reproduction.

South Manchester Radio Club.—A recent talk was on the interesting subject of The Straight Receiver, starting from the simplest and building up to the more elaborate types. Plans for the club transmitter are going ahead, the doubtful point at the moment being the erection of an aerial. Future talks will include the subjects of VHF, Practical Construction and Radio in Medicine. Morse classes are being re-

started and two groups will be active at all future meetings, which are fortnightly—alternate Fridays at 7.30.

Brentwood & District Amateur Radio Society.—Another newcomer to the fold ; this club meets on the first Thursday of every month at 27 Mount Crescent, Brentwood which is serving as a temporary QTH. Prospective members should approach the Hon. Sec.—see panel for address.

Stourbridge & District Amateur Radio Society.—Some 30 members assembled at the last meeting to hear Mr. Pratt lecture on Measuring Instruments. The latest AVO equipment was on show and members inspected it closely. Morse transmissions have been arranged for non-licence holders, and the Borough has been approached on the subject of QSL cards for club members. Meetings take place on the first Tuesday and prospective members will be welcomed by the Secretary.

Association of Midland Radio Committees.—This is a committee formed of representatives of the Midland Amateur Radio societies with the object of fostering mutual help and friendship among the many societies in the area. The first Association function was a Top Band Contest held in January ; this proved quite popular and entries are now being judged. It is hoped to hold a Hamfest and a Field Day during 1949. The Association Secretary is Mr. H. Porter, G2YM, 221 Park Lane, Fallings Park, Wolverhampton.

Warrington & District Radio Society.—At the AGM, in January, G3AAB was elected Chairman. In future Club meetings will be on alternate Thursdays, 7.30 at the Crown and Sceptre Hotel. A series of talks by members has been arranged. February meetings took the form of a talk on Audio Amplifiers and the first Annual Social.

Southend & District Radio Society.—At the February meetings Mr. I. Bailey gave a talk on Loud Speakers and Mr. J. E. Nickless (G2KT) on "Reminiscences." On March 4 there is a television lecture and on March 18 the Club transmitter will be on the air.

The Thanet Amateur Radio Society's dinner, held on January 22, at Ramsgate. About 30 members were present.

BTH Recreation Club (Rugby) Radio and Television Section.—At a recent meeting a lecture on "How Radar Works" was given by Mr. T. H. Mackenzie, B.Sc. This was illustrated by lantern slides and and an acoustic model, by which a PPI picture of the lecture room was simulated on the CRT screen. A film of an actual PPI (in a ship sailing from Belfast to Glasgow) was also shown.

Edgware & District Radio Society.—Members of the Harrow club were welcomed at a recent meeting, at which Mr. E. Everard demonstrated his 420 mc gear. The Club's Annual Dinner and outing was held in February ; certificates and trophies for the competitive events of the year were presented by the president at this meeting.

Chester & District Amateur Radio Society.—The club continues its activities and meets at the United Services Club, Watergate Street. Next meeting after publication is on March 8. Note the new Secretary's QTH, in panel.

Thames Valley Amateur Radio Transmitters' Society.—The subject for the February meeting was Radio Control of Models, and Mr. F. A. Cummings gave a fine talk and demonstration. The March meeting will be devoted to VHF subjects. The TVARTS 2-metre net has now been started—Friday nights at 2230. The club hope they are the first in the country to open up a 2-metre net, and are to be congratulated on their enterprise in doing so. Their Monday night Top Band net has been on the air for a year without a break.

Lincoln Short Wave Club.—This club is hoping to become active again, but it is found difficult to attract members because of the lack of lecturers. If any other Club can help, or if anyone is willing to co-operate, will they please get into touch with the Hon. Sec., whose name and address appear in the panel ?

Oxford & District Amateur Radio Society.—Recent activities have included an "Out of the Hat" Quiz, a Junk Sale and a talk by G8PX on Crystal Grinding. Plans are being made for the Hamfest to be held on March 27 at 2.30 p.m. Several old members who had left the district have now returned and are very welcome at the club. The series of talks, recently dropped, is now being picked up again, and members are looking forward to an interesting and instructive series.

Birmingham & District Short Wave Society.—At the January meeting members were given a talk and demonstration on a home-made oscilloscope ; the talk on February 28 was on Microphones and Speech Equipment ; and March 28 is set aside for a VHF evening. From April 11 onwards, general meetings will be held on the second Monday of the month at the Colmore Hotel,

Church Street, Birmingham 1. On the third and fourth Mondays the club room at 220 Moseley Road, Birmingham 12, will be open.

