The SHORT WAVE Magazine

2/6

VOL. XV FEBRUARY, 1958 NUMBER 12

FOR THE RADIO AMATEUR AND AMATEUR RADIO

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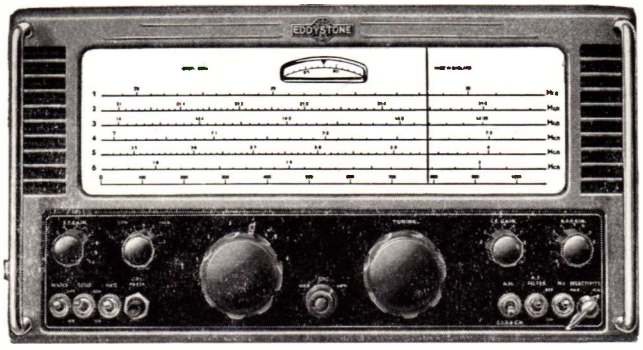

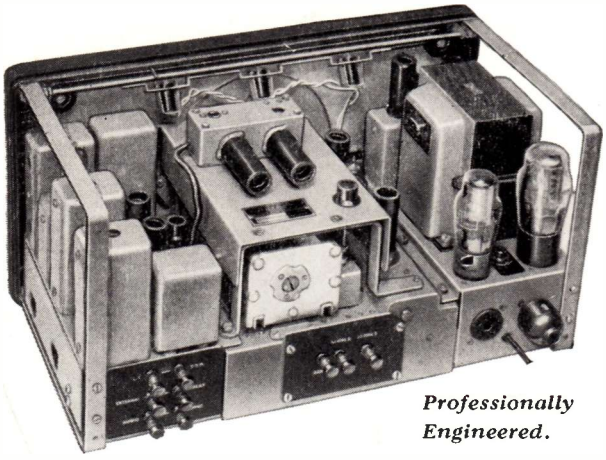

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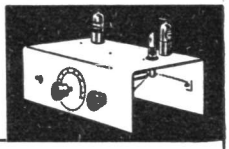

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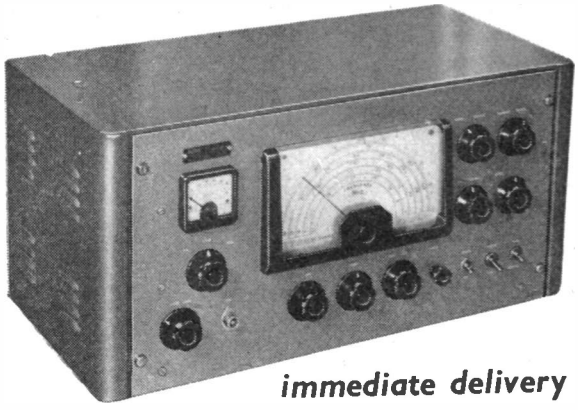

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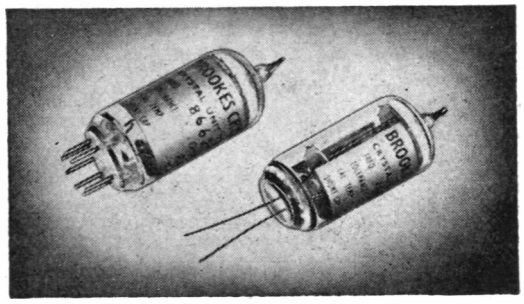

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G.E.C.

CATHODE RAY TUBES

for Oscillography

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The recently advertised 4GP., 5BHP and 6EP cathode ray tubes are only three of a wide range of instrument tubes marketed by the G.E.C.

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT WAVE Magazine

EDITORIAL

Careful! *Periodically, it comes upon us that all who read* SHORT WAVE MAGAZINE *should be reminded that Amateur Radio equipment involves lethal voltages. It is quite usual for radio amateurs to be handling apparatus which, even if it did not kill, could do them serious and lasting injury.*

In hundreds of amateur stations, every day foolish things are done and silly short-cuts taken — often only to save a few moments of time, or a little extra effort, when it would have been just as quick to do it the right way. In dealing with radio or electrical apparatus, it is of the utmost importance not to allow familiarity to breed indifference — it is essential at all times to Take Care. Previous dissertations in this space have indicated what Taking Care should mean. Apart from all the known and accepted safety precautions, probably the soundest rule of all is to make it a habit always to switch off when alterations or adjustments are being carried out — while, where tuning procedures in transmitting apparatus are involved with the gear live, they should be done with one hand only (the one not in use reposing safely in a pocket!).

It should also be remembered that in RF circuits which do happen to be isolated from high-voltage DC — such as a link-coupled aerial tuning unit — bad burns can be expected if they are touched when the transmitter is running. Even with relatively low power, RF burns can be nasty, and with inputs of 100-150 watts, extremely so.

The duty of every amateur, individually, is to ensure that his station is as safe to operate as his apparatus may be to handle. In the case of HT component failure or breakdown, things happen too quickly for there to be time for second thoughts. What one has to do is to make sure that everything is safe for that "first-time" which comes to us all sooner or later. If your gear is safe, about all you get is a bad fright, with perhaps a blown meter to remind you to be more careful. If it is not safe, it may kill not only you but also anyone else who tries to come to your rescue.

Austin Forbes G6FO

The "Geloso" Receiver Front End

HIGH-GAIN AMATEUR-BAND CONVERTER UNIT

R. G. SHEARS, B.E.M., A.Brit.I.R.E. (G8KW)
(K. W. Electronics, Ltd.)

The converter unit discussed here is a pre-fabricated assembly designed for use with almost any receiver, including the "surplus" and older communication types. The article shows how the Geloso Front End can be wired for operation with such a receiver, the advantages it gives being full band-spread through the amateur ranges 3·5 to 28 mc, high gain, good sensitivity, and excellent oscillator stability on the higher frequency bands.—Editor.

MANY readers of *Short Wave Magazine* have, during the past twelve months, built the famous Geloso Signal Shifter into a transmitter and, at reasonable cost, have obtained excellent results with a "professional" finish. Now available in this country is the Geloso Receiver Front-End Unit, which is as used in the G207-DR Double Conversion Superhet.

This unit consists of the following parts: (1) Coil Unit Type 2617; (2) Dial, escutcheon plate, slow motion drive and knob with handle; and (3) Gang condenser, trimmer assembly and dust cover.

The Coil Unit itself is ready-wired with valveholders, resistors, condensers, wavechange switching, and so on, only requiring external connections for HT, LT, gang condenser, IF transformer, AVC and aerial. The IF is at 4·6 mc bringing the unit on to almost any short-wave receiver, and each amateur band is spread to give the following frequency coverage:

10 m-band	...	29.8 to 28.0 mc.	Band F
11 ,,	...	28.1 to 26.4 ,,	,, E
15 ,,	...	22.0 to 20.6 ,,	,, D
20 ,,	...	14.6 to 13.8 ,,	,, C
40 ,,	...	7.6 to 6.95 ,,	,, B
80 ,,	...	4.0 to 3.5 ,,	,, A

A trimming adjustment is provided for every coil in the Unit and is clearly marked with adjustment frequency figure. The Unit can, if desired, be built directly into a receiver using a second mixer to convert to, say, 465 kc, or may be assembled as a converter and fed out at 4·6 mc to a receiver such as an HRO or S640. Two types of 4·6 mc IF transformer are available. The transformer for coupling the unit assembly into a second mixer requires two windings which can be "peaked" at 4·6 mc, but if conversion to the aerial terminal of receiver is contemplated, a 4·6 mc IF transformer with a low impedance output winding should be used.

The dial mechanism provides a 72: 1 reduction from an epicyclic motion with a fibre-glass cord drive. The fine fibre-glass cord is contained within a nylon sleeve and is thus long wearing and very smooth in operation. The cord is spring loaded, giving positive action and preventing backlash. No cut-and-try method of adjusting the drive cord is necessary, as the exact length is supplied, correctly terminated on the loading spring.

The size of the coil unit is approximately 5½in. x 4in. x 3in. deep and is designed for mounting below a chassis. The dial is 8½in. x 5in., and the minimum panel height requirement for the assembly is 8¾in.

The Circuit

This uses modern type valves—6BA6 (RF amplifier), 12AU7 (oscillator and buffer) and 6BE6 mixer. One interesting feature is the employment of a double-triode (12AU7) in the oscillator circuit. The first half is run as the oscillator and the second half as a cathode-follower buffer stage. This prevents any pulling of the oscillator frequency by the aerial and mixer circuits.

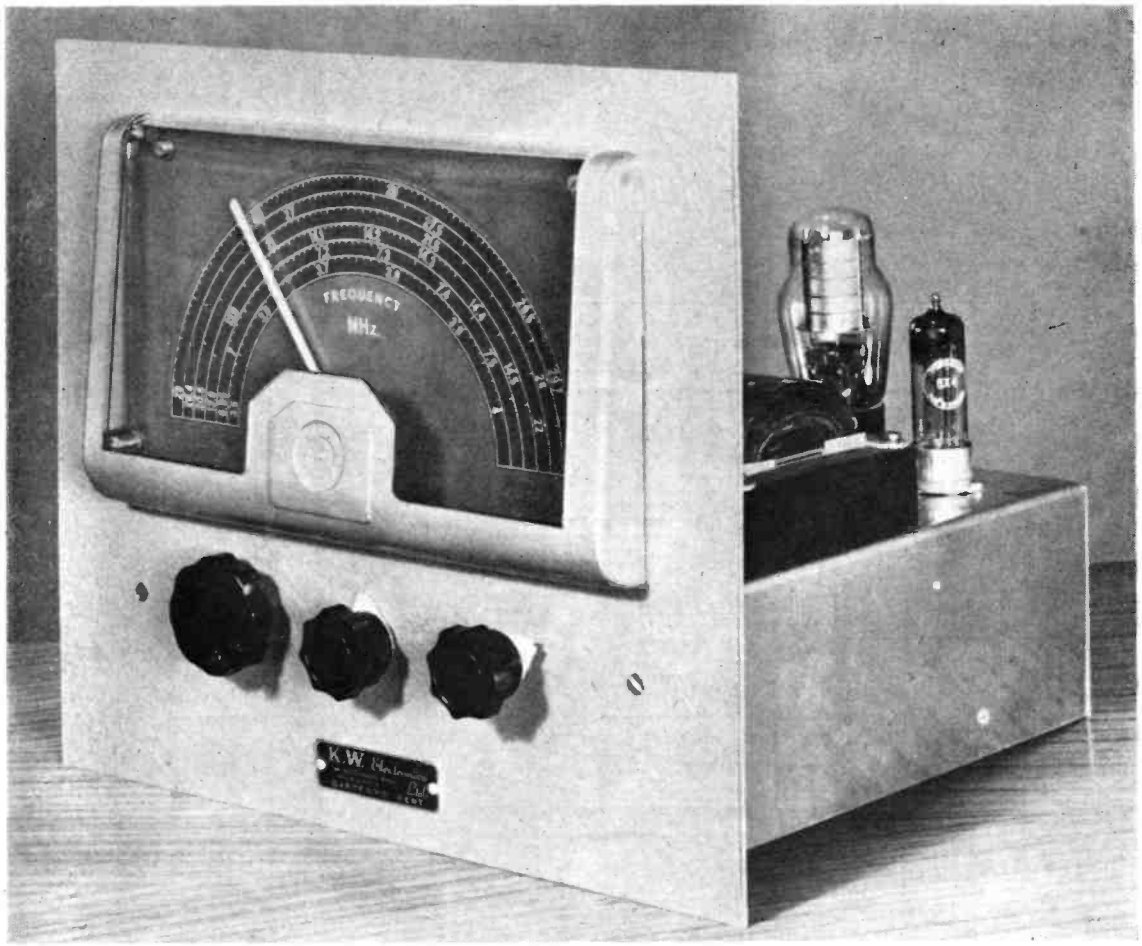
Fig. 1 shows the complete circuit required to build a compact converter which will impart to an old receiver modern performance, with an excellent signal-noise figure of better than 6 dB for 1 microvolt input.

The power requirement of the Unit is 210 volts DC at 35 mA, with 150 volts stabilised, and 6·3 volts AC at 1 amp. From Fig. 1 it will be seen that the 150-volt stabilised supply may be obtained from a VR150/30 valve.

Another interesting feature of the circuit is the provision of an additional wafer at the rear of the wave-change switch for adjusting the screen voltage to the 6BA6 RF amplifier valve. It will be appreciated that the performance of most valves is better at 3·5 mc than at 30 mc and this ensures that the sensitivity of the Unit is the same on every band, and is invaluable for correctly calibrating an S-meter.

Making the Complete Converter

The design using the Geloso Coil Unit and dial assembly shown in the photograph is based upon a 16 swg aluminium chassis 10in.



General appearance of the Geloso Receiver Front End, which makes up as a self-contained unit, the circuit being as shown in Fig. 1. Full spread is given across all amateur bands, including the 27 mc (11-metre) band as a separate range, and the Converter will work into any receiver tunable around 4.6 mc as the IF/AF amplifier. It will improve considerably the HF-band performance of most receivers, and is easy to assemble and instal.

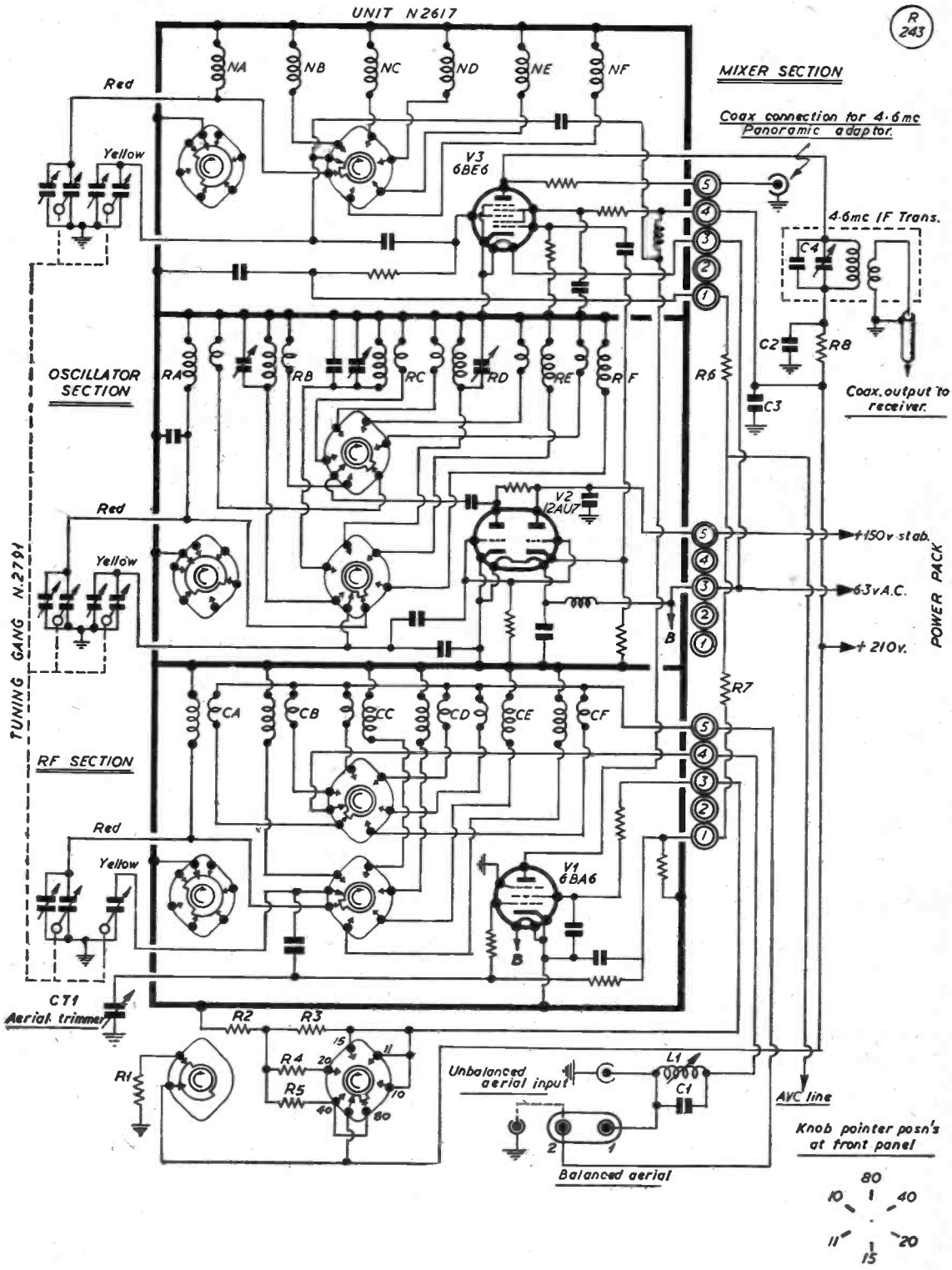
x 8in. x 3in. deep and front panel 11in. x 9½in. The coil unit is mounted below chassis; cut-outs are made for the valveholder skirts to protrude through the top of the chassis; ¾in. holes are required for the coil unit connections to pass through the chassis to the gang condenser, mounted on top of the chassis. It is important that these wires, detailed in Fig. 2, should be laid clear of the chassis as much as possible, in order to reduce wiring capacity to chassis to an absolute minimum.

Several holes must be made in the rear of the chassis to accommodate the aerial connection, the aerial trimmer, mains lead and fuseholder, AVC connection and coax output (also 4·6 mc filter adjustment if required). No measurements are given for these items as they can be located to suit the user's requirements.

Assembly

First mount the epicyclic drive on its bracket, and before screwing the bracket under the chassis, slip two turns of drive cord over the drive spindle and locate them around the thick section of the spindle, immediately in front of brass bush. Mount the gang condenser on feet and secure feet to top of chassis by four self-tapping screws. Wire up the switch wafer at rear of the Coil Unit (*see* Fig. 4) and mount the latter under the chassis; secure by means of 4 nuts and washers (one screw in each top corner of the Unit).

Fit the trimmer assembly bracket to the gang condenser end-plates, and mount all other components; then wire up in accordance with the circuit diagram. Fit the dial drive drum to the gang condenser spindle and see that it


UNIT N2617
R 243
MIXER SECTION
Coax connection for 4·6mc Panoramic adaptor.
4·6mc IF Trans.
Coax. output to receiver.
OSCILLATOR SECTION
RF SECTION
TUNING GANG N.2791
POWER PACK
+150v stab.
6·3v A.C.
+210v.
AVC line
Unbalanced aerial input
Balanced aerial
CT1 Aerial trimmer
Knob pointer posn's at front panel
V1 6BA6
V2 12AU7
V3 6BE6
Red
Yellow
NA
NB
NC
ND
NE
NF
RA
RB
RC
RD
RE
RF
CA
CB
CC
CD
CE
CF
R1
R2
R3
R4
R5
R6
R7
R8
C1
C2
C3
C4
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80
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11
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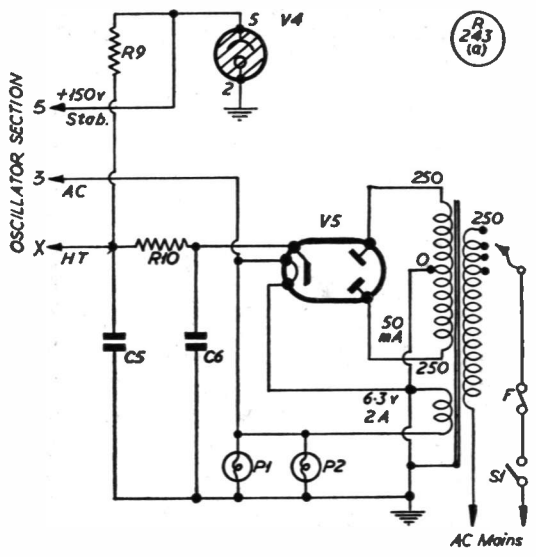


Fig. 1. Circuit complete (left) of the Geloso Receiver Front End Unit type 2617, which makes up as a very satisfactory amateur-band converter with IF output at 4.6 mc. The only connections to be made to the Unit, which is pre-assembled, are as shown outside the heavy line. A suitable power supply circuit is given above, and the appearance of the finished Converter can be seen from the photographs.