Hawick Radio Society.—In February Mr. G. Percy (GM3OL) gave an interesting talk on 2-metre work, advocating crystal control for the transmitter and a 6AK5 converter for the receiving side. Work still proceeds on the club transmitter and GM3FHS should soon be on the air.

West Cornwall Radio Club.—We learn from this club's journal, the *Radio Link*, that there is a possibility of the acquisition of separate Club Rooms for each Group—a scheme that might appeal to other clubs covering large territories, as West Cornwall does. There is a lot of VHF activity, including 2 metres, in that area.

Sutton & Cheam Radio Society.—Recent meetings included a lecture on UHF Valves, and the judging of the entries for the constructional competition. The Listeners' Section was won by Mr. L. G. White (Miniature Television Receiver) and the Transmitters' by Mr. G. R. Pearson (Miniature Transmitter). The AGM is fixed for April 19. During February two visits were paid to the *Daily Telegraph* (Radio Picture Transmission).

Cannock Chase Radio Society.—This club meets every other Tuesday, 7.30 at the Unicorn Hotel, Cannock; members come from as far afield as Stafford. There is still room for expansion, and new members are invited to get in touch with the Secretary—QTH in panel.

NAMES AND ADDRESSES OF CLUB SECRETARIES :

BIRMINGHAM. N. Shirley, 14 Manor Road, Stechford, Birmingham 9.
BRENTWOOD. J. F. Moseley, G2CIW, 23 Tower Hill, Brentwood, Essex.
BRIGHTON. R. J. Donald, G3DJD, 2 Canfield Road, Brighton.
BTH. Hon. Sec., Radio and Television Section, c/o Gen. Sec., BTH Recreation Club Office, Rugby.
CANNOCK CHASE. W. Whettall, 94 Cannock Road, Pye Green, Hednesford, Staffs.
CHESTER. H. Morris, G3ATZ, 24 Kingsley Road, Boughton Heath, Chester.
CLIFTON (LONDON, S.E.). W. A. Martin, 21 Brixton Hill, S.W.2.
EDGWARE. R. H. Newland, G3VW, 3 Albany Court, Montrose Avenue, Edgware, Middlesex.
GRAVESEND. R. E. Appleton, 23 Laurel Avenue, Gravesend, Kent.
HARROW. S. C. J. Phillips, 131 Belmont Road, Harrow Weald, Middlesex.
HAWICK. W. McMahon, GM3CV, 10 Drumlannig Place, Hawick, Roxburghshire.
LINCOLN. G. C. Newby, G3EBH, 35 Chaucer Drive, St. Giles, Lincoln.
MALVERN. F. Wingfield, G2AO, Branksome, Worcester Road, Malvern.
OXFORD. R. H. Clifton, G3CGU, 86 Victoria Road, Summertown, Oxford.
READING. L. Watts, G6WO, 817 Oxford Road, Reading.
SOLIHULL. G. Haring, 121 Bradbury Road, Olton, Birmingham.
SOUTHEND. J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend-on-Sea.
SOUTH MANCHESTER. M. I. Wilks, 57 Longley Lane, Northenden, Manchester.
STOURBRIDGE. W. A. Higgins, G8GF, 35 John Street, Brierley Hill, Staffs.
SUTTON AND CHEAM. L. Seaton, 8 Croft Road, Sutton, Surrey.
THAMES VALLEY. A. Mears, G8SM, Broadfields, East Molsey, Surrey.
WANDSWORTH. A. R. Dyer, 28a Isis Street, Earlsfield, London, S.W.18.
WARRINGTON. W. R. Murray, G3CUB, 56 Crow Wood Lane, Widnes.
WEST CORNWALL. R. V. A. Allbright, G2JL, Greenacre, Lidden, Penzance.
WEST MIDDLESEX. C. Alabaster, 34 Lothian Avenue, Hayes, Middlesex.
WEST SOMERSET. T. C. Bryant, G3SB, 29 Lower Park, Minehead.
WIRRAL. R. A. Browning, 24 Norbury Avenue, Bebington, Cheshire.

For the Best Information on the Latest News, Read the Short Wave Magazine

SMALL ADVERTISEMENTS

TRADE ADVERTISEMENTS

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SMALL ADVERTISEMENTS

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BERRY'S (SHORT WAVE), LTD., have vacancies for Senior and Junior Counter staff. Applicants must be well versed in HAM gear. Full particulars of age, past experience, salary required, etc. should be sent to 25 High Holborn, W.C.1. All applications will be treated in confidence.