Table of Values

Fig. 1. External circuitry of Geloso Receiver Unit

CT1	= 15 $\mu\mu$F air trimmer	R6	= 1 megohm, ½-w.
C1	= 300 $\mu\mu$F	R7	= 2.2 megohms, ½-w.
C1, L1	= 4.6 mc wave-trap (*see text*)	R8	= 2,200 ohms, 1-w.
		R9	= 3,000 ohms, 3-w.
C2, C3	= .0047 μF	R10	= 1,500 ohms, 10-w.
C4	= 50 $\mu\mu$F	V4	= VR150/30
C5, C6	= 32 μF	V5	= 6X4, or 6X5GT
R1	= 22,000 ohms, 2-w.	P1, P2	= Dial lamps, 6.5v. 0.3 amp.
R2	= 22,000 ohms, ½-w.		
R3	= 330,000 ohms, ½-w.	S1	= Mains switch, toggle on-off
R4	= 33,000 ohms, ½-w.		
R5	= 100,000 ohms, ½-w.	F	= 1 amp. fuse

turns centrally within the cut-out at the front edge of the chassis. The drive cord should then be placed around the outer of the drive drum and the spring located.

After the drive has been put on, the front panel can be secured in position and the dial mounted. Before fitting the escutcheon to the dial, push the pointer into position on the gang condenser spindle. Should it be a slack fit, gently pinch together the ends of the tubular section. A dab of paint on the spindle will help to secure the pointer. Make sure that the pointer is horizontal at just below 28·0 mc with the condenser vanes fully in mesh. Check that the dial drum is correctly located on the condenser spindle and that the pointer will turn 180°.

Testing Out

Check all wiring, then fit the valves. Connect the output of the converter to the aerial input of the receiver and tune it to 4·6 mc. Connect the converter AVC line to the receiver AVC—if this is not conveniently accessible, take the AVC line to chassis. (In Eddystone receivers the AVC line can easily be picked up at the BFO switch.) Join converter and receiver chassis together by a short length of braiding or heavy wire. Connect the converter to mains and switch on.

At this stage it would be advisable to check voltage points in the converter—HT + 210 v., stabilised HT, screen 6BA6 network, and heaters.

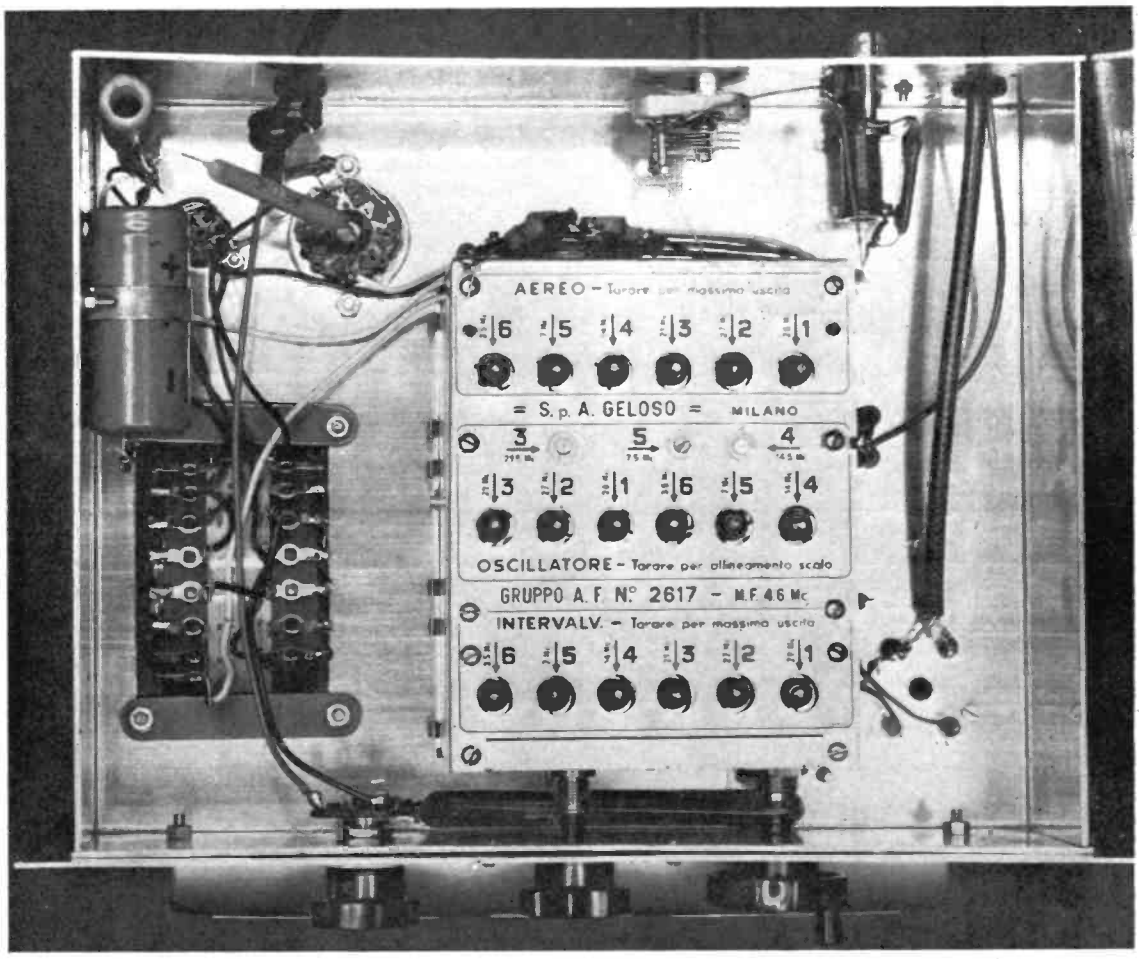
Manual Volume Control

As an alternative to feeding AVC to the RF stage in the converter, or to having no control on this stage, a manual RF gain control can be included. This may be achieved by incorporating a 1,000-ohm potentiometer across a negative 20-volt supply, with positive connected to chassis and the slider of the potentiometer taken to the AVC line in the converter. This 20-volt bias supply may be obtained from the converter power supply unit by including a 500-ohm 5-watt resistor between centre-tap of the HT transformer and chassis. The resistor should be by-passed with a 25 μF 25 v. electrolytic condenser. The positive side of the electrolytic should go to chassis. The 1000-ohm potentiometer is wired between centre-tap and chassis, with the slider going to the Converter AVC control line. If this bias arrangement is installed it may leave the HT volts slightly on the low side. In order to increase the HT rail (HT plus to chassis) to approximately 210 volts, the resistor R10 in the power supply unit (*see* Fig. 1) should be replaced by a small 10 Henry 50 mA LF choke.

A manual RF gain control will give improved signal-to-noise ratio for CW operation and can be associated with a switch which will enable manual or AVC control to be selected.

Alignment

All Coil Units are checked by the manufacturer before despatch and are usually not very far off. Do *not*, at this stage, touch any iron dust-core or trimmer in the Coil Unit. Alignment can best be accomplished by using a signal generator, but this is by no means an absolute necessity if a local transmitter can give a few "spot" frequencies on different bands—or a good station frequency meter is available. In the latter case, an aerial should



Construction under-chassis of the Geloso Amateur Band Converter, the central assembly being the pre-fabricated Coil Unit type 2617, showing the points at which alignment adjustments are carried out, as explained in the text. The values of the external items to complete the Converter are given with Fig. 1.

be connected to the aerial socket in place of a signal generator. It is important that alignment should commence on the 10-metre band, as the setting of CT3 will affect all other bands except 80 metres. If a signal generator is used, feed it at about the 100 microvolt level into the converter aerial socket. Set the wave-change switch at the 10-metre position. Tune the converter to 29·7 mc and set the signal generator to this frequency ; adjust CT3 on the gang condenser. If the signal cannot be located, set CT3 (*see* Fig. 6) at approximately half-capacity and adjust the dust-iron core " 28 mc oscillator " (under coil unit). Remember that the oscillator dust-iron cores are adjusted for correcting calibration at the *low* frequency end of each band and oscillator trimmers correct the calibration at the *high* frequency end of the band.

It may be necessary to re-adjust the 28 mc core and CT3 several times in order to obtain correct frequency tracking over the entire band. Once this has been achieved, do not touch again. Oscillator alignment should be obtained on all bands by this method, before adjusting inter-valve and aerial circuits. The oscillator iron dust cores are adjusted on each appropriate band at 28, 27, 21, 14, 7, 3·5 mc and the trimmers at 29·7 (on gang), 21·5, 14·5 and 7·5 mc (under coil unit), and 4·0 mc (on gang). There is no oscillator trimmer for the 11-metre band—only an iron-dust core. Each iron-dust core and trimmer in the coil unit is clearly marked with adjustment frequency. To align inter-valve circuits, first adjust CT5 (on gang), for maximum signal output on 29·7 mc—then

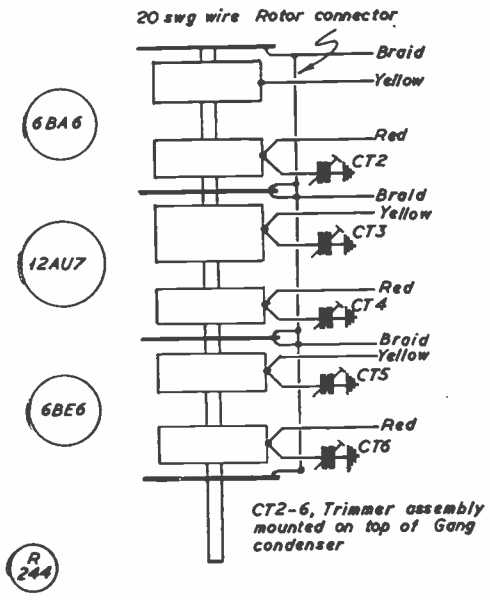


Fig. 2. Connections to the gang condenser and trimmers in the Geloso Rx Unit. The three braided unsleeved wires are taken to the three rotor leads on the condenser gang; all the individual rotor wires should be connected together by a 20 swg lead cut to the length of the gang. Mount the condenser assembly on the two feet provided, so that the ceramic insulating rod is "looking at" the spindle end.

set the iron-dust core marked "Intervalve—28 mc" for maximum signal output at 28 mc.

It may be necessary gradually to reduce the output from the signal generator and to repeat these last two adjustments several times to obtain linear sensitivity over the whole band. All other inter-valve iron-dust cores are peaked on each band at 27, 21, 14, 7 and 3·5 mc, also trimmer CT6 at 4·0 mc.

At this stage, with a low signal input, the 4·6 mc IF transformer should be peaked for maximum output from the receiver. To align the aerial circuits, set the aerial trimmer at about half-capacity and adjust iron-dust cores at 28, 27, 21, 14, 7 and 3·5 mc for maximum output in the receiver.

4·6 mc Break-Through

With some receivers, due to insufficient screening, break-through may occur from powerful commercial stations on or around 4·6 mc. This can be very much reduced, if not completely eliminated, by screening the input to the receiver. The fitting of a co-axial connector in place of terminals will usually make an improvement. The converter end of the co-axial connecting cable should have the minimum length of centre conductor unscreened where it is connected to the IF transformer.

It has been found from experience that most of any 4·6 mc break-through occurs around the receiver front-end and is not reduced when the aerial is removed from the converter, *i.e.*, it is due to direct pick up. Should the break-through be reduced when the aerial is removed, a 4·6 mc trap in the aerial feed will help. This can be made up on an iron-dust cored former, of 5/16th dia., close wound with 30 turns of 36 swg enamelled copper, in parallel with a 300 $\mu\mu$F condenser (shown in circuit diagram Fig. 1). The core should be adjusted for resonance of the tuned circuit (L1 and C1) at 4·6 mc.

Alternatively, the receiver can be tuned just off 4·6 mc to clear the interfering station, but

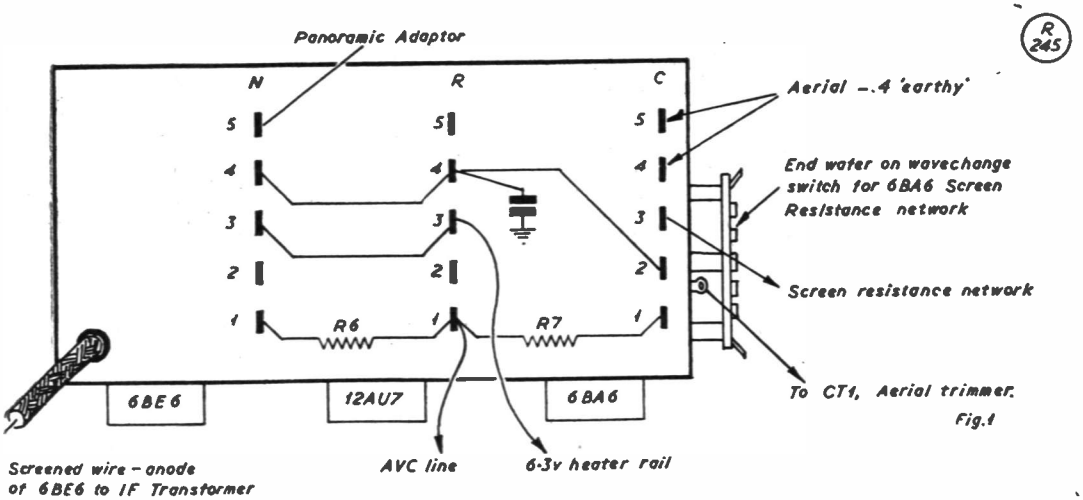


Fig. 3. Connections to the Geloso coil unit, which is pre-fabricated to the circuit shown in Fig. 1. All necessary information is given in the text, and inspection of the unit itself will make the assembly procedure clear.

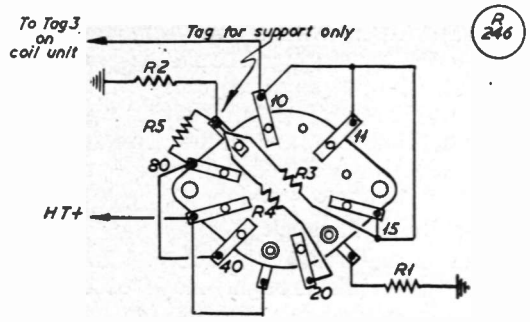


Fig. 4. Connections to the rear wafer of the wave-change switch. This is used to adjust the voltage on the screen of the 6BA6 RF amplifier so as to obtain sensitivity equal on all bands; the highest voltage is taken on 28 mc.

this operation will cause the converter alignment to change. It may, however, be necessary only to re-align CT3 at 29·7 mc. If all bands are seriously affected, the alignment of the oscillator circuits as detailed must be carried out again. The IF transformer should also be peaked up at the new frequency.

Table of Values

Fig. 5. Circuit of the 6BE6 2nd Mixer

C1, C6	= .005 μF	R1, R6	= 2,200 ohms, ½-w.
C2, C3,		R2	= 22,000 ohms, ½-w.
C4	= .001 μF	R3	= 10,000 ohms, ½-w.
C5	= .0047 μF	R4	= 100 ohms
C7	= .01 μF	R5	= 330 ohms

OSCILLATOR COIL DATA

Grid —28 turns 28 swg enam. close-wound on 3/8-in. former, with 275 μμF silver-mica fixed capacity and 40 μμF air-spaced trimmer in parallel.

Feed-Back– 12 turns on earthy end of grid coil former, spaced 1/8-in. away; reverse connections if oscillation is not obtained.

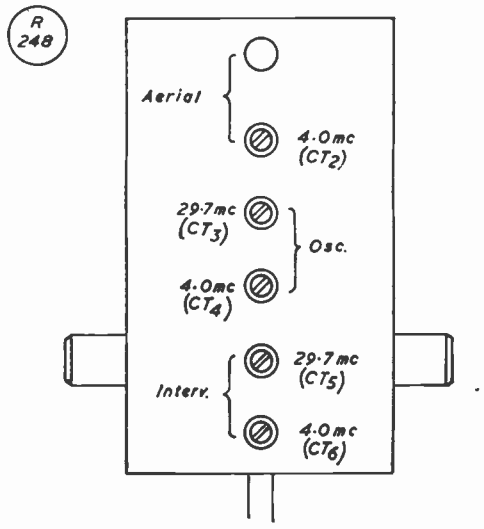


Fig. 6. Trimmer positions on the gang condenser, showing the frequencies at which alignment adjustments should be made.