HALLICRAFTER Transmitters type HT4E, complete to makers' latest specification, covering all amateur bands up to 30 mc, with speech amplifier, connecting cables, etc. Immediate deliveries in quantity. HALLICRAFTER HT.14 50-watt Marine Radio Telephone, complete with all valves crystals, and covering amateur and marine bands from 1·6-4 mc. Immediately available from Hallicrafter United Kingdom distributors.—McElroy-Adams Manufacturing Group, Ltd., 46 Greyhound Road, W.6.

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LT MAINS TRANSFORMERS giving MULTIPLE ISOLATED outputs:—6·5v 6 amp; 5v 10 amp; 5v 10 amp; 2·5v 10 amp. Insulation 2,000v AC winding to winding and to frame. 200-250v 50 c/s tapped primary. No flying leads—heavy duty terminals. Suitable for 2·5v, 4v, 5v, 6·3v, 7·5v, 10v, 12·6v valves. Every popular valve combination catered for, including high voltage rectifiers. HT switching problems at an end by running all filaments off this separate supply. By bulk production of a common transformer we have got the cost right too—47/6, and you don't have to spend another penny when you re-design the rig around different valves.—LABGEAR LTD., Willow Place, CAMBRIDGE. *Phone* 2494/5.

U.H.F. OSCILLATOR units containing 2 CV6 UHF Triode valves, 1 D1 diode, split stator condenser, decoupling condensers & chokes, 5/-. Guaranteed valves, SP41, 1/6; D1 television diodes with holder, 2/-; 6J5 and 6J5G's, 3/6r—M. A. Weston, Harman's Cross, Corfe Castle, Dorset.

NEW VALVES. 6AK5, 955, 956, 12/6 each; 9001, 10/-; 6SH7, 6AC7, 2C26, 7193, 9D2, 15D2, 8D2, 4D1, 5/- each. R.C.A. crystal wave meters 200 kc-20mc, type TE-149, as new, in case with instruction book, £6/10/- each. Type 392 Power units 700v 120 mA, 230v AC in., £3 each. RF units Type 24 at 8/6 each; 24, mod 27, 10/6 each; 25, 10/6; 26 and 27, 21/- each. Carriage 1/3 each extra. Receivers AN/ARR-2, 234-258 mc, 12 valves including 10 B7 type 6AK5 and 9001, as new, £4/10/- each. Circuits 2/6 each. Send S.A.E. for our new 12-page list of Surplus bargains which includes HRO's and S27's, etc.—H. ENGLISH, RAYLEIGH ROAD, HUTTON, ESSEX.

WANTED. AN/APS-4 Radar Units, especially control box C-12/APS-4, Junction box J-84/APS-4, and 700 watt Power Unit, 115v Hi-cycle (NEA-3, 4 or 5). Cramoins. Grimsby.

50 MMF CERAMIC TRIMMERS. 4/6 dozen; mains droppers, 1/9 each; 16 mF+16 mF, 2'6 each. Send for lists.—T. G. Howell & Co., 29 McWilliam Road, Woodingdean, Brighton.

SMALL ADVERTISEMENTS

TRADE—*continued.*

SMALL ADVERTISEMENTS

TRADE—*continued.*

EDDYSTONE "680", also the "Commander" and "Hambander"—the latter now only £17/10/-.—Johnson (Radio), Macclesfield.

25 MARCONI CR100's—special purchase permits offer from £20, complete.—Johnsons (Radio), Macclesfield. Send for special lists, 2½d stamp with your name and address.

WISK type microphones, P.O. type carbon insert, complete with 5 ft. screened cable and jack plug, 10/6 each post free.—G3EEL, 78 Bridge St., Peterborough.

BENSON'S BETTER BARGAINS (see page 850 Feb. issue). Most items still available except SCR522's, VR150/30. **BRAND NEW R1355, CASED 50/-. RF UNITS 25, 15/- ; 24, 15/- ; BRAND NEW 26's, 40/-.** Modified RF unit, 5 spot frequencies ; 45-48-52-56-61 mc. **BRAND NEW, 21/-.** 145 mc Convertors, with CV66, EF50, SP61, EA50, circ. diagram, 16/-. Valves 12K8, 12SK7, 12SR7, 12A6, 7/- each. Bulgin 4-pin Ceramic V/bases, 1/- ; 5-pin (807) 1/3.—**BENSON, 308 RATHBONE RD., LIVERPOOL 13.**

CHASSIS, panels, racks and metal cabinets. Stock sizes, or made to specification in steel or aluminium. —Reosound Engineering & Electrical Company, Coleshill Road, Sutton Coldfield, Warks.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5 -, payable with order. Box numbers 1/6 extra.