Unit With Second Mixer

The unit may also be built directly into a complete receiver having a low second IF channel. The Geloso G207-DR uses 467 kc with a crystal-gate, but the choice of frequency can be left to the individual's requirements. It is, however, necessary to convert from 4·6 mc to the second IF desired. Fig. 5 gives a circuit which has proved quite satisfactory. The oscillator is injecting to the mixer at 5065 kc to produce a second IF of 465 kc—that is, 4600 kc + second IF. Instead of using a self-excited oscillator for the mixer it may be

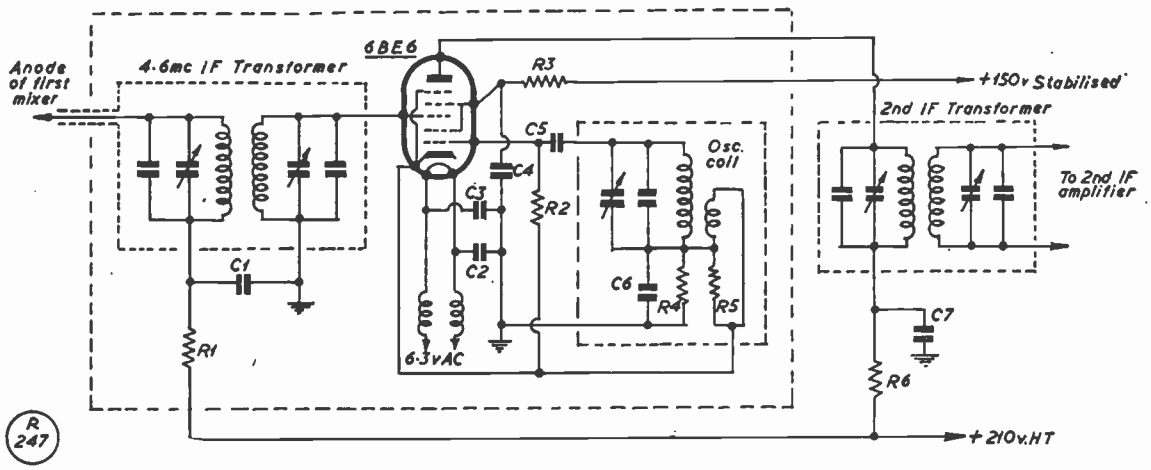
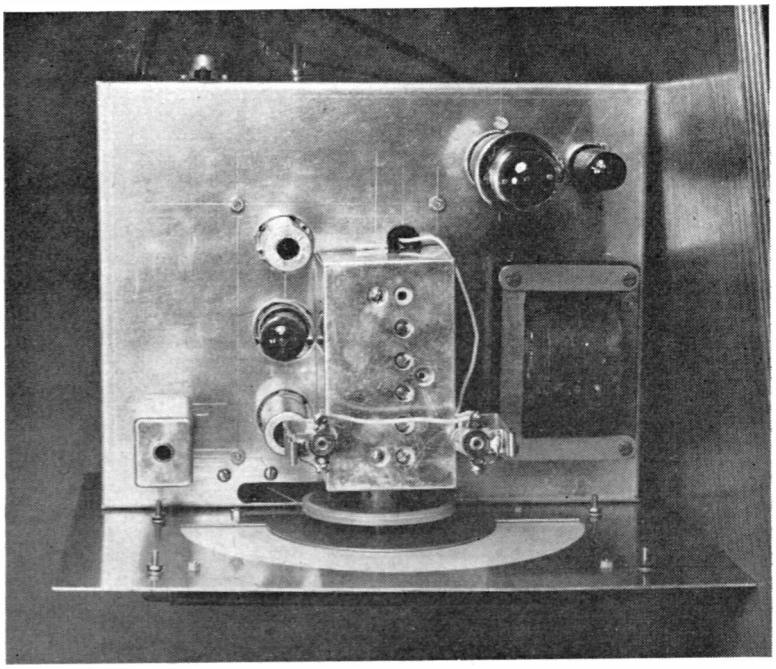


Fig. 5. With some receivers, it may be necessary to convert to a low-order IF. This is a suitable circuit for a second mixer, converting from 4.6 mc (the IF output of the Geloso Unit) to 465 kc; the SEO could be replaced by a crystal, and the circuit sections should be screened as indicated. The 330-ohm resistor across the feed-back coil is there to damp this winding and can be varied in value to ensure optimum conversion. The correct operating condition for the 6BE6 is when 0.5 mA flows in the grid resistor R2; this should be checked when setting up the oscillator.

more convenient to utilise a crystal oscillator circuit with 5065 kc crystal (readily obtainable as "surplus"). It is advisable to have the oscillator on the high frequency side of the first IF channel. One IF transformer at 4·6 mc is sufficient —any additional gain should be obtained in the second IF amplifier. The selectivity of the complete receiver will depend entirely upon the characteristic of the second IF amplifier section.

Conclusion

This new Receiver Front End will improve the performance of any existing receiver. It combines the advantage of a double-conversion circuit with improved signal/noise figures and increased sensitivity. The band-spread facilities and smooth operation of the dial make it a pleasure to use.



How the Geloso Amateur Band Converter can be laid out behind the panel. Power supply components are at right, the 4.6 mc IF transformer lower left, and the tuning heart, as shown in Fig. 1, at the centre. The latter is factory-assembled, and needs only adjusting for correct frequency coverage. The chassis is 10 ins. by 8 ins. by 3 ins. deep.

The writer has been running the converter as described here with an HRO which has itself already undergone several modifications to improve performance on 10 metres. An S3 signal on the HRO, as indicated on the S-meter, becomes an S9 when fed through the converter, with a very noticeable improvement in signal-to-noise ratio and oscillator stability. At 4·6 mc, the HRO oscillator is very stable and produces a clean T9 beat on all transmissions which are PDC, but these qualities are not present on all receivers at 28 mc!

Already many operators with "surplus" receivers of one sort or another have taken advantage of the availability of this Front End Unit to give them performance at least equivalent to, if not better than, many modern communications receivers.

THE NEW "CALL BOOK"

The latest (Winter) issue of the international *Radio Amateur Call Book*, which we can supply from stock, is selling fast. The Full Edition, which runs to more than 600 pages and lists the call-sign/addresses of more than 200,000 licensed radio amateurs throughout the world, costs 37s. 6d., post free. Now in its 35th year of publication, the international *Call Book* remains an essential buy for everyone interested in DX operating, and the accumulation of QSL cards. As it sells throughout the world, and most people buy at least one edition every year (it is published quarterly, to keep up-to-date) you can be sure your contact will have your address if you can say "QTHR in C.B." And you can be sure of that if your own call-sign/address has been published in any issue of SHORT WAVE MAGAZINE up to and including October 1957, as we are U.K. agents for the *Call Book* and keep the G sections up-to-date as new call-signs or changes of address are notified to us. This is, of course, a free-of-charge service.

Because not everybody wants the Full Edition, we can supply what is known as the Abridged *Call Book*, at 17s. 9d., post free. This omits only the American amateur listings, and is otherwise the same issue as the Full Edition. The Abridged is, in effect, all the rest of the world outside the U.S.A., and itself runs to 186 pages, of which some 28 pages are devoted to the U.K. lists, under the G prefixes.

INDEX — VOLUME XV

As this issue concludes Vol. XV of SHORT WAVE MAGAZINE, each copy of the March issue, with which we commence our 16th year of publication, will have in it, as a free loose supplement, a complete Index to the current volume. Any reader who may not find an Index in his March issue copy can have one on request, with an s.a.e.

No-coil Tx for Top Band Mobile

CO-PA PHONE TRANSMITTER FOR CAPACITY-FED WHIP

IN the October, 1957, issue of *Short Wave Magazine*, a radically new method of coupling and feeding a mobile whip aerial system was discussed—*see* "Capacity Feed for the Mobile Whip," pp. 408-410. The design evolved was the result of some interesting experimental work by G3HMO, and the system as finalised was found to perform extremely well.

Under strictly mobile operating conditions, it is hardly possible to give fair comparisons in terms of distances worked or S-meter readings; broadly speaking, however, the new aerial arrangement, as described in the October issue, applied to a roof-mounted whip only 5 ft. long (including the resonating coil), and with a PA input of 7w., gives as good, if not better, signals at 25 miles as 8- or 12-ft. whips using the conventional loading and feeding arrangements and running (in some cases!) more than twice the power.

To exploit the Capacity Feed system to the full, the transmitter should be mounted as near the base of the aerial as possible; this not only minimises losses off the "hot" capacity-coupling lead from the plate of the PA, but makes for easier adjustment and a neater, more compact installation. In the October discussion, it was mentioned that the new aerial system called for a modified and improved transmitter design. (The modulated RF unit used for the initial tests was, of course, the "Top Band Talking Box," first described in the October, 1956, issue of *Short Wave Magazine*). It is the purpose of this article to give some details of the new mobile transmitter.

Circuit and General Arrangement

The circuit complete is shown in Fig. 1, the general mechanical layout in Fig. 2, and the appearance of the finished transmitter in the photograph.

V4 is the crystal oscillator, using a 6AM6 (Z77) direct coupled to the PA, V3, which is a 6BW6. The CO circuit is a little unusual, being a modification of one of those given in the crystal oscillator section of recent issues of the *ARRL Handbook*. Here, the screen of the 6AM6 is used as the oscillator anode, coupled into the grid through C12 and the crystal, with the screen resistor R12 acting both as HT dropper and RF choke; the crystal also has in series with it a low-current flash-lamp bulb, to guard against over-excitation (this is not shown in the circuit). The CO tank L1,C11 is fixed-tuned and ensures adequate drive, through C10, into the PA grid; with 300v. on the plate, the grid drive current through R11 is 3.6 mA, and with 225v. it is 2.6 mA — ample for the 6BW6 under full

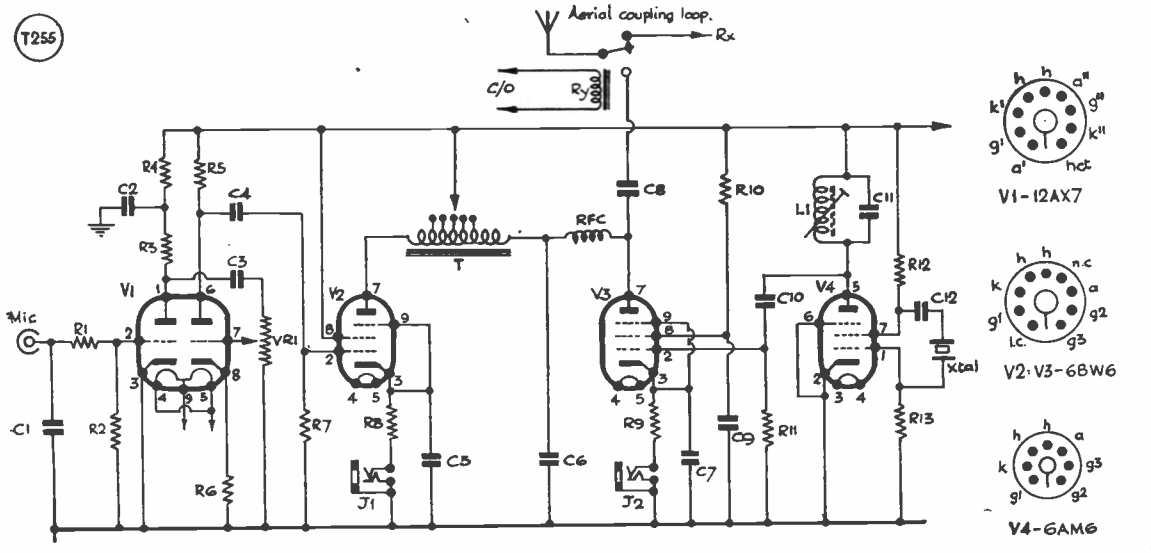


Fig. 1. Circuit of the CO-PA phone transmitter, designed to work into the capacity-fed aerial system, as explained in the text. The PA stage V3 runs 7-9 watts input, and is plate modulated, coupling between PA and modulator V2 being by the tapped choke T, used as an auto-transformer. The 12AX7 in the speech amplifier section V1 gives ample gain with a crystal microphone of average sensitivity and the PA can be fully modulated at any carrier level within the capacity of the power supply used for mobile working. If adequate modulation is not obtained, the HT end of R10 can be taken to the junction of C6-RFC.

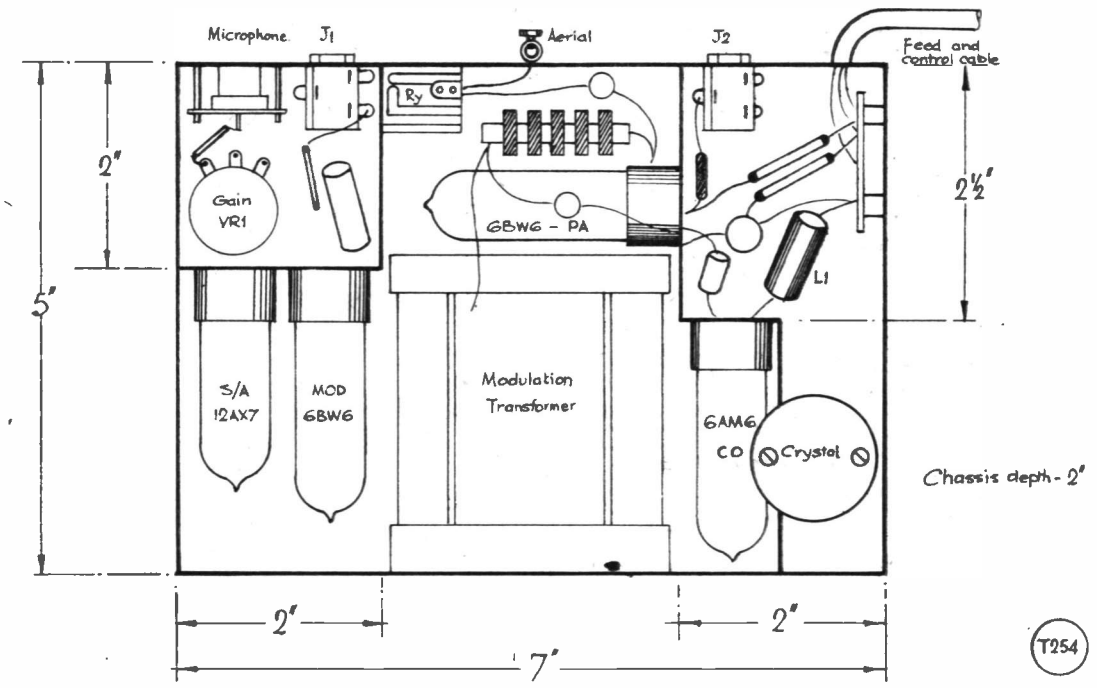


Fig. 2. Layout mechanically of the mobile CO-PA phone transmitter; all the parts are accommodated in the six small compartments into which the 7 in. by 5 in. by 2 in. deep tray is divided. Compare this sketch with the photograph (overleaf).

modulation.

The construction of L1,C11 can be made quite small, and in fact it takes up less space than a conventional RF choke, which might otherwise be used in that position if 2.5 mA of drive can be obtained without a tuned circuit.

On the PA side, the circuit is conventional as far as C8, the condenser through which the aerial loading coil is fed—*see* p.409, October, 1957, in which "C2" is the C8 of the circuit we are now considering. The jack J2 measures PA grid and HT currents. The RF section is absolutely stable, in spite of the close construction; indeed, it could hardly be otherwise, as the layout mechanically brings about complete screening between the aerial loading coil and the CO tank, which has only the flatly-tuned pre-set circuit L1,C11.

Since the transmitter is designed essentially for /M operation, it is phone-only, though the PA can be keyed at J2. The twin-triode speech amplifier V1 and modulator V2 are based on the design of the phone side of the "Top Band Talking Box," except that instead of screen control (which involves a reduced carrier for full modulation) in this case the PA is plate controlled. The 12AX7 in the circuit around V1 gives ample voltage gain with a D.104 type of crystal microphone (not the most sensitive of crystal microphones)—so much so that it was found possible to omit the usual cathode by-pass condenser, thus saving space in the speech amplifier-modulator section of the transmitter. The gain-setting resistor VR1 is actually a deaf-aid volume control which, though somewhat high in total value, was the only available item really small enough to fit into the space; it is less than an inch in diameter overall, and in this layout can be pre-set by notching round the grooves in the knob with a small screw-driver put through a slot in the chassis, cut out for the purpose. Once the level has been adjusted, like the CO tank circuit, it need

Table of Values

Fig. 1. Circuit complete of the CO-PA phone Tx.

C1	= 50 μμF, mica	R10	= 10,000 ohms
C2	= 0.25 μF, 350v. paper	R11	= 15,000 ohms
C3, C4	= .005 μF, Cascap	R12	= 20,000 ohms
C5	= 50 μF, 25v. elect.	R13	= 100,000 ohms
C6, C8, C12	= .001 μF, Cascap	VR1	= 4-megohm pot'meter
C7	= .002 μF, Cascap	T	= Mod. xformer (*see text*)
C9	= .003 μF, Cascap	L1	= 50 turns pile-wound Litz on ¾ in. slugged former
C10	= 100 μμF, mica	Xtal	= Any Top Band frequency
C11	= 200 μμF, mica	J1, J2,	= Close-circuit jacks
R1, R6	= 5,000 ohms	RFC	= 2.5-5.0 mH. 5-pie RF choke
R2	= 3 megohms	V1	= 12AX7, Brimar
R3 R5, R7	= 500,000 ohms	V2, V3	= 6BW6, Brimar
R4	= 50,000 ohms	V4	= 6AM6, Brimar
R8	= 390 ohms		
R9	= 500 ohms		

not be touched again.

The modulator valve is a second 6BW6, V2, the HT current in which can be checked on J1.

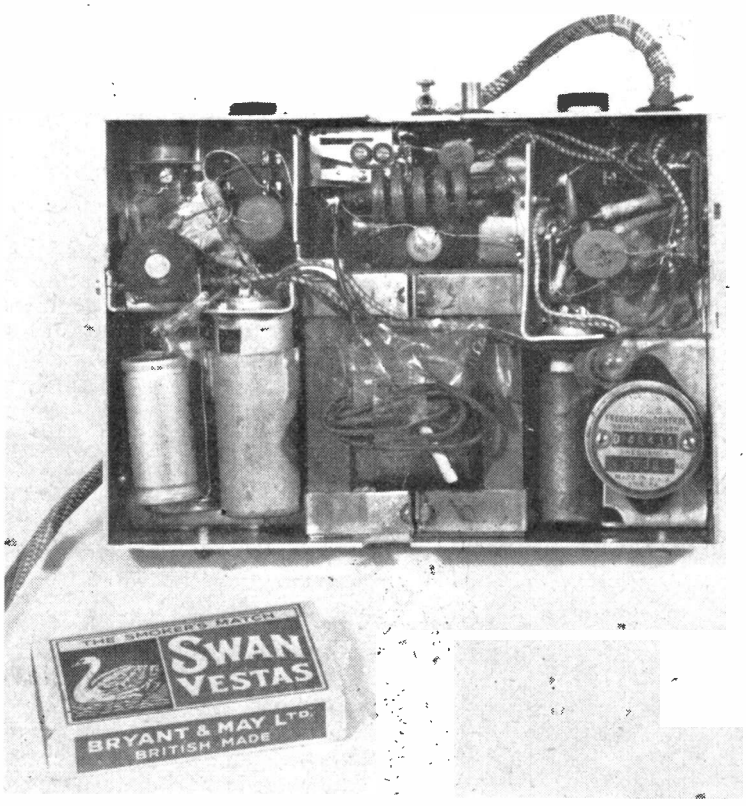
Modulator Coupling

Because in mobile work one must make the most of the available carrier power, it was decided to use plate control instead of the screen-modulation system adopted for the "Talking Box" (p.408, October, 1956). In the present transmitter, the immediate difficulty in going for modulation on the plate of the PA was, of course, finding a small variable-ratio matching transformer (or even some suitable fixed one) for coupling the modulator into the PA. The available multi-ratio types are all too large and heavy for this particular application.

The solution was found in a standard Class-B output choke, originally of Varley manufacture; this is actually a tapped iron-core inductance which, electrically, looks like the circuit element T in Fig. 1. Adjustment of the tapping-point changes the ratio across the choke, and hence the match between V2 and V3. The connection is somewhat similar to the old unity-coupled, or fixed ratio, system of plate modulation of the early days, except that the present circuit is more effective because the matching can be varied within the required limits. This choke, as stripped out of its original case, measures only 3 ins. by 3 ins. by 2 ins. deep, and thus fits nicely into the constructional form shown in Fig. 2 and the photograph. With a larger, or smaller choke (if one can be obtained), the main dimensions of the mounting tray could be varied accordingly.

There is, of course, no need to use a tapped choke if a small transformer happens to be available, having plenty of inductance on both sides and a ratio of, say, 1 : 1.25 or 1 : 1.5. With a fixed modulator-to-PA coupling ratio, it would then be a matter of adjusting PA plate loading or modulator feed current in order to obtain the best match.

It is also worth mentioning that with a tapped choke, as used here, it is possible to take the screen of the modulator V2 to one of the tappings to get the fashionable "ultra-linear" effect. With a good microphone and speech-amplifier section, this should give improved speech quality.



Inside the 160-metre transmitter described in the article, the circuit of which is shown in Fig. 1. The CO section is lower right, the PA is in the central compartment above the modulation choke, and the modulator itself is lower left. The aerial coupling loop (see p.409, October, 1957) connects to the barrel terminal immediately above the midget change-over relay in the PA compartment. The pre-set modulator gain control (a deaf-aid volume control) is the black disc in the compartment at upper left. The chassis depth is two inches and the total weight of the transmitter complete is less than 2 lbs.

Other Circuit Points

The small Rx/Tx change-over relay used in the model was obtained from a Command transmitter unit (normally 24v. operation) rewound to work off 12v., which is the vehicle LT system. This relay swings the aerial from "send" to "receive" through the main control switch on the dash-board; this switch is also wired to change the vibrator HT supply (all that is used in this installation) from

transmitter to receiver in the same operation.

Valve heaters are connected in series-parallel for the 12v. line, and the vehicle LT circuit also feeds the single vibrator HT unit. The curves at Fig. 3 (obtained by actual test) show what is available from the standard Mallory 12-volt Vibrapack, sold as "surplus," which is used to power the installation. The transmitter loading is such that the CO draws 7.5 mA, while the PA takes 25-35 mA, depending on aerial coupling and drive. The modulator demands 35 mA, and the twin-triode speech amplifier V1 a mere 1.5 mA for both sections together. Hence, the total transmitter load is about 80 mA; from the curves, the actual voltage at this current draw (engine running) is the rated 275 volts. This gives a maximum PA input of 35 x 275/1000, or 9.6 watts. Actually, the PA is run at nearer 7 watts input for full modulation.

The construction is clear enough from the drawing at Fig. 2, and the photograph. Everything goes into a 7 in. x 5 in. x 2 in. deep aluminium chassis, looked at as a tray, and divided into compartments as shown in Fig. 2. The result is a flat box which can be bolted on immediately at the base of the aerial mount —the "works," of course, look inwards, and there is nothing to see except the jacks and the aerial terminal when the box is in position. All power and control circuits are carried in the multi-way cable, led off to the dash-board, where the receiver and main switches are located. For setting up, current in modulator and PA can be checked by plugging meters into J1 and J2, and the gain control VR1 is set by listening to the transmission on an adjacent receiver.

The aerial system is resonated and adjusted to the PA frequency by the methods fully discussed in the October, 1957, issue of *Short Wave Magazine*. It has been found that the system works equally well for reception, though there could be some loss if the aerial lead to the receiver is too long, or has a lot of capacity to the vehicle body; as in this installation a BC-454 is used as the mobile receiver, the length of Rx aerial lead is not a serious limitation, because the BC-454 has so much gain in hand. Actually, the limiting factor in reception is noise-level, and not lack of aerial pick-up or receiver gain.

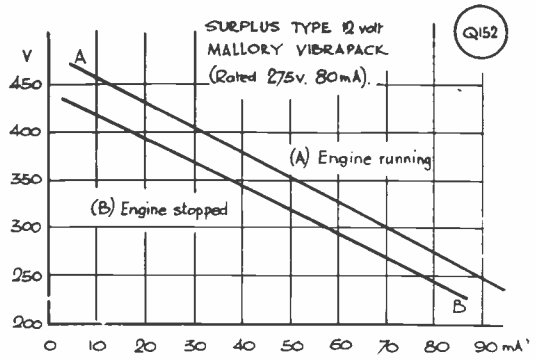


Fig. 3. Regulation curves, obtained on load test, for the standard Mallory 12v. Vibrapack used as the HT unit for the transmitter (and receiver) mobile installation discussed in the article. These HT units are well-known as "surplus" items, are obtainable very cheaply, and give no trouble provided the no-load voltage is not allowed to go too high; they should never be run open-circuit, as the rectifier mounting tracks across the HV pins. A small fixed load, or "bleeder," permanently across the output will prevent this; a 50,000-ohm 5-watt resistor will keep the voltage to within 450v. and draw less than 10 mA.

It can be said that the nett result is a neat and efficient mobile phone installation, utterly reliable in operation which, as regards transmission, is capable of giving good speech quality with ample modulation over the distances reasonably to be expected in Top Band mobile working.

G3HMO/G6FO

SCOTTISH VHF CONVENTION

We are asked to announce that a Scottish VHF convention is to be held on Saturday, March 15, at Brabloch Hotel, near Renfrew Airport (Glasgow), for which an exhibition, lectures and a dinner are planned. Tickets will be about 21s., and full details can be obtained from: W. C. Bradford, GM3DIQ, 6 Langside Park, Kilbarchan, Renfrewshire. It is hoped to welcome a large contingent from south of the Border.

SPREAD OF GOOD THINGS

In this issue of the *Magazine*, we carry a rather larger number of Readers' Small Advertisements than usual—and there are some very attractive items on offer, too, as well as much equipment in the "wanted" category. For years now, SHORT WAVE MAGAZINE has been the recognised market for readers' sale-or-exchange of Amateur Radio gear. If your offer is a good one, the response is prompt. One reader, in sending an advertisement for the current issue, writes as follows: "My last for-sale advert. produced an offer in the post *previous* to that in which I received my copy of the Magazine . . . in the end I sold all the items for more than I expected, and if I had only waited a few days longer, when other offers came in, I would have been another £3 better off . . . "

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Command Transmitter Conversions

FOR 10, 15 AND 20 METRES

From Notes by **G3ATL**

THE Command series of "surplus" transmitters is, by now, well known. Cheap in the market, compact, very well built and (for stripping down) full of useful parts, these units can quite easily be modified for effective amateur-band working.

For the 14, 21 and 28 mc bands, it has been found that the most convenient one for treatment is the unit tuning 4·0-5·3 mc in the original (the BC-457, or T-20). Other units in the same series — BC-696, 3·0-4·0 mc; BC-458, 5·3-7·0 mc; and BC-459, 7·0-9·1 mc —can be similarly modified, but the notes below refer to the BC-457. It should also be mentioned that these BC numbers are often followed by a letter (A-D) which merely indicates a sub-type of the same unit, covering some small design or constructional difference, which does not affect the main function.

Modification Procedure

Remove the rear connection socket and substitute a standard octal holder, as the power input connector. Take out the magic-eye indicator (1629—VT138) and the octal socket in which it is fitted. Cut out completely the wiring from the central octal socket, used to carry the crystal. Remove the relays above and below chassis, the former being the aerial change-over relay.

Make a small patch-plate and fit it under the chassis in the hole left by the magic-eye. Drill this plate to take a $\frac{3}{8}$-in. slug former with the adjustment protruding above the chassis.

The BC-457 is wired for 1625's in the PA, but 807's can be used in place of them, if desired. To do this, the spring clips on each socket section of the 1625 bases should be removed *gently* and the holes shaped as shown in Fig. 1; the clips are then replaced, and the bases will now take 807's. The heaters can be wired in the usual way, except that pins 7 and 8 on the 6J5 must be left as they are and the heater live lead taken to pin 4 of the oscillator coil (T.53, Figs. 2-3), leaving the ·001 μF decoupling condenser in place of the original ·006 μF. The heater line of the second (doubler-tripler) stage—which can be a 6AG7, 6F6, 6V6, 6AQ5, or 12A6—is then wired up to the supply socket at the rear. On this, pin 1 can be made earth; pin 2, 6·3v.; pin, 3, oscillator HT, 150-200v. stabilised; pin 4, PA screen HT, 275v.; pin 5, PA plate HT, 400-750 volts; pin 6, blank; pin 7, 12·6v. LT; pin 8, doubler-tripler HT, 250 volts.

Coil Data

For 14 and 21 mc, the 6J5 must work in the 7 mc band; the main winding of the oscillator coil T.53 (Figs. 2-3) should be reduced to 12 turns by taking wire off the top of the coil. The oscillator tuning condenser C63 (Fig. 3) should have all but two rotor plates removed; at the oscillator coil connections the neutralising capacity should be extracted and the bias return line for the doubler moved from the centre tap (5) of the coil to the free end (3)—*see* Fig. 2.

The slug-tuned coil L1 is wound with ·10 turns of 24 swg for 20 metres, and 7 turns of the same for 15 metres. C11 connects to the "hot" side of L1, and is supported at its free end on a small ceramic stand-off insulator. C8 and C9 mount directly on the doubler-tripler socket; C10 connects between the "cold" end of L1 and the coil mounting lug. RFC2 and the bias resistor R4 go on the side

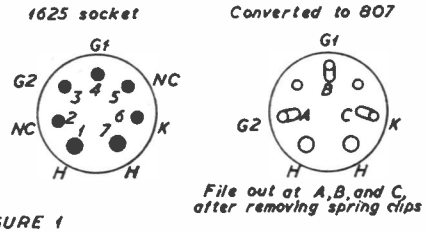


FIGURE 1

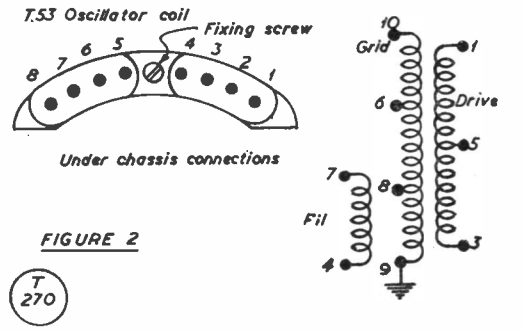


FIGURE 2

T 270

Fig. 1. Modifying the 1625 socket to take an 807. Fig. 2. Coil assembly T.53 in the original oscillator. Its windings, which have to be modified (see text) can be identified from this sketch.

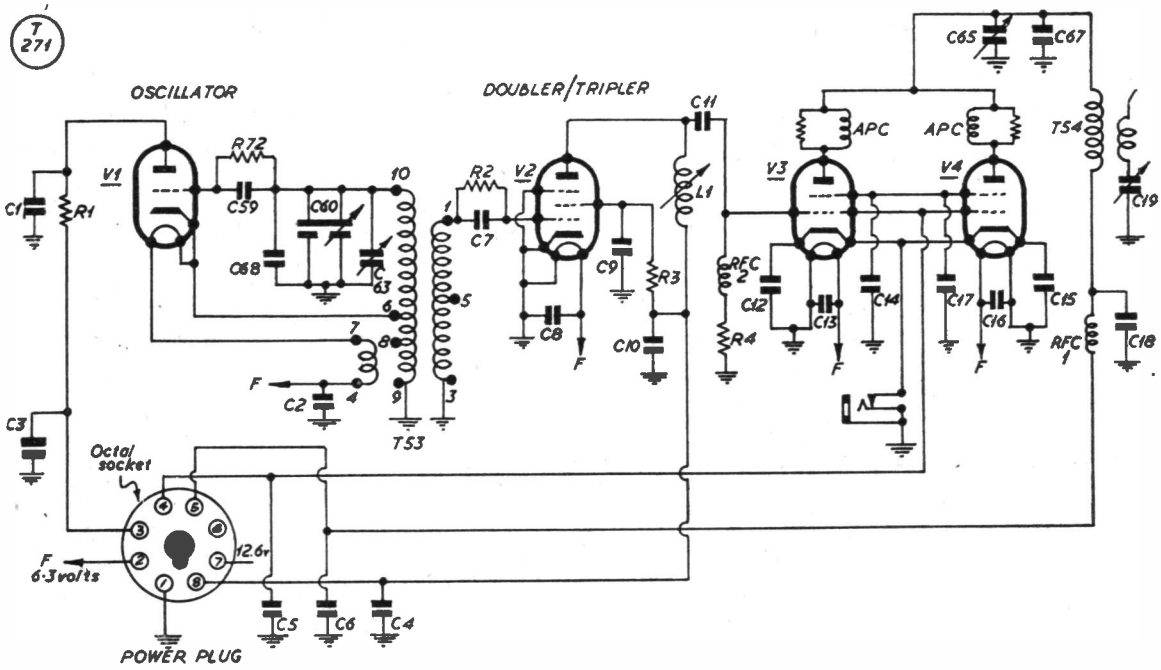


Fig. 3. Circuit of a Command transmitter unit as modified in accordance with the notes in the text. All "high numbers" are original parts. The modification items are C1-C19 inclusive, and R1-R4, with V2 as an additional doubler-tripler stage.

of the chassis, roughly where the relay was originally fitted.

For 20 metres, the PA plate coil T.54 is rewound with its own wire to 5½ turns double-spaced in the grooves. Remove all but two rotor plates from both PA condensers C65, C67. Link output should be taken direct to the aerial terminal on the front of the unit.

On the 15-metre band, the gang-connected condenser C65 in the PA stage is not used, all tuning being done by the PA loading condenser, which is reduced in plates as for 20 metres. The PA coil is re-wound with four turns of its own wire double-spaced, two above and two below the link coil shaft.

Ten-Metre Modification

For 10 metres, the oscillator V1 is brought to 14 mc and the next stage V2 acts as a doubler to 28 mc. The doubler coil L1 is wound with 5 turns of 24 swg. The oscillator coil is dealt with thus: Remove turns from the top of the main portion of the coil, leaving one and two-thirds of a turn above the cathode tap (6)—*see* Figs. 2-3. Reduce the coil below the tap to four turns only. Care must be taken not to damage the filament winding of fine wire inter-wound with the grid coil. Remove 4 turns from the bottom of the filament winding (4); this is best done by cutting a turn, taking off turns, and then rejoining, making sure that the joint sits clear of the other windings. Then remove all but three plates from the oscillator condenser C63 and all but 7 rotor plates from the oscillator padding condenser C60.

The PA plate coil T.54 is discarded altogether for 10-metre operation, and a new one made. This consists of 5 turns of 12 swg, 1-in. diameter spaced out to one inch, and mounted on small ceramic s/o insulators fitted in about the same position as the original plate coil. The ganged condenser C65 is not used for Ten, and the padder C67 should be cut

Table of Values

Fig. 3. Circuit modification details for the BC-457

C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C12, C13, C14, C15, C16, C17,		R2	= 68,000 ohms
		R3	= 15,000 ohms, 1-w.
		R4	= 11,000 ohms, 2-w.
		R72	= 51,000 ohms
		RFC1,	
		RFC2	= 2.5 mH RF choke
		APC	= Parasitic suppressors
C18	= All .001 μF	V1	= 6J5 (replaces 1626 for 6v. operation)
C11	= 100 μμF		
C59	= 175 μμF	V2	= 6AG7, 6F6, 6V6, 6AQ5 or 12A6 (for 12v. operation)
C60	= 50 μμF		
C63, C65, C67	= 220 μμF		
C68	= 3 μμF	V3, V4	= 807 (replace 1625's for 6v. operation)
R1	= 1,000 ohms		

down to 5 rotor and 6 stator plates, to function as the main PA tuning capacity. An aerial link of 3 turns of 12 swg, 1¼-in. in diameter, is mounted on an s/o insulator and slipped over the plate coil. For ease of loading up, a 100 $\mu\mu$F variable C19 should be placed in series with the link winding.

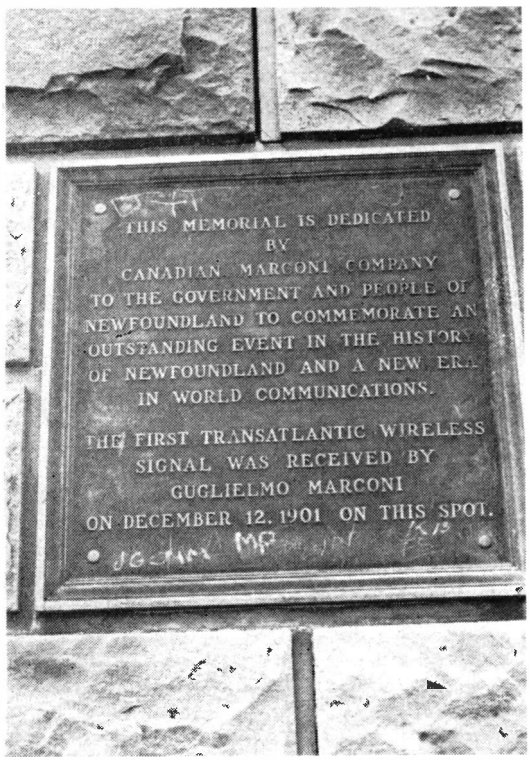
It follows from the foregoing that one BC-457 unit cannot conveniently be modified for all three bands—the idea is to apply the appropriate band modification to one unit, used only on that band, additional BC-457's then being modified for the other bands that may be required. Note also that in the diagram of Fig. 3 all "high-numbered" circuit elements are as in the original — the new parts are numbered C1-C19, and R1-R4.

At G3ATL, separate Command transmitter units, modified for each band from 80 to 10 metres, are in use. DX has been worked with great success on 10, 15 and 20 metres, using the conversions described here.

RADIO AMATEURS' EXAMINATION IN MAY, 1958 — AND R.A.E. EXEMPTIONS

Readers who intend taking the next R.A.E., to be held in May, are reminded that their application to sit should be in by the end of *this* month; though in exceptional circumstances late entries can be accepted until towards the end of March, there is a surcharge of up to 20s. on the fee—so get yours in without delay! Applications to sit must be made through the candidate's school, *or* local technical college *or* the county education authority; quote Subject No. 55 in the City and Guilds Examination syllabus.

Those who at present hold Service exemptions on the R.A.E., *i.e.* have qualifications which excuse them either the theoretical (R.A.E.) examination or the Morse test, or both, should note that, with effect from May 8, 1958, this system is to be abolished. The Post Office authorities have given notice that after that date, *all* applicants for an amateur transmitting licence must take both examinations (theory and Morse) in the usual way. So, if you hold exempting qualifications, and contemplate applying for a licence, go through the motions in good time if you want to avoid having to take the R.A.E. or Morse test. Forms of application, the conditions for the issue of an amateur transmitting licence, and the Service categories under which exemptions are at present allowed, can be obtained by writing to: Wireless Section, Radio & Accommodation Dept., Hq. General Post Office, London, E.C.1.



When ex-MP4BCA made his pilgrimage recently, he took this photograph of the plaque at the Marconi Memorial site, Signal Hill, St. Johns, Newfoundland.

DEATH OF SATELLITE I

It is officially reported, and agreed by the Russians, that S.I dived into the atmosphere on January 4, and vaporised, having existed as a cosmic body for 92 days; S.I was launched on October 4 and, the Russians say, made 1,400 circuits round the earth, equivalent to a distance of about 36 million miles. S.II, launched on November 3, was still in orbit at the time of writing. Articles on the radio aspects of Satellite activity appeared in the November and December issues of SHORT WAVE MAGAZINE, and have since been freely quoted.