HALLICRAFTER Super Skyrider **SX17**, Crystal, S-Meter, amplifier, recently overhauled. Offers? 5 Station Road, Benton, Newcastle on Tyne.

FIL. transformers, 7·5 twice 6·3, 5, and 4v heavy duty, weight approx. 12 lb, useful Tx or bench, 55/-. Nife cells, 1·3v 10/15 AH, size 6 × 1½ × 1½ in., unspillable, useful wireless, electric bells, hand lamps, LT, HT, etc. 3/- each. AF3 intervalve transformers, 3/- each. B2 ceramic coil formers, 1/6. Tubular condensers, 0·1 mF, 7d each. ·01 ·005 mF, 6d each; all new, carriage paid.—Thompson, G2FXK, 82 Walsall Road, Aldridge, Staffs.

TELEVISION—1949 Invicta, Brand new with manufacturer's guarantee. Bargain 48 guineas, BM/CDN, W.C.1.

FOR Sale. Army 22 set, Transmitter-Receiver 2-8 mc, complete with power pack, handbook and all accessories. A complete rig and ideal for the 3·5 and 7 mc bands. £10 or near offer. Brooks crystal 7369 kc, mounted, 15/-. Partridge Modulation transformer, 25 watts audio, £1. TZ40, new, 25/-.—Edwards, Deverell Mess, S.M.E., Ripon, Yorks.

HRO PERFECT, cabinet model. ·43-30 mc, 6 coils, amateur bandspread, handbook, power unit, shelved coil stowage, Q5'er, £35 or exchange with cash for FB AR88.—Box No. 481.

INDICATOR UNIT 62, with valves and VCR97, also 2 spare tubes and spare valves. Receiver 1124c complete with 6 valves. W.SA Transmitter and Receiver in travelling case, with 6-v power pack, spare vibrator and 2 spare sets of valves, nearest £30. Various Ex-Govt. valves.—VCR97's, £2 each.—Box No. 483.

HRO SENIOR, exc. cond. ·9-30 mc, bandspread amateur. Some spare valves, manual. Less power pack and speaker. Delivered reasonable distance, £26. STC 4012C ball mike, unused, £3.—Plant, 1 Park Avenue North, N.8.

AMATEUR'S SURPLUS. CNY1 transceiver (consists many useful components), meters, valves, transformers, rotary converter, etc. Genuine bargains, must sell.—S.A.E. please.—Box. No. 482.

HAM selling up : Rack-mounted 1155 fitted with 'M' drive, power pack, two 8 in. speakers and operating tray, all mounted in 6 ft. rack, complete. Also 5-metre transceiver. Bargain £25 the lot. Write or call Wiblin, 8 Caldecott Gardens, Abingdon, Berks.

WANTED. Commercially made Side-swiper (not bug). Price to GC5OU, 28 Bath Street, Jersey. Urgent.

READERS'—*continued.*

SMALL ADVERTISEMENTS

SELLING UP. Transformers for 250, 300, 350, 500v p/packs, 30/250 mA, with LT's, 10/6 to 15/-. Write list of gear.—Box 484.

SALE. Taylor Universal Meter, model 85A, £16. Hambander receiver, £15. Perfect condition. Buyer collects—Green, 42 Queens Road, Slough, Bucks.

WANTED urgently. Any one of the following Radar receivers. R3084, R3131, R3132, R3170A. —J. Murray, 47 Windermere Street, Gateshead 8 Co. Durham.

BC342 or ARR5-S27 in new condition wanted in exchange for new BC-348. Require receiver with 450 kc or 5·25 mc. IF for use with Panadaptor; or exchange 2 BC-348's and 1 LM7 frequency meter, all brand new, for AR88, Super-Pro, SX28-A or similar.—Offers Box 485.

FOR SALE. R1116 Rx, good condition, 142 kc-20 mc circuit. Best offer secures.—R. W. Selvey, Roisel, Brodrick Road, Hampden, Eastbourne, Sussex.

SALE. AR11 Transceiver, 25 watts CW, xtal, Rx and Tx 3·5-16 mc; Rx 5-valve superhet. Offers? *Phone ELM* 5132.