USEFUL CATALOGUE

We are glad to notice, once again, the very useful radio parts and equipment catalogue offered by Southern Radio & Electrical Supplies (Sorad), whose issue No. 11 contains detailed information on a wide range of equipment, with particular emphasis on the requirements of the amateur transmitter and SWL. Sorad have been in the mail-order business for many years now, and their service and the quality of the goods they handle can be relied upon. The catalogue costs 9d., post free. In connection with it, a prize contest is being run—*see* p.613, January.

AUDIO EXHIBITION, MANCHESTER

We are asked to announce that an exhibition of Audio and Hi-Fi Equipment is to be held at the Midland Hotel, Manchester, during March 1-2. It is hoped to draw audio enthusiasts from all over the North, and to meet the needs of those who cannot travel to the London Audio Fair. Details regarding this venture can be obtained from: E. Yates, G3ITY, 210 Stamford Road, Blacon, Chester.

DX COMMENTARY

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

THIS is really the first Commentary of 1958, since the previous one was, of necessity, written in mid-December, 1957. It was thought best to wait until the Old Year had expired before commenting on its behaviour, but we might as well say here and now that 1957 was the best year the DX-chasing fraternity have ever experienced. Whether 1958 will be better, or even as good, one cannot guess, but at least let's give thanks for 1957!

Many new countries arrived on the air; Zone 23 made a wonderful surprise packet and brought the WAZ Certificate back to life; MUF's went higher than ever before.

Our 1957 WAZ Marathon *(see* Table for final placings) was handsomely won by **G3FKM** (Birmingham), who topped the 200 mark in the last few days of the year and finished up with 40 Zones, 201 Countries—a terrific performance. Close on his heels was **G3HLY** (Godalming) with 40 and 195—also worthy of many congratulations; and third was **G3FXB** (Southwick), not far behind.

It is interesting to note that when we ran our first WAZ Marathon, in 1948, not one of these 'chasers had a licence! Interesting, too, to note that the winner of the 1948 event was G2EC, with 40 Zones and 174 Countries, with G8KP and G4CP close behind. These figures clinch the argument that 1957 has been the best year we have known, although, at that time, 1948 was thought to be wonderful.

So congratulations to all the runners in the 1957 Marathon, five of whom joined the ranks of the *élite* by working all 40 Zones—and nobody need think you can do *that* merely by "taking an interest in working DX." It calls for hard work, concentration and operating skill of a high standard. It was our guess at the beginning of the year that 40 and 200 might be possible, and G3FKM just managed to prove that we weren't far wrong.

JT1AA

CALLS HEARD, WORKED and QSL'd

The Zone 23 Phenomenon

Probably the biggest event of the year (or even of the last ten years) was the arrival in Zone 23 of a station prepared to give out as many contacts as possible. All previous inhabitants of that Zone were rather busy people who were only on the air for short periods when other work permitted it. JT1AA is also a busy man, but when he takes the air he stays on—to the extent of having worked 2,300 stations so far! His operations were interrupted in early December by the severe earthquake in Mongolia, the centre of which was about 400 miles from his QTH. Cards for contacts up to December 11 have been handled by OK1JX, who hopes that the next batch will shortly be with him.

The QSL side of JT1AA's life has produced some unfortunate experiences. OK1JX writes: "I never imagined how it was possible that so many hams, and especially the top ranking ones, could apply for a confirmation of a contact which Ludvik never mentioned in his logs!" And it turns out that Ludvik does not confirm incomplete contacts . . . so, in innumerable cases where he didn't get his own report through the pile-up, the thing quite rightly is not counted as a QSO.

There were several cases of stations *assuming* that the contact was theirs, owing to confusion of call-signs; there were many contacts with a pirate also signing JT1AA. What it all boils down to is that you won't get a QSL from JT1AA until you have a *proper* QSO, with call-signs and reports both ways beyond all doubt—which is just as it should be.

OK1JX sent JT1AA a complete translation of our "Hopping Mad" effort in the November issue, which dealt not only with pile-ups in general, but with JT1AA's brand in particular; so he is probably wise to some at

least of the DX-manship tactics by now.

Finally, it is nice to report that JT1AA finally turned up on 21 mc, where he proved much easier to get hold of than on 14 mc, as one would expect. Correspondents who report working him on 21 mc include G2DC, 2YS, 3AAE, 3BHW, 3DO, 3FXB, 3JZK, 3HLY, 3LET, 5BZ, 6QB and GW3AHN. The contrast helps to prove a pet theory of ours, which is that Fifteen is a much better DX band than Twenty—but since most of the rare ones don't bother to move away from Twenty, one has to tolerate all the Short-Skippery and Clottery up there in order to work them. Why, we even worked JT1AA on Fifteen without anyone else calling him on the frequency during the QSO!

W A Z MARATHON, 1957
All Bands
Final Placings

Station	Zones	Countries
G3FKM	40	201
G3HLY	40	195
G3FXB	40	184
G3DO	40	182
G5BZ	40	165
G3BHW	39	182
G2DC	39	154
G3BDQ	39	145
GM3EOJ	38	140
G3JKF	38	117
G3LET	38	105
G3FPK	37	112
G3GGS	36	113
G3HCU (Phone)	36	98
G3KMA	35	105
G5FA	35	100
G3GZJ	34	112
G2BLA	34	99
G3JJG	34	98
GM2DBX (Phone)	33	91
G3HQX	32	99
G3JWZ	32	88
G6PJ	32	86
ZL3CP	27	64
G3DNR	26	78

An important point is that Fifteen is not only a better band for the 'chasers—it is much more comfortable for the chased. In JT1AA's own words, concerning Twenty: "I have a bunch of antennas in every direction possible, but on whichever of them, after the initial CQ the W's put a rug on me and I don't hear anybody else." When he tried 7 mc, the same thing happened with the U's and the JA's. Now, on 21 mc, he finds he is able to work the world outside the areas mentioned.

Multi-Band DX

Most of our correspondents this month seem to spread themselves over four or five bands, at least, and we will deal with these versatile types first of all . . .

G3FPQ (Bordon) worked 40 Zones during the year and totalled 430,000 points out of the *CQ* Contest, during which he wore out his electronic keyer. In addition to cross-band (50/28 mc) operation on phone and CW, he has worked all bands up to 3.5 mc, where his phone brought S9-plus reports from VE1XK and VO1DN, and he also raised W1GAC. CW up there brought in LA2JE/P, OH2YV/Ø and YK1AT—three pretty nice ones for Eighty! CW on 7 mc accounted for CO, LA2JE/P, OH2YV/Ø, TF, UN1, VP2LU, VP9CY, YK1AT and ZC4. Best on 14 mc CW were JT1AA, ZK2AD and VS9AC; phone added VK9AD (Norfolk Island). Then came 21 mc CW with OHØ, FC, UD6, UR2 and VK9XK; 21 mc phone with CR4AD, HS1B, KG6AGO, KR6DR, M1H and ZS9G. Finally, 28 mc gave him FC and OHØ on CW, with CR9, KR6, KG6, VP1OLY and VQ6ST on phone. Not a bad month's work, we should say . . .

G6TC (Wolverhampton) also covered five bands and reports K2CHQ on 3.5 mc; OHØ, TF and all W's including 6 and 7 on 7 mc; KR6BW, VE7 and 8, HC1JM, KH6IJ, JA and OHØ on 14 mc; CO and CX on 21 mc; and VQ4, PY and SV on 28 mc. He finds 7 mc very interesting in the early mornings, and daybreak is a good time for W6, 7 and Ø, but there is a great lack of VK and ZL on that band.

G2YS (Filey) raised YK1AT on both 3.5 and 7 mc; and JT1AA, FB8ZZ, JA, YV5HL and 9G5BBE (Bahrein) on 21 mc.

25-watt Wizard

GW3AHN (Cardiff) attains the distinction of having the highest 21-mc score we have heard of, and certainly of being the first to reach 200 countries on that band. This he managed with a maximum of 25 watts to a 68-ft. Windom and a rotary dipole, and latterly to a G4ZU beam. The 21 mc tally of 200 countries worked, 181 confirmed and 160 on phone, with 25 watts, certainly calls for some sort of celebration. Recent acquisitions on the band were FB8ZZ, FY7YH, HC1JW, JT1AA, UL7HA and XE1AX on CW, with ET3, FB8BX, HL9KT, JT1AA, KX6BX, TI2ES, VP2GS, YN1LR and ZP5JP on phone. A spot of 14 mc phone brought in HV1CN, and on 28 mc he worked KG6's, KR6's, ZD6RM and ZD8SC. Finally, we chronicle some 14 mc CW, including CR8AC, FG7XC, PY7AN/Ø, PZ1AP and VKØAB. Just how potent *can* one be with 25 watts?

G3LET (Westcliff) must hold the most recent call to have been in QSO with JT1AA; on December 26 he worked him, together with XE1PJ and EA8BF, on 21 mc. On 14 mc he collected FB8ZZ, ZK2AD, EI8BC/MM, HE9LAC, YV, TI, UAØ and HA5AM/ZA; heard on that band, but not worked, were ZD3G and YJ1DL. Finally, 7 mc yielded W6MOJ (0830), KP4FAE, UA9's, FA3, VE and East Coast W's. All this, by the way, with 50 watts only on account of TVI.

G3FPK (London, E.10) collected 58 new countries during 1957, his total now standing at 37 Zones and 121 countries. 21 mc CW fetched in FA, KR6, UA9, VK2 and 6, CN8, KP4 and LZ; 14 mc was accountable for KH6 and UD6, both new, as well as HK3, KZ5, OHØ and UAØ. 7 mc was not neglected either, and thereon were worked LA2JE/P, UM8KAA, VS9AG/ZD3, UAØ and other nice ones. G3FPK was thrilled to hear "Mr. U." at the LF end of

14 mc, suddenly burst out into a string of two-figure numerals . . . so he does possibly mean something to somebody, after all!

G2DC (Ringwood) worked through the WAE Endurance Test and made 424 QSO's and 85,230 points—mostly with W's, only some 20 countries being worked. He finds 28 mc "more settled" and worked CT3AV and a CE for new ones; 21 mc he thinks the best all-round band, with DX at reasonable times and pleasant reception conditions. ZL and JA were plentiful in the mornings, and others worked included JT1AA, OX3DD, YV, HC, KL7, CR6 and 7 and FF. 14 mc was slightly better as regards short-skip, but the only new one was JA1JG/Antarctica. 7 and 3.5 mc were uneventful, although the latter shows signs of improvement and all W districts were worked. OX3DL was a new one. Finally, G2DC asks, "What has happened to all the stations in VU, 4S7, VS1 and VS6—we never seem to hear them these days."

G5BZ (Croydon) had 250 contacts "just for fun" in the WAE Contest, but says it was mostly a free-for-all between the EU's and the W's. He found 14 mc the most interesting band—in fact, his transmitter has been tuned there with the beam heading north for nearly the whole period. There was a lack of VK's, but he worked OX, PY7AN/Ø, FB8ZZ, KA8KW, JA's, VQ8AS, ZK2AD, VP8CC, VKØAS, KP6AL, VR2DA and whole strings of KH6 and KL7. 21 mc produced VK, ZL and KL7; 28 mc, VE, ZS, LU, UA9, CR6, CN8, VQ2 and PY. G5BZ recently received a large batch of UA cards, including some interesting ones going back twelve months or so.

Cross-Band Work

Best contacts for G3FXB (Southwick) were VQ8AS on 14 mc CW, and JT1AA ("a push-over") on 21 mc. All other activities have been confined to rag-chewing on the Ten/Six cross-band channel. G3FXB's score for this mode is now 105 QSO's, 74 stations, 20 States, and among the best have been W5VY (Texas), W7RUX (Arizona) and WØ's in Colorado and Nebraska. Six metres has been open on occasions until 1745 GMT.

Our heading photograph this month, on p. 639, is of JT1AA, the famous station now in operation at Ulan-Bator, Mongolia, in Zone 23. In this group, JT1AA is on the left, in a setting which conveys well the still-primitive background against which life is lived in that remote part of the world. Both photographs were taken quite recently, and are the very first to be published of him — in this or any other of the world's Amateur Radio periodicals — since JT1AA made his appearance on the air.

Colleague A.J.D. passes over a letter from G3EHY (Banwell, Som.), normally a VHF-only operator, who has recently been devoting his energies to 6/10 cross-banding. Between December 20 and January 19 the 6-metre band was found to be wide open every day and full of W/VE phones; G3EHY himself worked more than 300 stations on phone during this period, and covered all W call areas except W6 (heard at S9, but apparently not getting G3EHY's 10-metre signal). Best DX heard was OA7Y, unfortunately not trying 10 metres but QRX only on the 50 mc band. G3EHY finds that 6 metres follows the general pattern of Ten, *i.e.* opening about noon with W1-2, with the W6's audible around 1630, and the band folding up about 1800 GMT. Comparing his records of ten years ago, G3EHY says that then W/VE's were coming over as late as February, 1948—so there is a good chance of the present exceptional high-MUF DX conditions continuing for a while longer. Thanks, Louis.

G3IGW (Halifax) worked all bands, mostly CW, which brought him CR7, FC, OHØ, UAØ, VQ2, 3 and 4, and ZE on 28 mc; GD and LX on 14; UF6AA, TF5TP and ZC4BL in three consecutive QSO's on 7 mc; and OH2YV/Ø and UB5WF on 3.5 mc. The latter is prepared to work *Top Band* after 2100 GMT and will make skeds on 3.5 mc for the purpose.

G3DO (Sutton Coldfield) made his "40 Zones during 1957" with the help of JT1AA on 21 mc (1230 on December 21). On 14 CW he collected CR8AC, while 14 mc phone yielded VKØAS and 3A2BF.

G3BHW (Margate) reports 21 mc QSO's with JT1AA, VU2MD, ZD2DCP, KH6 and UL7. On 14 he hooked XW8AE, VP7NM, SU, KH6, KG6 and PJ2. Cards turned up from XW8AG and YK1AT—both very promptly.

G3DNR (Broadstairs) found VQ6ST and OY1R on 28; CN2 and OHØ on 21; KV4BO, KL7, VE and W6 on 14 mc. His TVI situation looks more promising and he hopes to be more active.

G3JZK (Cambridge) collected PJ5CA and ZD3G on 7 mc, also a rather curious "JA3ADX/MM" at Antwerp. On 14 mc the new

ones were KH6 and OHØ (someone working the latter thanked him for "first Nauru QSO"!); and on 21 mc the bag was JT1AA (at last), UO5AA and OY5S. Plans are afoot for a new "hand-picked" QTH, from which great things are anticipated. Q3JZK also reports that G6UW, the Cambridge University club station, is likely to be very active, and it is hoped to start a Universities Net on 7 mc . . . details from Ian Davies, G3KZR, St. Catharine's College, Cambridge.

G2BLA (Morden) sends an all-CW report for five bands, including TF5TP on 3.5; W's on 7 mc; UD6DD and VS8BB, said to be in Indonesia, on 14 mc; UL7, XE, FA8AN (Sahara), VK and ZL on 21 mc; and CR7, ZE, CE, PY7AN, VE7 and W's on 28 mc.

Best for G2DHV (Downham) were VQ5GJ, EL1S and ZD4CM on 14; DL9PJ/CP2, ZP5's and 9AY, FF8AP, FF, HI8BE, VP8CC and ET3X1 on 21 mc; and KX5GXM/P and ZP5KQ on 28 mc.

Specialists

We are now down to those who worked on two bands or even one. GM3EOJ (Aberdeen) stuck to 28 and 14 mc with very worth-while results. 28 gave him VE5, 6 and 7, YV, CO, HC, KR6, ZD4, ZD6, CX, XE and others; 14 mc turned up with ZL5AA (Ross Island), HC1HL, ZP9AY, KH6, KR6, UJ8, JA and VE8—all CW, plus VU2RK and ZD3E on phone. Very late openings on 28 mc puzzled GM3EOJ—on one occasion he was working VE6MP at 0013 GMT!

EI6X (Limerick) stuck to 21 mc and raised MP4BCC and 4KAS, HC4IM, VQ3DQ, EL1P, HH4MV, ZS9G, ZD6RM and VP9DZ, with the usual collection of W's and VE's—all on phone. He runs 100 watts to a pair of 807's, into a W8JK and a "Lazy-H."

G3AKX (Sale) divided his attentions between Top Band and 28 mc; in the latter region he worked OQØDZ, VP1OLY, VP8CC, PZ1AE, OHØ, KG6, KR6 and VQ6—all phone. He also made his WAS on 28 mc phone.

G3HLY (Godalming) finished up with a Marathon score of 40 and 195, putting him second in the final placings. During 1957 he *heard* 227 countries, and most of the gotaways were in a southerly direction, from which he is badly screened.

G3AJP (Great Yarmouth) worked his first ZL on phone (ZL3RB on 21 mc); CW raised ZS9Q on 21 and ZS9P on 28 mc. PY7AN/Ø was worked on 14 mc, and gave QTH as Fernando Noronha Island. G3AJP remarks that if *this* one gets country status, then the Scroby Sands, off Great Yarmouth, should certainly do likewise. In conclusion, he says he dare not erect a beam, because he might work JT1AA for his 40th Zone, and what would be left then? (But what about those who have worked JT1AA without a beam? Better go on to an indoor ground-plane to avoid all danger!)

A list of those who have *never* had a beam at all would yield some surprises, by the way. G6QB will be glad to start the said list off . . . who are the long-wire enthusiasts?

The DX on Forty

Quite a number of reports this month cover 7 mc only, including G5FA (London, N.11), who worked HR1JH on phone and ZC4's, PY, UF6, UQ, UO and OHØ on CW—with plenty of W's to swell the list.

G3GGS (Preston) worked FB8BG up there; G5JU (Birmingham) raised W's, VK3YD (1930) and UA9KOA (2050); G3BST (Bletchley) collected FA, TF, UAØ, ZC1KF, EA8 and TA3CM. The "ZC1KF" gave his QTH as "Ozalw" . . . can anyone elucidate, or even pronounce it?

Miscellany

Box 88 is not, it seems, quite as inactive as has been alleged. G2NS (Southbourne) tells us that most of his cards came through within three months of working them—but only through one particular bureau; G3JZK suggests that decentralisation is taking place, as a UB5 requested QSL *via* Box 88, Kharkov; and even G3ESP, whose plaint started the subject off last month, says he has now had an envelope full of UA QSL's and SWL reports. G3FAS has had 34 cards from 74 contacts, comparing favourably with any part of the world.

G3KHE (Birmingham) confirms the gen about the new prefix for Kuwait, and tells us that MP4KAS is now 9K2AX. G3WL (Plymouth) is active again after two months' QRT, and finds 28 mc the most profitable band, having raised eleven new ones in the first two week-ends of January with only 30 watts and a Zepp.

G3BHJ (Norwich) has reinforced *his* Zepp with an 8-element Curtain, and when he recently worked a W using an 18-element Curtain and the same power as himself (75 watts), he figured that the ERP concerned was equivalent to "many kilowatts." G3BHJ has found a number of stations having some connection with Norwich: VP6LT and MP4BBL are two "exiled locals," WØFQY lectured the local club a year ago, and VE7ZM and VE8NJ were both at R.A.F., Swanton Morley, during the war. He is surprised how many W cards bear the words, "my first G," or "first European," or "Norfolk needed for WBC." Collected during the month were CN8, CO, EA8, FA, OY5S, TF, VP6's and VP7, VK, VQ4 and VS2 on 21 mc; and MP4, FQ8, OHØ, PZ, TF, VP5 and 6, ZD2 and 4 on 28 mc — all phone.

G3AAE (Barnet) reports having worked 40 Zones and 161 Countries during 1957, which would have put him in a nice position on our Marathon ladder if he had entered. He recalls that he was one of the few to reach 40 Zones in the 1948 Marathon. JT1AA on 21 mc gave him the fortieth this time, on December 26. The interesting point with him, too, is that this score was reached with nothing but a simple 67-ft. Zepp.

Top Band Topics

Dealing with local affairs first, we are delighted to announce that G2CZU (Bath) has scooped the pool and is the very first to prove an all-Phone WABC Certificate. We are particularly pleased about this, since he was in a position to claim WABC when it was

This photograph is of particular interest because it is of two much-discussed personalities in the world of Amateur Radio — on the left, Danny Weil, VP2VB, and on the right Dick Spenceley, KV4AA, who has done so much to help and advise VP2VB since this round-world DX venture was started. The picture above was actually taken at St. Thomas, Virgin Is., during VP2VB's last trip; at the moment of writing, "Yasme II" is still at Poole, Dorset, awaiting the completion of her refit. Then VP2VB will set off once again, making for the Caribbean and KV4AA.

inaugurated—except for the time limit which we clamped on; by going back a few years earlier, he could show that he had worked The Lot, but it took him quite a long time to make them up again after the appointed starting time of January 1. 1952.

Recently some bouts of ill-health have held him back, but he now is the proud possessor of WABC (Phone) No. 1. The final contacts were with GM3AUD (Ross) and GM3KMR (Midlothian). He also got his phone across (4 and 7) to DL1FF in Kiel —nice going.

G3LNR (Nottingham) records a whole bag of new counties, also DL1FF, DL2ZO and OK1KDQ. G3LBQ (Hounslow) worked four DL's. G2FTK (Coventry) raised a number of DL's and OK's, also GC2CNC and GM3COQ (Kincardine).

G3IGW, an old Top Band hand, worked DL1FF, and heard many OK's, YU3EU, HB9IN and 9QA, and other DL's. In fact, one of the striking features of One-Sixty during the last two months has been the terrific strength of some of the DL stations, especially DL1FF, who has a formidable array in use.

G3BDQ (St. Leonards) has forsaken the DX bands for the time being, having built himself a 4-watt Top-Band mobile. Using this on his fixed 136-ft. wire, he has achieved good ranges, including DL1FF and an OK; as a mobile (G6HH/M) it has also met with great success, and its "Sputnik" aerial gives better ranges than anyone expected.

G3AAE promises to pass along full details of a DX-pedition to Alderney, which four operators are busy arranging for a later date.

Top Band DX

Conditions for Trans-Atlantic work have not been at all good, but quite a few QSO's have been taking place on Sunday mornings. G5JU worked W1BB and heard two others on December 22; on December 29 he received W2GGL on sked but could not work him; on January 12 things were a little better and W1PPN and K2CHQ were raised. Much clottery was in evidence on this side, with G stations working in the U.S.A. sector and making things more difficult than they should be.

W1BB himself reports that December 8 was a washout; that the 15th was also a very poor night; that the 22nd was better, with G6GM and GW6HB working W1LYV and heard by W1BB. TF2WCC was also logging W1BB steadily. December 28 was no good at all, but on January 6

things opened up a little and G3ERN worked W1BB for the only contact across the Pond.

W5SOT and W6VBY are plugging away; ZB1HKO and ZB1BJ are also QRX. Also, W1BB worked "a new one" on December 22, but, alas! cannot disclose it for publication. This was his *fiftieth* country on the band. (Just think of it, WAC and half a DXCC on One-Sixty!)

W2EQS, that former stalwart, is off Top Band for the time being owing to a change of rig, but he reports that during the *CQ* Contest VP5FH was offering to QSY up there for those who wanted the extra multiplier.

Sundry Strangers

Strange new sounds are to be heard around the bands these days. Ghana switched from ZD4 to 9G1 on January 1; Kuwait, on the same date, changed over from MP4K to 9K2; and, to balance things slightly, Saarland, where the amateurs have been signing 9S4 for some years, has now reverted to DL8. G2YS reports working 9G5BBE, which rather confuses the issue! One would expect Bahrein to be allocated 9K5 rather than 9G5.

The strange XQ8AG reported last month, first as being in Chile and then as possibly one of the XW and 3W fraternity in the Far East, turns out to be in Chile after all. He is a W operator in Antofagasta, running a Viking 500 and a 5-element beam, and his QTH is given as Radio Satellite Tracking Station, Vanguard Station No. 7.

XV5A is another strange one, but has no Chilean connections. He is in Saigon, is ex-KV4AD, and will shortly be using a tri-band beam and a kilowatt.

DX Strays

G6LX (Croydon) reports that all Monaco QSL's should go to 3A2AH, and that "3A1W" and "3A2YB" are phoney. The only genuine calls are in the 3A2AA-3A2C series, but most of the cards arriving there are for the phoneys. Over 600 have recently been returned to their senders, mainly in U.S.A.

G3BQG (Birmingham) informs us that VP8CH has left Halley Bay and is due in the U.K. shortly. G3BQG has worked him 93 times since last March! VP8CI is still there.

VQ6AB writes that he will be QRT until early March, and that he is receiving QSL's for 21 mc, on which band he has never worked. VQ6AC closed on January 12 on his return to the U.K.

ZD3G is ex-ST2NG and VS9AG. He may be there for six months . . . W4IHW/KS4 expects to be on Swan Island for three months . . . Genuine activity from Albania at last! HA5AM will be operating with a ZA call on February 8, 15 and 22, using 50 watts on 14040 kc.

If you hear a 4W1 operating from Yemen during early February he will probably be genuine, as OD5BA was hoping to go there in mid-January for about three weeks, working phone.

One of the rarest spots on earth, DX-wise, must be the Kermadec Islands. ZL1ABZ is said to be active therefrom, but only on Eighty for six months. Although he is CW only, his frequency is said to be 3844 kc.

VR2AP is travelling to Singapore in March, and has obtained permission to operate *en route* from FU8, VR4, CR10 and ZC5. He has 20 watts and one crystal (14340 kc).

VR1C is active on phone, 14180 kc, usually from 0500 onwards . . . VQ8AS is still on regularly, but weak and hard to locate, as ever . . . ZM6AV (14 mc phone) is yet another new one for those parts . . . FKØAD gives his QTH as Chesterfield Island — whether this counts separately from New Caledonia we shall not know until the pundits have delivered their verdict.

PY7AN/Ø was heard several times last month, but seems to have vanished. He was not on Trinidad Island, but on an islet very near the Brazilian coast (Fernando Noronha).

News from VS1

A long letter from Frank Johnstone, G3IDC and now VS1FJ, gives the following news items: The two R.A.F. clubs are VS1GZ (R.A.F. Changi) and VS1GL (R.A.F. Seletar). Members with their own stations include VS1JF, 1HU, 1BB, 1HX, 1HR, 1FJ, 1HV, 1HS and 1HZ. The activity level is very high, both CW and phone. VS1FJ himself collected his licence on July 29 last year, and worked his 100th country on August 31, using a 25-watter and a Vee-beam; he is now up to 168 countries and WAZ, thanks to JT1AA.

Most of the VS1 stations use 50 or 75 watts. Conditions have been very good on 14 and 7 mc, and quite a bit of DX is possible on 3.5 mc. The most exciting station in the locality has been ZC3AC, who is on 14107 kc daily, 1200 GMT, with both CW and phone — QSL *via* VS1FJ. Recent DX worked by VS1FJ includes FB8CD, FL8AC, VQ8's, HS1C, VKØAB, KZ1BG and 1BS, ZK2AD, ZS8R, VS9AD, VR2DA, FU8AD and XV5A (*see* earlier paragraph). ZC3AC, CR8AC and HL2AC make a good trio of "locals" . . . a VS1 location is quite something!

VS1EW has W6UOU's small SSB rig, and VS4JT is also on Sideband, as is VS6AE.

SWL Corner

Once more we must ask our SWL friends to send in only news of unusual DX, or particularly interesting items of gossip, because we simply cannot spirit-up the space for long lists of run-of-the-mill calls heard. Some of our keener SWLs' description of their month's listening would fill an entire Commentary . . . so considerable compression is the order of the day. News items, of course, are *always* welcome, and will be credited.

L. D. Strange (Sutton Coldfield) confirms the Kuwait (9K2) and Saar (DL8) prefixes; best DX heard was HKØAI, CR8AC, HV1CN, VS9AJ on 14 mc phone; XQ8AG on 21 mc phone; and VU2PS and HP2ER on 28 mc.

S. H. Stephenson (Morden) confirms the details about XQ8AG; he also heard JV5HN and would like some info on that one . . . S. R. Smith (Crewe) logged JA's, KA's and HL9KT on 21 mc phone around 0900, and at 1300

he heard KR6's, CR9AH and several VS6's. Other useful ones were HI8BE (1830), HH2NM (1800), HH5LA (same time) and XQ8AG.

M. J. Prestidge (Birmingham) gives HL9KT's QTH as Roy Jones, 304 Signal Battn., APO 301, San Francisco. He received CR8AC's card by airmail, and among his loggings were VK9AD (Norfolk Is.) and VE8AT, the most northerly station in the world. P. Webb (Tiverton) runs an HRO and a G4ZU beam, and as he can copy 25 w.p.m., he is logging the DX all right; but he comments that, as a listener, it is easy to send cards and hard to get 'em back! His six-band listening has accounted for 135 countries and about 12,000 different call-signs to date—interesting statistics.

A. W. Nielson (Glasgow) has been "knob-twiddling since cats-whisker days," but has only recently fallen to the spell of amateur-band reception. He has pulled in HS1A, KA, KH6, VU, 4S7, HKØAI, FP8AP, VS9AE, XQ8AG and many other good ones, and is now looking for some of the more exotic calls that he sees mentioned here month by month.

M. J. Edwards (Carterton) reports HH2NM, HH2R, HKØAI and XE3AF on 14 mc phone, with KA2AL, MP4, VU's and XQ8AG on 21 mc, and he sends us the full gen. on XQ8AG, confirming the statement in a previous paragraph.

P. Day (Sheffield) has logged about 120 different stations on six metres (including Arizona at S9 plus 20!) but finds the band very much down at the time of writing. Plums on the other bands were HKØAI, FP8AP, VKØAS, HV1CN, CR8AC and FB8XX on 14; HL9KT and KW6CE on 21; and XQ8AG, VQ8AH, CR9AK, BV1US and 9G1CH on 28 mc. Finally, he passes on the following very useful "strays": KS6AF hopes to go to VR5-land . . . FU8AD is on 21 and 28 mc phone . . . KB6BH is on 21 mc, 0900 . . . VP5ES, 5GB and 5HC are on Turks Is., VP5BD and 5BE on Cayman Is. . . . AC3QY has been heard on 14 mc CW, 1930. And he also confirms many items already retailed in previous paragraphs, which is most useful. Thanks, P.D., for a very interesting report.

V. Porter (Loughton) heard PY2CK announcing that a new country was available in the shape of PY7ANC/Portable on Sanoumaronia (?) Island, and that another was on from Fernando Noronha, on which we have already remarked. Others heard were HV1CN (several times), 3A1W (known now to be phoney), FC1UC (Corsica), HH2's and a mysterious "AC39" (Sikkim).

Piracy

A Maritime Mobile pirate would be logical enough, but G3JTC (Liverpool) is suffering from someone using his call as "mobile" on Top Band and 3.5 mc. As he sticks to 14 mc CW, he is a bit irate about this, and asks us to explain why a number of stations have received no QSL from their supposed contact with his "mobile."

But we hear, also from Liverpool, that two piratical types have at last been caught and heavily fined, and their gear confiscated. This is the action that has been awaited for years, and it is hoped to be the start of a general and much-needed clean-up.

G3ESP is another who is suffering from the unwelcome attentions of someone who fancies his call-sign. He gives the correct QTH (Pontefract), but his name is "Peter," and he is said to speak like a foreigner. The genuine G3ESP is rarely on phone—and, when he is, he speaks English!

Small Moan

G3FAS is slightly annoyed by something which happens to most of us at times—the receipt of a QSL direct from some distant part, together with four or five others which one is expected to forward to the addressees. This is duly done, and then, as he says, "I am not so concerned about having the postage returned, but a word of thanks would have been in keeping with the true 'ham spirit.'"

This compares with an experience of ours some weeks ago, when a bundle of CR7 (Beira) "diplomes," made out to U.K. call-signs, arrived in the office—with no covering letter or request to forward, no address list and, of course, no IRC's. Added to this was the fact that the wretched things were too large for our standard Certificate packing—and then it transpired that several of the G's concerned had never even applied for the diploma!

Appeal to Correspondents

We have always aimed at making this a real Commentary, in which there was space to spare for *comment*, rather than long lists simply of DX worked. Regular correspondents — of whom there are many, and whose support and opinions we value—are asked to help, in the following way, as the post-bag becomes heavier each month: Please let us have your DX gossip, your pet aversions, your odd remarks, as profuse as you like, in the body of your letters. But please list the DX worked, band by band, separately and at the end thereof.

If you have heard JT1AA working CR8AC — that's gossip and worthy of note, whatever band it happened on; news of new countries or new stations on the air; your own results with that new aerial system; the fact that YK1AT has been worked on five bands . . . all good "DX Commentary" stuff. But the actual list of stations worked (and please omit all except the unusual ones) can well be separated from the rest of the gen. and presented quite separately at the end of the letter.

We, for our part, will reorganise this Commentary accordingly, so that the reader does not have to wade through long lists of calls worked in order to extract the odd news item.

And now we have to remind you that the coming deadline is **first post on Friday, February 14.** The calendar doesn't give us much grace this month, so don't be late. Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1—please use this and no other form of address, as it expedites handling of our mail internally. And until we hear from you again, Good Hunting, 73 and—BCNU.

SSB Topics

THE G3MY MIXER UNIT — QUERIES ANSWERED—NOTES AND NEWS

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

IN describing the G2NH exciter in the last "SSB Topics," in the December issue of SHORT WAVE MAGAZINE, the writer's object was to introduce a Single-Sideband equipment which had an acceptable standard of performance, and yet was both easy and economical to construct. The queries, comments and suggestions have been arriving in an almost continuous stream and provide a good indication of the current interest in simple SSB equipment. Many of our correspondents have asked for additional information related to the construction of supplementary equipment that can be used with the basic exciter. This month it is the turn of G3MY, who has contributed notes on his very useful high-level mixer unit which permits the "Single-band only" operator to work on the other amateur bands.

The G3MY Mixer Unit

The basic unit was designed to convert a 3.8 mc lower-sideband signal to 14, 21 or 28 mc upper-sideband output. Other units have been constructed for output in the 160- and 40-metre bands. At G3MY, separate models are used for each band, but it is known that other operators have built band-switched models which cover the five bands in the HF range. (On 3.8 mc the mixer is by-passed.) The arrangement used by G3MY allows the desired mixer unit to be connected into circuit by a simple plug-and-socket combination. (A common power supply feeding all the mixer units is incorporated in the 160-metre unit.)

Circuit Considerations: The original prototype unit used two stages; a mixer and a crystal oscillator. The combination worked quite well, but did not provide enough output fully to drive the parallel 807's in the G2MA-type linear amplifier used at G3MY. The addition of the grounded-grid buffer stage cleared this trouble and permitted the exciter to be operated at a much reduced gain setting, with a consequent improvement in overall linearity. The circuit is shown in Fig. 1, and a unit built to this design can be used for heterodyning a signal from 3.8 mc to any other band in the 1.8 to 30 mc range. The only changes necessary for the different bands are the values of L and C for the tuned circuits and the injection-frequency to the mixer stage. The circuit arrangement is straightforward and there are no snags or tricks which can cause difficulty in the construction or operation of the unit.

The mixer (V1) operates with the SSB signal fed to the control grid and the heterodyning voltage to the cathode. Both feeds are at low impedance; the SSB signal (10 volts peak is sufficient) is taken from the coaxial line connecting from the exciter. The injection voltage is supplied *via* a link winding on the crystal oscillator anode coil.

During the design stages considerable thought was given to the possibility of spurious signals being

Table of Values

Fig. 1. Circuit of the G3MY Mixer Unit

C1 = 0.1 μF paper
C2, C5, C9 = 100 μμF variable
C3, C4, C10, C11, C12 = 0.01 μF disc ceramic or similar
C6 = 0.005 μF mica
C7 = 15 μμF silver mica
C8 = 100 μμF silver mica
R1, R3, R4, R6 = 100 ohms
R2 = 820 ohms
R5, R7 = 47,000 ohms
R8 = 5,000 ohms 1-w.
RFC1, RFC2 = Any small RFC (1.5 mH or higher)
APC = 68 ohm ½-watt resistor wound full of 22 swg.
Xtal = *See Table 1*
L1, L2, L5, L6 = Suitable coils with link windings for the band in use.
L3, L4 = Suitable coils with link winding for the correct injection frequency (*see Table 1*)
V1 = 5763, or 6CH6
V2 = 6CH6, or 6BW6
V3 = 6CH6, 5763 or 6CL6

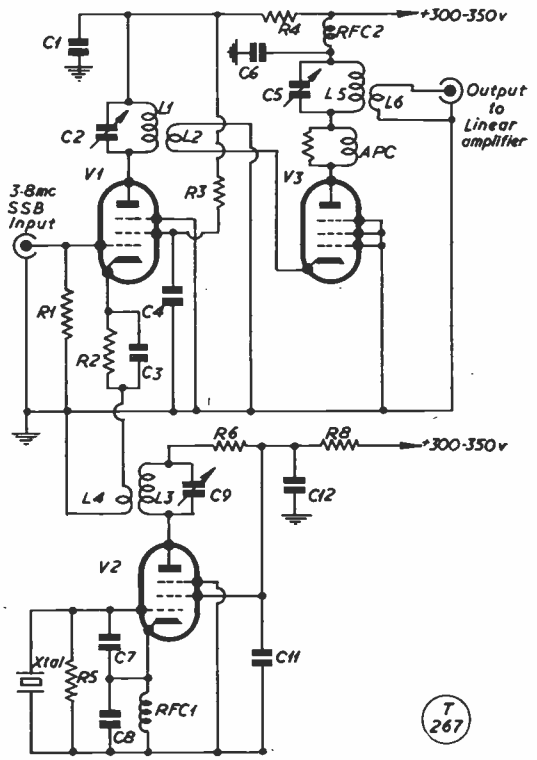
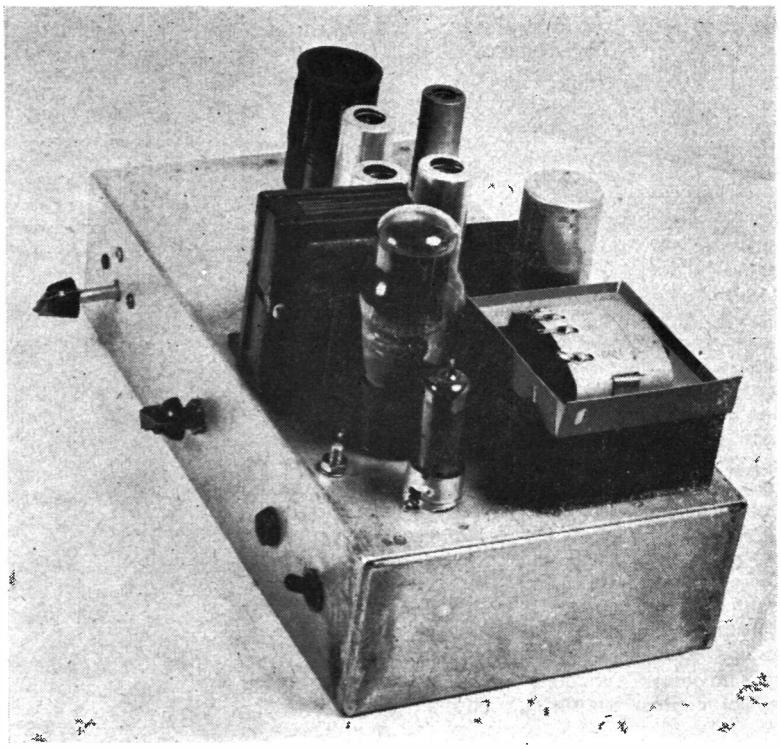


Fig. 1. The G3MY high-level Mixer Unit, discussed in the text. The SSB signal is fed to the control grid of V1.

generated by unwanted harmonics of the oscillator beating with the signal-frequency and its harmonics. To avoid trouble of this nature, the oscillator was first tried in the overtone circuit with the crystal oscillating on its third-harmonic. The output was insufficient for correct mixer operation, so use was made of the conventional harmonic-type circuit. Careful checks and actual operating experience with the grid-plate oscillator (as given in the circuit diagram) have shown that the spurious problem is not as serious as anticipated. High-Q tuned circuits are incorporated in the oscillator and mixer stages, and these, combined with link coupling and the correct drive and mixer injection voltages, ensure a low level of distortion products in the output signal. The crystal-oscillator frequencies and the correct output harmonic for each amateur band are shown in Table I. As a lower-sideband output is produced by the G3MY exciter (exactly as the G2NH model), it is necessary to invert the sideband for the 14, 21 and 28 mc bands. This is accomplished by the "difference" mixing technique, the oscillator output being higher in frequency than the SSB output signal. On 40 and 160 metres the lower-sideband output has to be maintained and "product" mixing is used—*see* "SSB Topics," December issue.