HRO SENIOR components; IF coils, crystal filter, S-meter, gang condenser, PWO drive, RF coils, Meters; several first-grade meters by Turner, Weston, Everett, etc. 2½ to 3½ in., 100 mA upwards, all new and unused. 3½-in. wirewound potentiometers, 10K 10 watts.—S.A.E. particulars.—Box 487.

SALE, 12 6AK5's, 10/- each, post free. See page 802, January *Short Wave Magazine*. Also latest velocity modulation valve with bracket and motor. Also 7 magnetron. Exchange lot for 1155 with P.P. or offers? —Box No. 486.

QRT G5FS. Transmitter 75 watts, crystal control, P/P KT8c. Modulator PP 807, pre-amp. Four Power Supplies: 800v-400v-300v-250v. Relay switching. Outfit complete on 72 in. rack all steel, ready to operate, with D104 mike and two 7 mc xtals. Also VFO 6V6-6V6 7 mc output, Bug key, Headphones, valves, etc. Offers to G3BAJ, 166 Lyham Road, Brixton Hill, London, S.W.2.

EDDYSTONE S640 in carton, as new, plus S-meter, spare valves, preselector, Q5'er, headphones, £26. 20-80 mc 4-stage transmitter, VFO, 807 final, complete power supplies and aerial tuning unit, fully metered, brand new in unmarked case with instruction book, £9. —57 Summerlee Avenue, London, N.2.

HRO Senior, 9 coils, p/pack, £30; S27, £25; Oscilloscope with spare 5 in. tube, £35; Valve voltmeter, VHF prongs, £20; G5UK, 140 Broadway Leigh-on-Sea.

BARGAINS:—Transformer, 200/250, 50 c/s; 5000-0-5000v, 35 mA, 22/6. 1100-0-1100, 500 mA, £3. Excellent R1155, S-Meter, output stage, noise limiter, £10/10/-; Woden pack to suit, £4; Standard rack transmitter, 40 watt, 3 panels, phone/CW, mike, key, xtal, coils, £20; All delivered. Write 130 Hollycroft, Hinckley.

EMIGRATING—150 watt Tx, power packs, 145 VFO with internal calibrator, Garrard gram motor, P.A. Speakers. For sale or swap. WANTED —Class 'D' Wavemeter, xtals, transportable gear. S.A.E. for list.—G3DJD, 2 Canfield Road, Brighton.

40 Recent Radio Magazines, £1. QCC 100 kc xtal, new, 25/-. 5·0 mc xtal, 10/-. Parmeko choke, 10H, 600 mA, £1. BC342 power pack, 25/-. 125 mc ground plane aerial, with co-ax, 25/-.—Box No. 488

BC221—£8, BC348—£8, incomplete mains mod., no power pack. Or exchange for mains/battery miniature Rx.—Box No. 489.

WANTED. Rack-built transmitter, 100/150 watts, 'phone/CW on 14/28 mc. Good quality components and workmanship. Mains AC 230v. Description and photo if possible to Advertiser, Heatherwood, Hordle, Hampshire.

PEPPED up 1224 pen o/p, £4/10/-. Also Eddst. Batt A.W.2 as new, comp, valves and new coils, £5 or offers? R. A. Fitzjohn, Smeeth Road, nr. Wisbech, Cambs.

SALE. R208, 10 to 60 mc, mains operation, built-in speaker, complete in metal carrying case. Perfect condition, circuit diagram supplied. £10, carriage paid. —G3ASK, 12 Acroville, Colindale, London, N.W.9.

SMALL ADVERTISEMENTS

READERS'—*continued.*

SERVICE Ham, posted overseas, requires power pack, instruction book, phones for B2 transceiver. All letters answered.—Box No. 490.

EXCHANGE, QCC bandpass filter, 2 kc at 465 kc. Wanted, 6BE6, 6AK5's. 12 Ewanrigg Road, Grasslot, Maryport, Cumberland.

B2 Tx/Rx and power pack wanted. Good condition essential. Price to—G3CMY, 62 Clifton Road, Weston-super-Mare.

WODEN transformers, pri. 210-250v. secs. 7·5v 3 amp, 7·5v 6 amp, £1. Pair TZ20, 30/-. 19 Set power unit; 12v input, 275v and 500v output, 15/-.—Allen, 14 Frampton Close, Birmingham 30.