The G3MY 160-metre Mixer Unit for SSB operation, for which the circuit is shown in Fig. 1. The unit is complete with its own power supply, which feeds all mixers in use at G3MY. A plug-and-socket arrangement is used for inter-connection.

The buffer-amplifier circuit is similar to other grounded-grid boosters that have been described in previous "SSB Topics."

Chassis Layout: This is not at all critical, and the only point to watch is possible RF leakage from the 80-metre input socket (and grid lead) to the output circuit. The physical layout will depend largely on personal choice of chassis size and how the unit is to be integrated with the other equipment in the station. The photographs show the Top-Band model, which is complete with the power supply unit.

Operating Conditions and Initial Adjustments: The input level required for correct mixer operation is about 10 volts peak. In cases where drive is at a premium, the 100-ohm grid resistor (R1) can be increased in value to 500 ohms, or a tuned circuit with link coupling from the exciter can be included in the mixer grid-circuit. The mixer-stage operates with a standing anode-current of about 10 mA (with no oscillator injection or SSB drive). With the oscillator working, the current should increase to 35-40 mA. SSB voice-input should kick this a further 5-8 mA on speech peaks.

The standing anode-current of the grounded-grid buffer stage will be about 10 mA. Full carrier or tone input will drive the current up to 45-50 mA. Under normal SSB speech operation, peaks of 25-30 mA are about right.

The only adjustment necessary (other than tuning) is to set the coupling between L1 and L2 for maximum output. With the unit working correctly, the output should light a 5-watt bulb to more than full brilliance on voice-peaks. These operating conditions ensure a very low level of spurious products in the output signal.

Query Department

First, to answer the many readers who have asked for information on the routine tune-up procedure for the G2NH exciter. Our correspondents rightly point out that as the carrier is suppressed, it is necessary to feed audio into the exciter to provide drive for tuning the mixer anode circuit, the Class-A buffer and external high-level mixer or linear amplifier. The drive for tuning can also be obtained by arranging for a "controlled leakage" of carrier round the sideband-filter and carrier suppression circuits. This method is often more convenient than providing an audio signal and has the added advantage of producing a form of AM signal (carrier *plus* one sideband) which can be used for communication with the uninitiated. The circuit has been taken from the description of the WIJEO exciter (page 53 of *Single Sideband for the Radio Amateur*) and is shown in Fig 2. The amount of carrier insertion is controlled by the potentiometer R3, and

the controlled "carrier leakage" is coupled to one grid of the balanced mixer (V4 in the original circuit, p.538, December issue).

Next, a query relating to netting procedure. No control circuits were included in the description of the exciter, and several readers have questioned the control facilities necessary for netting and for normal operation.

SSB operating practice dictates the need for very accurate netting, as all stations in a round-table normally work on *exactly* the same frequency. (This does not apply in the 14 mc band for contacts with the U.S.A., where it is usual for the DX operators to work outside the U.S. phone segment, *e.g.* above 14300 kc.) The method of zero-beating a wanted station, as used for CW and AM operation, is just not good enough for SSB, as the netting must be correct to within a few c/s. The procedure adopted by most SSB stations is to "talk themselves on frequency." The receiver is tuned to the wanted station or stations, or to the desired frequency for a CQ call, and the exciter is switched on (preferably on lower power) with the linear off and the receiver operating normally. The VFO is then tuned to the wanted frequency under "talk" conditions; the transmitter being on "net" when the received signal sounds normal.

The control functions for netting can be included in the control circuits for normal operation. The system used at G6LX is to key the transmitter for voice-control by means of a blocking bias, which is used to cut off the balanced-mixer, Class-A buffer stage and linear amplifier. This bias is also used to mute the receiver on transmit and is controlled by a fast-acting multi-pole change-over relay. For netting, a potentiometer is included which permits the bias level to be adjusted to the balanced-mixer and Class-A buffer stages. The final linear amplifier remains blocked and the receiver is open during netting. The modifications necessary for blocked-bias keying of the G2NH exciter are shown in Fig. 3. The bias (100 volts negative) is obtained from a simple unregulated power supply which is mounted on the main power-supply chassis. The voice-control circuits are fully described in the various SSB handbooks, and any of those shown are suitable for working with the control methods suggested for normal manual or voice operation.

Several readers have, quite rightly, queried the circuit diagram for the carrier oscillator as shown in the G2NH description. In the circuit given on p.538, December, the anode of the oscillator valve is shown directly connected to the cathodes of the balanced-modulator (V3).

As mentioned on p.605, January, there should have been a coupling condenser in this line; a value of 50-100 $\mu\mu$F is suitable.

A reader has asked for details of suitable surplus crystals for use in the exciter, and in particular he would like to know the "Channel" numbers recommended for optimum performance. This point was fully covered in the original article and it is not possible to specify exact frequencies, because the availability of "surplus" crystals varies from locality

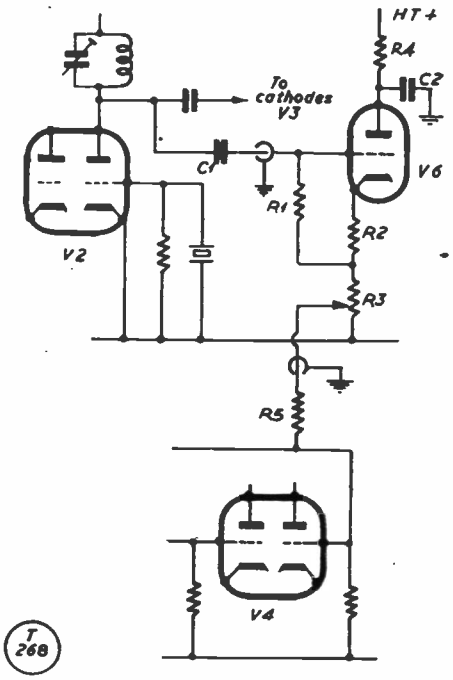


Fig. 2. Carrier re-insertion — see text. This is for tuning up on the G2NH SSB Exciter, described in the December issue. Circuit elements not numbered are as given on p.538 of that issue.

Table of Values

Fig. 2. Circuit for carrier re-insertion

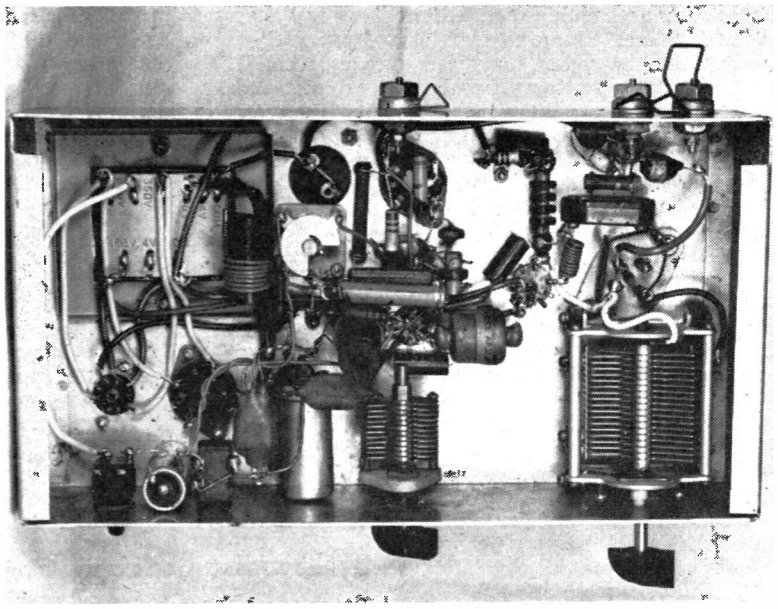
C1 = 47 $\mu\mu$F
C2 = 0.01 μF 400v. paper
R1 = 100,000 ohms
R2, R4 = 1000 ohms
R3 = 20,000-ohm carbon potentiometer (carrier level)
R5 = 200,000 ohms
V6 = (*Cathode follower*) any suitable triode.

to locality. A very complete listing of "surplus" crystal frequencies related to "Channel" numbers appeared in *CQ* for January, 1957. (Henry's Radio, Ltd., have been able to supply sets of four crystals for the G2NH design.) A further query relating to crystals was raised during a recent 3.8 mc round-table, and this refers to the methods of grinding IF-type crystals, as mentioned in the original article. The general opinion is that etching is safer than grinding, as it is less likely to affect the activity of the crystal. Having damaged several crystals by attempts at edge-grinding, the writer can confirm that this procedure requires considerable skill.

A further query, this time from Belgium, where it seems that the G2NH exciter is already well known. Our correspondent suggests that a three-stage speech amplifier is unnecessary, as he finds that a single 12AT7 fed from a crystal microphone gives more than adequate gain. This is probably correct, but three stages were suggested and tests indicated that there is only a small amount of gain in hand when the exciter is used with the D104 type of crystal

microphone.

The last question this month comes from a well-known CW operator who specialises in winning contests. He has been listening to SSB and feels that he would like to give it a try. The G2NH exciter, in conjunction with a high-level mixer and his present PA (converted for Class-AB1 operation), appears to meet his requirements, provided that it can be used for CW as a second-string exciter. For CW operation it is necessary to insert full carrier, which requires that the additional cathode-follower valve is incorporated in the exciter (as shown in Fig. 2). The exciter must also be keyed, and the grid-blocked method, as shown in Fig. 3, is very suitable. Care must be taken to ensure that, as the power amplifier is correctly biassed for linear operation, it is not over-run under key-up conditions. As the blocked-bias facilities are available for the PA when working SSB, it should be possible to devise a simple circuit to include a cut-off bias which is keyed in sympathy with the exciter.



Wiring layout under-chassis of the G3MY Mixer Unit, of which full details are given in the text.

The Top Band Nets

As briefly reported in "SSB Topics" for December, the Monday night get-togethers (2200 GMT, 1930 kc approx.) have taken place as a regular feature of G-sideband operation. Some excellent inter-G multiway contacts have been reported, but generally conditions have not been as good or consistent as expected. Because of this, many of the stations which appeared on the first few nets have become discouraged and now consider that it is not worth while joining the "regulars."

From the transmitting aspect, overseas activity on 160 metres has been *nil*, but receiving reports have come in from Antwerp, Malta, Munich, Paris and Stockholm. SWL reports have also been received from listeners in the U.K., and these, combined with "worked" and "heard" information provided by G-SSB stations, gives a good indication of how the conditions on 160 metres vary from hour to hour and from place to place. For example, at times contacts over 50 miles have been almost impossible, whilst 10 minutes later the band has opened with all signals S9 or better. QSO's over the path between Derbyshire, Swansea and London have been quite good, with only a few misses due to band conditions.

The prize for the outstanding signal goes to G3KEU (Swindon), the runner-up being G3MY. Every report received gives special mention of G3KEU, who erected a 270-ft. aerial and built a separate transmitter for the tests. SWL Adler (Munich) reports that he was able to follow several contacts between G3KEU and G3MY, and also heard at least one round-table, which included G3COJ and G6LX. C.P.O. Bentley, on board an R.N. ship stationed at Malta, listened every Monday evening and logged G3KEU on five separate occasions! He also heard G3COJ, G3MY, GW3EHN and G6LX during the evening of November 18. From Stockholm, SWL Jasson lists G3KEU and

Table I

(Input in all cases is 3500 to 4000 kc, Lower Sideband.)

OUTPUT FREQUENCY	OUTPUT SIDEBAND	CRYSTAL FREQUENCY	HARMONIC	INJECTION FREQUENCY
14000 — 14350 kc	*upper*	9000 kc	× 2	18000 kc
		6000 kc	× 3	
21000 — 21450 kc	*upper*	8333 kc	× 3	25000 kc
		6250 kc	× 4	
28200 — 28700 kc	*upper*	8050 kc	× 4	32200 kc

G3MY as outstanding, but did not hear any other British stations. Reports from Antwerp and Paris list all the "regulars," but again mention G3KEU and G3MY as the most consistent signals. It's the same story from Glasgow, Aberdeen, London, Exeter and Brighton.

A full list of the stations which were worked or heard is given below. This includes AM and CW stations which were in contact with the SSB group during the Monday evening nets. A special word of thanks is due to these operators for their co-operation and to all the SWL's who sent in such detailed reports.

The nets have stirred up considerable interest in SSB working, and for this reason alone have been well worth while. It's now up to the individual operators concerned to decide if they should continue. G2DAF, Lancashire (SSB); G2JF, Kent (AM); G3COJ, Berks. (SSB); G3CWB, London (SSB); GW3EHN, Swansea (SSB); G3FIH, Somerset (SSB); G3FRN, Salop (CW); G3HAE, Durham (SSB); G3ILD, Darlington (SSB); G3IRP, Surrey (SSB); G3JEL, London (AM); G3JJG, Surrey (AM); G3JKY, Kent (AM); G3KEU, Wilts. (SSB); G3KXT, Surrey (AM); G3MY, Derbyshire (SSB); and G6LX, Surrey (SSB).

News and Views

G3JKY is ex-VS6DN, and is at present active on 160 metres. A new all-band SSB transmitter is planned as a replacement for the present stop-gap AM rig. G3IJI (Cornwall) recently spent two weeks in London, where he visited G3IRP and G6LX. He believes he is the only SSB station in the West of England and, until his visits, had never seen any sideband equipment other than his own. GM8CH (Glasgow) is in a similar position, but a visit is planned to GM3CIX. G2DAF (Preston) started on SSB for the first of the 160-metre nets; he was so impressed by the results that he rebuilt his exciter and is now active on the other bands.

G2AO (Malvern) does *not* agree with the SSB group using frequencies on Top Band that are clear from commercial interference. He points out that SSB is a form of transmission that can compete with interference, and the clear spots should be left to the CW and AM operators. (Sorry, OM, but you have missed the point; 160 metres is a *shared* band and checks made before the nets started showed how much damage SSB could do to a commercial circuit.) Thanks also to G2NS (Bournemouth) for the very comprehensive list of commercial stations that share Top Band with us.

GC5ZC (Guernsey) was active on 3.8 mc during the Christmas holiday and gave many of the newcomers (and some OT's) their first SSB contact with the Channel Isles. G6FO has been monitoring some of the evening 3.8 mc nets and is very impressed by the operating standard and slick working made possible by voice break-in methods.

G3DAR (Bradford) is new to SSB and is active on 3.8 mc. Welcome also to G3KQR (Hampton Court), who has a filter-type transmitter. Another newcomer is G3BGR (Worcester), who has a very clean-sounding signal on 80 metres. G3WP has taken some interest in SSB and has raised a number of questions for the query department. Some of these were answered in the December "Topics" and the balance will be cleared next issue. (Sorry, OM, for the delay.) G3COJ reports that EI3J is new to Sideband and is at present on 14 mc. G3MY passes along the news that G3LGS (Bradford) has just started on SSB; he also mentions that G3HEB (Crowle) is another newcomer. GW2DUR/GW3LLU have a joint moan about European and North African stations working in the American phone band when that band is open for the DX. They also query the status of DSB for DXCC. (The ARRL do not differentiate between SSB, AM, DSB or FM for the purposes of their awards and regard them all as "Phone.")

SM6SA, reporting for the first time, provides the news that the Sideband habit is catching amongst the Swedish DX fraternity. The latest to succumb is SM5KP, who has a KWM-1.

G2BUJ, F7AN and others have suggested an SSB meeting to be held in London during the Spring. Various ideas have been put forward, but a Conversazione or Dinner seems to be the most popular. The next step is to see how much support would be forthcoming and to arrange for a committee to do the organising. Any offers? If you think it a good idea, please let us know. We shall be glad to lay on such an event.

DX Notes

In recent weeks a number of new countries have appeared for the first time on SSB, and many of the operators on the country-worked ladder have jumped a few rungs nearer the magic 100. From out of the blue, W2JXH, sending in his first report to "SSB Topics," topped the list with 99 worked. He followed this up by working ET2US and VS2DB to make his score 101 countries worked two-way SSB. Congratulations, OM, and now good luck with those QSL's!

VS6BE confirms that the SSB transmitter loan scheme is working very well and the equipment is at present going the rounds of the several interested stations in Singapore. The transmitter was built by W6UOU and has so far been used by VS5AT, KH6KS/KB6 (Baker Island), W6UOU/KX6 and VS2DB. Othes news of VS6 stations mentions a new sidebander, VS6AZ, and the movements of two of the original SSB group: VS6CW is now VQ4GX, and VS6DA has moved to Cyprus, where he is active as ZC4DA.

VS4JT reports that he will stay in Sarawak until mid-1949; he is active most mornings (GMT) and works 10, 15 and 20 metres. From VK3AEE is news of another new country on SSB; this is Viet-Nam and the call in use is XV5A. (The ARRL do *not* count this for DXCC.)