EXCHANGE or Sell. HRO rack model, 9 coils, built-in speaker: Eddystone 358X, 9 coils, built-in power pack: S27 UHF Receiver: CH3—250 watt Tx. Wanted, 35 m.m. camera and complete wire recorder.—244 Chorley Old Road, Bolton, Lancs.

FOR sa'e:—Hallicrafter S2OR, as new, £12/10/-. 500-0-500, 400-0-400 transformers with LT's, £1 each. Avo valve tester complete, as new, £5. Eddystone five-metre battery Tx and Rx, £3. Hallicrafter S-meter, new, £2.—G5QA, Lendorie, Birchy Barton, Exeter.

1155 Converted, internal power pack and 6V6 output stage, new panel, perfect. £9/10/-.—Niblock, 25 Milner Road, Thornton Heath, Surrey. *LIV* 1090.

1940 Sky Buddy, good condition. Offers? Seen by appointment. All enquiries answered. Send details. 'DEEX' record card outfits.—G3BBU, 38 Ashbourne Avenue, London, E.18.

FOR disposal. AR88LF and LS (new). Wanted: Cash offers or televisor, also "Baldax" 2·8 tessar for disposal.—Box No. 493.

BC348 Internal AC power pack. Excellent condition, £15/10/-.—Box No. 492.

BC348 internal 230v AC Mains pack, S-Meter, good condition, £14.—10 Duchy Avenue, Heaton, Bradford, Yorks.

SX24, good condition, instruction book, with two stage "Eddystone" Preselector covering 11 to 30 mc. The two £20, or offers? Seen by appointment. Buyer collects.—McInarlin, 88 Greyfriars St., Glasgow, E.2.

G2IN offers one complete 10-metre transmitter (less modulator section), with 829 final. One final amplifier complete with 1200v 250 mA power pack, push-pull PT15's. One SCR522 Tx section, and one Rx section (separate), modified for 144 mc. One BC221 Frequency Meter. Will sell, or exchange for commercially built Audio or Public Address Amplifiers. —114 Cambridge Road, Southport.

THREE TU9B's, brand new, 30/- plus carriage 7/-. P.P.51 rectifier power unit case and chassis, aluminium, 5 ceramic octals, ½-watt resistor, 5/6 carriage paid. Condensers 4 mF, 1000v, 2/6; 1 mF, 1500v, 1/6. Valves: 5R4GY, 3/-. Include postage.—Knight, 82 Fairfield Road, Widnes, Lancs.

SALE—AR77E Receiver, excellent condition, £24. Type 37 oscillator (new), £8/10/-. Eddystone 5 and 10 metre Converter, with built-in power pack, almost new, £6/10/-. Wicox Gay VFO Unit (807 output), £3/10/-. Bendix Tx Type TA/2J/24, complete with valves, £6/10/-. Rx Type 1132A, £3.—G2HOJ, 22 Parris Place, Cleethorpes, Lincs.

WANTED, loan or buy, B2 circuits and instruction manual.—G3EXE, 20 Hurst Grove, Bedford.

WANTED, circuit diagram of 22 Set Trans-Receiver. —193 Clundle Road, Woodston, Peterborough, Northants.

EDDYSTONE Battery Two, £4/10/-. Two 2-v accumulators, 12/6. Brown's "F" phones, 17/6. D104 mike, with handle and switch, £4. All-dry 3-wave superhet, less coil pack, £5. *Short Wave News*, Apr. 46-Mar. 48 (24). *Practical Wireless*, Mar. 45-July 48 (40).—Bird, 118 Woodpecker Road, New Cross, S.E.14.

SMALL ADVERTISEMENTS

READERS'—*continued.*

RCA AR77E, 0·54-31 mc, 10 valves, calibrated, bandspread, xtal, S-meter, noise limiter, flywheel tuning, modified RF, manual, £28 or offer. Buyer collects.—Batey, 6 Wakefield Road, London, N.15.

144mc kit, new parts, dials, m/c meters, valves (100 watt CC, see *Short Wave Magazine*, Nov. 37 oscillator RGD, new, spare valves; wavemeter W.1252. 22-30 mc; *QST*, 5 bound vols. (Jan. 46-June 48). Reasonable offers.—G3AIZ, 56 Hampton Road, E.7.

R.1116 mod. No DF, good working order. Carriage paid, £6/10/-.—Box No. 494.

CR100/7 receiver, noise limiter, £30 or offer. AR88D receiver, £40 or offer. Both perfect order. Carriage extra.—BM/CLF, London, W.C.1.

14mc three-element close-spaced rotary beam. Dural tube elements on strong wooden cradle. Complete with mast, guys and pickets, ready for erection. Collect South London area. Cost over £70 recently. What offers?—BM/CLF, London, W.C.1.

CAR radio, Emerson 6v, as new, £10. Partridge 2½ kW Auto-transformer, 195/255v. 5v steps, new, £5. Speech amplifier and power pack: 6J5, 6C5, PP6A3's, rack mounting, £4. 800v 400 mA transformer, £2. New, boxed, valves: T40, £1; HY25, 15/-; PX25, 15/-; 832, 18/6; 15E, 10/-; 210, 7/6; HK24, £1. Wanted. 25 mmF vacuum condenser. 250v Variac. RK4D32—Webb, Bigbury-on-Sea, S. Devon.

BENDIX RA-1B Receiver 0·15-15 mc, separate power unit, speaker, manual, as new, £12.—A. Atkinson, 15 Barrett Street, Silsden, Yorks.

PREMIER 5-valve superhet, 12-2000 metres, £9/10/-. Transmitter, 6V6-807, less power pack, £5. Xtals, 3600, 3650, 3760, 7082, 7157, 7295. 9/- each.—Hill, 81 Rye Hill Park, London, S.E.15. *New Cross* 0149.

EXCHANGE or Sale TX VFO 4 stage PP807's chassis and panel, 40 watt mod., CR100. £60 lot. Wanted dynamotor TX and RX working order, ready for use.—GW3VL, 2 Mackworth Road, Porthcawl, Glam.

SALE. Brand New LM7 Freq. Meter, improved version BC221, FB ax VFO, 3 valves, 1000 kc xtal check, ·2 to 20 mcs. Modulated. Complete with charts, extra valves and spares. £7/10/-.—G3BDD, 20 Palin Avenue, Bradford Moor, Bradford.

1132A Rx. Lab. modified, new IF's 1·6 mc fitted FB job, with valves. 1132A Rx unmodified Line termination unit TF677 with 3 KT33C in. Control Unit Type 7A. Exchange, cash, offers to:—G2FJR, Sutton-Bridge, Spalding.

SALE. Mod R.208, noise limiter, S-meter, spares, 10-60 mc, £12. R107, £14. Both 100 per cent. Pair as double-super, £25. Components, keys, Rx tubes new.—Box 495.

QRT—HRO, power pack, 4 coils, £35, or offers? 25watt CW Tx, 6L6-807, enclosed aluminium rack, fully metered; two packs, 500v. 350v., £10. Woden UM2, £2.—16 Hallas Grove, Dalton, Huddersfield.

SELLING up. 450w phone and CW Tx. specially built to specification, in 6 ft. black crackle rack, complete with *Two* 3 stage 450w RF chassis. Mod. has AMC and high level SPL circuit. 5 Power supplies, 12 metered circuits with meters, remote 4 stage VFO, BC221 freq. meter with stab. supply. D104 mike and stand. Photo and details given. Gift at £150. Not Army surplus. 3 new boxed Taylor T55's, £3 each.-2 new boxed Eimac 304 TL's, £3 each, one new V holder for above, 7/6. 2 new boxed 24G's, 30/- each. 6 866's, new and boxed, 16/- each. SCR 522 Rec and Tx, with 8 valves, £7/10/-.—G3HZ, 14 Styal Road, Gatley, Cheshire. *GAT.* 4367.

RME69 and SX-17 for sale. Both overhauled and in brand new condition. Offers for either or both to:—Box No. 496.

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All 200/230/250v 50 cps with screened Primaries. Type "A"—half-shrouded drop-through. "B"—upright unshrouded.

MT/E. 350-0-350v 100 m.a. A and B, 4v 3 amps, 4v 5 amps C.T. **37/6.**

MT/A. 350-0-350v 100 m.a. A and B, 5v 3 amps, 6·3v, 4 amps C.T. **37/6.**

MT/EA. 350-0-350v 100 m.a. A and B, 4v 3 amps, 6·3v 4 amps C.T. **37/6.**

MT/1. 250-0-250v 100 m.a. A and B, 4v 3 amps, 4v 5 amps C.T. **37/6.**

MT/2. 300-0-300v 100 m.a. A and B, 4v 3 amps, 4v 5 amps C.T. **37/6.**

MT/3. 325-0-325v 100 m.a. A and B, 5v 2 amps, 6·3v 3 amps C.T. **37/6.**

MT/4. 325-0-325v 100 m.a. A and B, 5v 2 amps, 2·5v 7 amps C.T. **37/6.**

MT/5. 350-0-350v 100 m.a. A and B, 4v 2 amps, 13v 3 amps C T. **37/-.**

MT/6. 450-0-450v 250 m.a. B, 4v 3 amps, 4v 3 amps C.T., 4v 3 amps C.T., 4v 6 amps C.T. **63/6.**

MT/7. 450-0-450v 250 m.a. B, 5v 3 amps, 6·3v 3 amps C.T., 6·3v 5 amps C.T. **58/6.**

MT/8. 500-0-500v 250 m.a. B, 4v 3 amps, 4v 3 amps C.T., 4v 3 amps C.T., 4v 6 amps C.T. **69/6.**

MT/9. 500-0-500v 250 m.a. B, 5v 3 amps, 6·3v 3 amps C.T., 6·3v 6 amps C.T. **69/6.**

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MT/A150. 350-0-350v 150 m.a. B, 5v 3 amps, 6·3v 5 amps C.T. **48/6.**

All prices post free.

We are still able to offer the **MT/M1 MIDGET MAINS TRANSFORMER**
Compact—efficient—versatile in application. Upright mounting. Dimensions, 3" high × 2" × 3".
Primary : 200/230/250v 50-100 cps (screened).
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5v 2 amps } Rectifier
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Multi-Ratio Types. The transformers listed under this heading offer a wide choice of Push-Pull and Single-Ended Ratios. All possible combinations can be matched, within the limits stated below. If, in your amplifier, you use one of these multi-range types, and at some time you wish to make design changes, the output transformer will still be suitable.

TYPE MR/7 Rating 7-10 watts. Heavy duty. Fitted with terminal panel. Ratios available as follows :— 100/1, 100/1 C.T., 66/1, 66/1 C.T., 44/1, 44/1 C.T., 33/1, 33/1 C.T., 36/1, 35/1 C.T., 26/1, 25/1 C.T., 25/1, 22/1, 19/1, 18/1, 14/1. Price **20/9**, post free.

List No. MR/15. Rating 15 watts, max. 18 watts. Ratios available single-ended or push-pull : 13, 16, 18, 20, 22, 27, 33, 40, 52, 66 and 80/1. Primary loading 2,000 to 16,000 ohms. Secondary impedance 1 to 30 ohms. Maximum primary current for single-ended stage 90 m.a. For push-pull stage 100 m.a. in each half of primary. Full instructions with each transformer. Price **43/6**, post free.

List No. MR/30. Rating 30 watts. Ratios available, single-ended or push-pull, 13, 16, 18, 20, 22, 27, 33, 40, 52, 66 and 80/1. Primary loading 200 to 16,000 ohms. Secondary impedance 1 to 30 ohms. Maximum primary current for single-ended stage 170 m.a. For push-pull stage 170 m.a. each half of primary. Full instructions with each transformer. Price **51/6**, post free.

DOUGLAS MIDGET COIL PACK. Medium and Long Waves. Oscillator Coil mounted on wavechange switch with separate aerial coil. I.F. 465 kc/s. Complete, with all trimmers, padders and circuit. Boxed, **23/6**, post free.

24v DIMMER SWITCH BOX. Comprising one 200 ohm + 200 ohm wire-wound potentiometer, one 400-ohm potentiometer, with switch (isolating slider from track), one SPDT bakelite toggle switch and two connector sockets. Mounted on bakelite base. Size 6"×4". New, **2/6**, post free.

METERS. Taylor Junior, 120A, **£8/8/-**. Avominor, **£4/4/-**. Universal Avominor, **£8/10/-**. Pifco Radiometer, **25/-**, plus 9d. (minimum) post and packing.

T.M.C. INTERFERENCE SUPPRESSORS. Bakelite tube type, suitable for suppressing interference caused by domestic appliances, either in the flex lead to the appliance, or the flex lead to the Radio Set. **11/6**, post free.

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Printed in Great Britain by Lochend Printing Co., Ltd., London, S.W.9, for the Proprietors and Publishers The Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1. The *Short Wave Magazine* is obtainable abroad through the following : Continental Publishers & Distributors, Ltd. ; William Dawson & Son, Ltd. ; CANADA—Imperial News Co., of Canada ; AUSTRALIA AND NEW ZEALAND—Gordon & Gotch, Ltd. ; AMERICA—International News Company, 131 Varick Street, New York. Registered for transmission to Canada and Newfoundland by Magazine Post. *March*, 1949.