YA1AA has been active recently and gave many SSB operators a new one. He will be on from time to time during the next few months. GW2DUR and GW3LLU were among the lucky ones who collected both YA1AA and KH6KS/KB6. HS1A expects to stay in Siam until June; he can usually be found near 14325 kc most afternoons.

Table of Values

Fig. 3. Circuit for blocked-bias keying

C1,	C3 = 0.01 μF disc ceramic	R4 = 10,000 ohms	
	C2 = 0.25 μF	R5 = 500 ohms	
	C4 = 0.006 μF mica	R7 = 100,000 ohms	
R1,	R6 = 1000 ohms	SW1 = Local control switch or relay	
	R2 = 33,000 ohms	SW2 = Net switch	
	R3 = 100,000 ohms, net gain	Key = for CW operation	

Israel is yet another country where there is a little SSB activity. During a short visit recently VE3MR looked up several of the 4X4 stations and has now sent a 10A exciter, VFO and Slicer to 4X4DK. In Kuwait, MP4KAC and MP4KAM are new converts to SSB. ET3GB is also new with 30 watts DSB, but has licence trouble, due to a new ruling about non-Ethiopian nationals and residence permits.

There is little news to report from the Americans, other than to mention the FP8AR expedition, which caused quite a stir several months ago. Other trips to FP8 are planned now that the licence situation has been cleared with the local authorities. VP2AZ is ex-G2ZB and is now very active from the Leewards with a 25-watt filter-exciter and vertical dipole. VP4TE should be on soon with a new all-band exciter which is *en route* to him with W5MX/MM. This exciter is a gift from W1BDF, who heard that VP4TE was having trouble getting enough parts to rebuild for SSB. HC2AGI is another newcomer, and during a recent contact he mentioned that he hopes to improve his signal into Europe by a fixed beam and higher power. KG4AQ is ex-KL7AIZ and will be at Guantamo Bay for at least two years. Several HK stations have converted to SSB.

Nearer home, Monaco and the Aaland Islands are in the news again. As previously reported, 3A2AH has rebuilt and worked his first two-way SSB contacts on November 30. He was not too successful at first, and it was left to F7AN and G3IRP (who arrived in Monaco on December 2) to put 3A2 on the Sideband map. Operating a joint station under the calls 3A2BX and 3A2BW, they were active for three days on 15, 20 and 80 metres (100% SSB). Two transmitters were used: a Collins KWM-1 and a 20A *plus* GG parallel 6AG7 linear. Results on 3.8 mc were excellent, but the going was tough on 14 and 21 mc, due to the "usual" poor conditions experienced by Monaco expedition stations. (Local terrain is the problem.) Just before Christmas, 3A2AH added a linear to his exciter and is now putting a very good signal into most parts of the world. CN8IF is due in Monaco and will operate SSB for a few days; his call is likely to be 3A2BY or 3A2BZ. OH2OJ, whose recent expedition to OHØ was reported in the December issue of SHORT WAVE MAGAZINE, has now taken up residence in the Aaland Islands on a semi-permanent basis. He has been issued with the call OHØNC and is 100% SSB on 14 mc.

Finally this month, a few words about activity on the LF bands. On 7 mc, the separate segments used in the States and Europe, combined with broadcast interference, makes contacts with North America difficult. There are, however, many parts of the world that can use the 7.0 - 7.1 mc section, and QSO's have been possible between G on one side and ZS, VQ4 and VS6. On 3.8 mc, the usual crop of W, VE and VO cross-band (75-80) contacts with Europe are taking place under winter conditions. In addition, QSO's have been reported with VQ4, CN8, MP4 and HZ. A newcomer to the band is ZB1CZ, who puts a very fine signal into the U.K., during the late evenings. (Thanks to all the U.K. and overseas readers who have passed along information for these notes.)

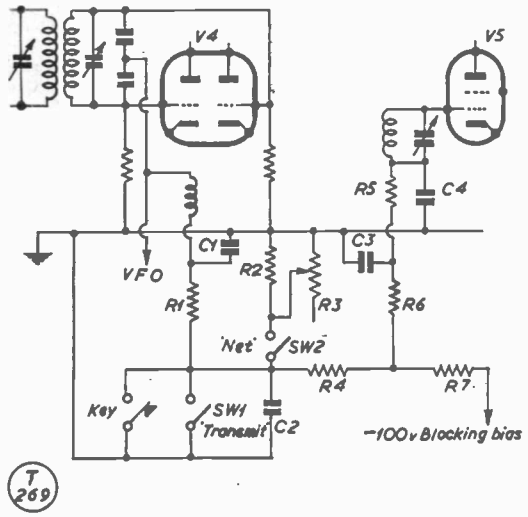


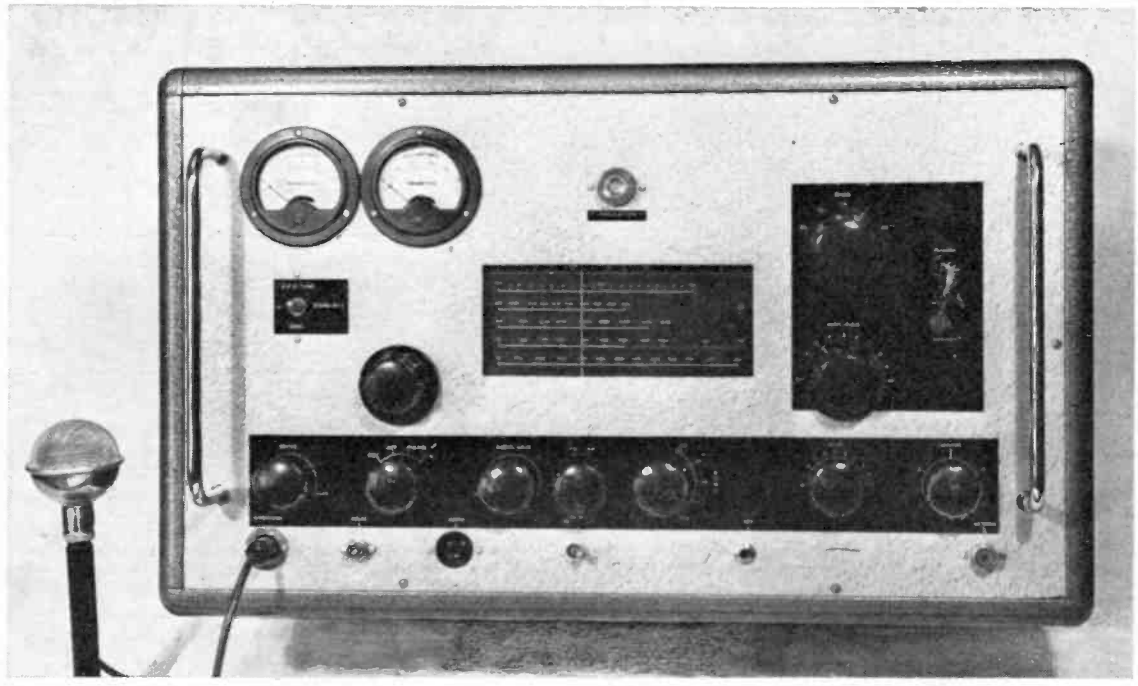
Fig. 3. Circuit arrangement for blocked-bias keying of the G2NH Exciter, elements not numbered being as shown on p.538, December. A simple unregulated power pack is built in as an additional section of the main pack, and about 100v. negative is provided.

World-Wide DX Contest

It is announced that this year's *CQ* SSB Contest will take place from 1800 GMT March 15 to 1800 GMT March 16. No further details are available at the moment of writing, but the rules are believed to be exactly the same as last year—*see* p.539 December 1956 issue of SHORT WAVE MAGAZINE. We hope to confirm the rules and give some further information on the Contest as a short note somewhere in the March issue, as the next "SSB Topics" is not due until April—for which the closing date is March 3. So, till April 4, 73 to all Sidebanders, *de G6LX*.

"VHF BANDS" HELD OVER

Because of poor VHF conditions and low activity having produced few reports for this issue, together with heavy pressure on space and an urgent demand from A.J.D. for his (last) summer's leave, "VHF Bands" is being held out this month. Deadline for March will be February 19, addressed to A. J. Devon as usual.



The front panel appearance of the Minimitter "Mercury" is particularly handsome and striking. The PA section controls are on the right, the VFO knob upper left, below the manual send-receiver switch, and the controls along the lower finger-plate are, left to right: Drive setting, Phone/CW switch, Audio gain, AM/FM selector switch, and Exciter band-change switch. The coax socket to the right of the microphone inlet is for the external send-receive control, and then from left to right are the power input socket, the mains on-off switch, the key jack, and the aerial coax connector at the extreme lower right. The indicator lamp centred above the VFO dial is the modulation tell-tale, and the meters read PA grid and plate current.

The "Mercury" Five-Band Transmitter

CW-AM/FM PHONE AT 95 WATTS RF OUTPUT, 10-80 METRES—SELF-CONTAINED FOR POWER AND MODULATION—FULLY SCREENED

MAGAZINE TEST REPORT

BECAUSE it attracted a good deal of attention at the Radio Hobbies Exhibition, we have recently had for test a production model of the new Minimitter "Mercury" Transmitter, and these notes are based upon experiences from the user point of view.

As can be seen from the photographs, the "Mercury" is a very handsome piece of equipment—and there is nothing "mini" about it. Essentially, there are four separate units — VFO-Exciter, RF power amplifier, Modulator with speech amplifier, and Power supply — designed and built as such, which are married up on a strong open chassis, drilled and tapped for the positioning of each unit. This brings out the first point in the construction: Units can be extracted separately by removing a few self-tapping screws and disconnecting the appropriate tag-strip, to which all inter-connecting wiring for that unit is taken.

Throughout, general wiring and all external leads are run in screened cable bonded to chassis at several points. Each unit is not only separately mounted, but individually screened; as one photograph shows, screening is complete on the undersides of the four main units. These covers also remove separately, so that if necessary it is possible to get at the under-chassis wiring of a particular unit without having to take it right out—though this is not *quite* as easy as it sounds, because the Transmitter in the piece is pretty heavy. It weighs some 65 lbs. withdrawn from the cabinet, which encloses the chassis completely, and itself weighs about 25 lbs., making a total all-up weight of 90 lbs. However, one strong man

can handle the chassis alone, and it is an easy lift for two.

The mechanical finish is excellent, and a critical examination of the "Mercury" shows it to be a well-engineered job all through.

VFO-Exciter

The primary frequency-generating circuit (*see* Fig. 1) is a series-tuned oscillator on the 3·5 mc band, the capacity network of which is separately switched to give adequate spreading of all bands on the VFO dial; the "window" of this is approximately 7in. by 3in., with horizontal scales.

Output from the oscillator-buffer unit feeds a series of four frequency multipliers, which are "free-running" in that they operate in zero-bias Class-B, and are driven on both grid and screen; these valves are 6AQ5's, with 6AM6's in the oscillator-buffer stages. Coupling inter-stage is through pre-tuned wide-band circuits, and the level of RF drive is remarkably constant over a wide VFO frequency swing. The actual RF drive output can be controlled by varying the screen voltage of the first 6AQ5 — V3 in Fig. 1.

A high level of drive is available on all bands—in fact, one is constantly "throttling back" on the drive, as far more can be given than is needed for the RF amplifier unit used in the Transmitter. (This is because the VFO-Exciter, being obtainable separately as a basic unit, has been designed to give ample RF output in all conditions under which it is likely to be used.)

After a short warm-up period, oscillator stability is very good and it was found—in actual operation on the air—that the beat-note did not change by more than a few cycles when going over from receive-to-send. This is very important when trying to work CW DX on a band like 28 mc, under congested contest

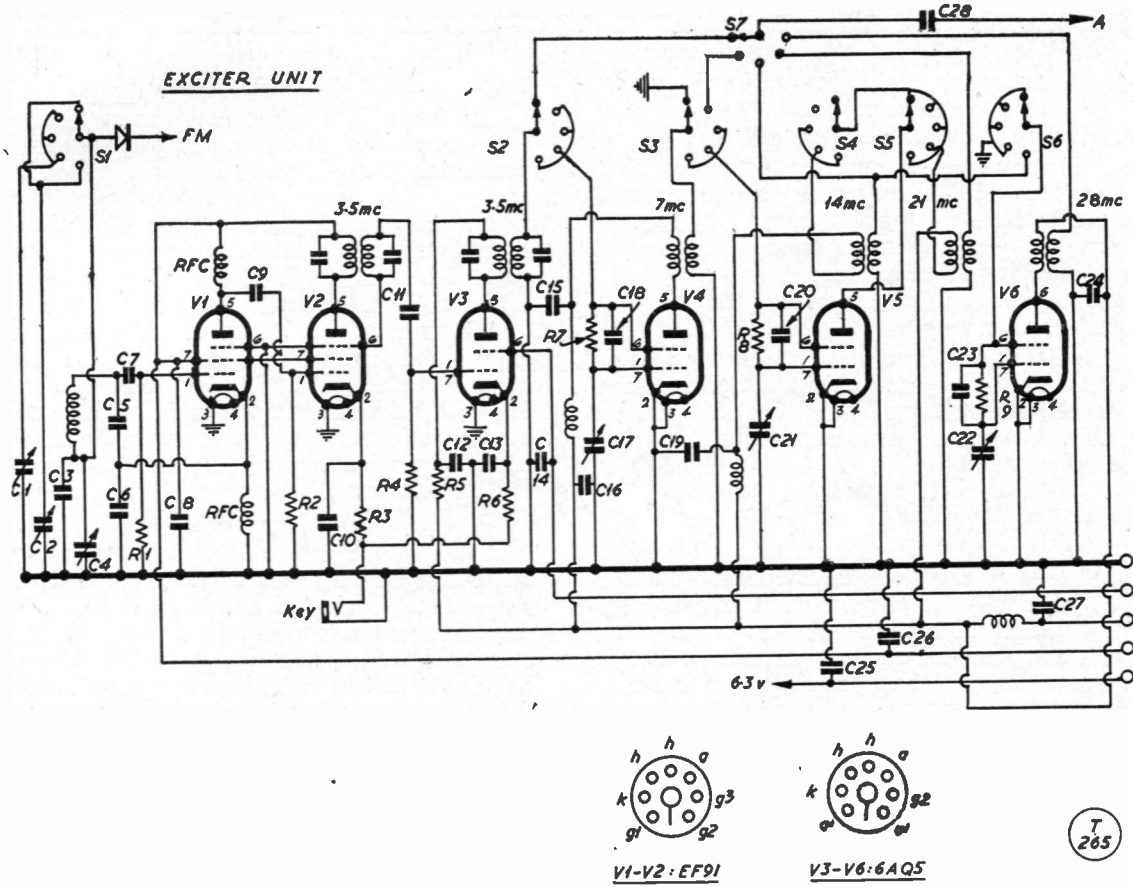


Fig. 1. The VFO-Exciter section of the Minimitter "Mercury," giving ample drive output on five bands into the PA, the successive stages being V3-V6, with V1-V2 as the VFO-buffer unit. The switching controls V1 separately for netting, or checking oscillator performance, and the level of grid drive is set by a variable resistor in the screen of V3 — see Fig. 4. On CW, the note is clean and sharp, keying being in the cathodes of V2, V3. In the switching, S1-S7 are ganged.

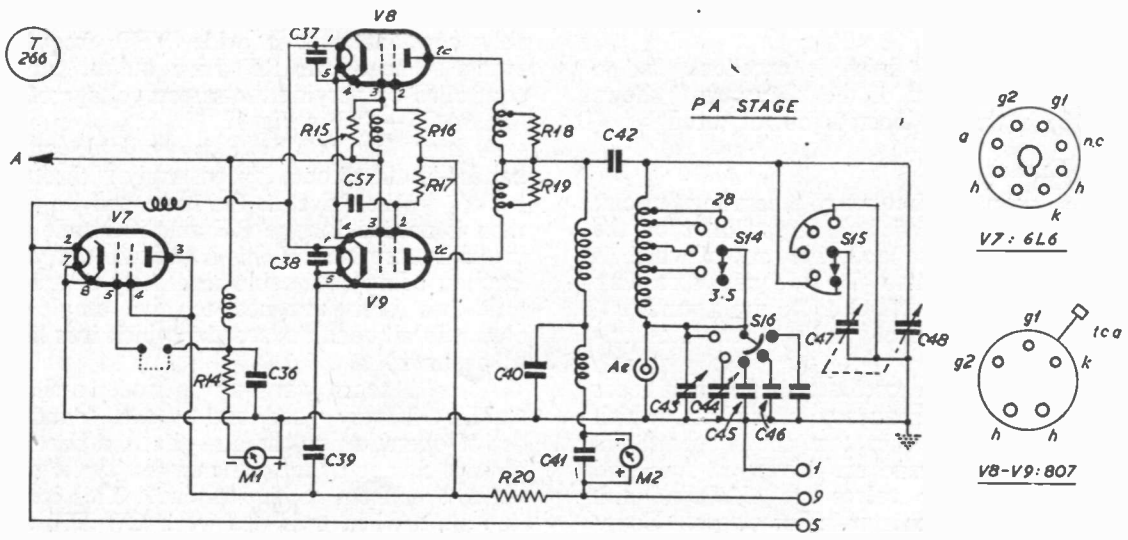


Fig. 2. The PA unit in the Minimitter "Mercury," using a pair of clamped 807's in parallel, operating at 700 volts, CW and phone. Inputs up to 120 watts can be obtained, with full modulation on telephony. The tank circuit incorporates additional capacities, brought in by S16, to ensure correct matching into the load. Components used are amply rated for the operating voltages involved, and the RF choke in the plate circuit presents a sensibly constant impedance over the whole switching range.

conditions. On the lower-frequency bands, there is no perceptible change in the beat-note, and keying is clean and sharp all through.

The only snag encountered with the VFO was a "drizzle" on the note after a long series of bench tests—this was due to a faulty contact on one wafer in the Exciter band-change switch and, once it had been located, was easily put right by the application of a little Painton switch cleaner.

The VFO net-control is on a spring-loaded switch, and is very convenient to operate; the function switch also gives control of the oscillator alone, when it can be heard only in the 3·5 mc band.

RF Power Amplifier

In the layout, the lead marked "A" in Figs. 1 and 2—the drive from the Exciter output into the PA grids—is kept quite short, a matter of a few inches only, as the units are in adjoining boxes and the inter-connection points "look" at one another. The circuit diagram suggests that the RF is "taken for a walk," but that is not so.

As can be seen from Fig. 2, the PA runs a pair of 807's in parallel and their tank circuit consists of a band-switched pi-section matching network; a refinement is the addition of padder capacities, brought in separately as required, to ensure accurate output loading on all bands. The PA is safeguarded by a 6L6 clamper, and the standing PA current when undriven is about 60 mA.

The PA unit is completely screened, above and below chassis (*see* photograph) with a ventilation grille immediately over the valves. The tank inductances are of generous dimensions, with a heavy band-change switch, on short leads and positive in action. Since parallel-feed is used, the vital component in this part of the circuit is the RF choke. A "soak" run on each band at full power, into an artificial load, failed to reveal any weakness in this choke. The PA was also punished, under the same conditions, with much heavier modulation than one would normally use in actual operation on the air, and nowhere in the PA was there any sign of distress or flash-over.

It was in the course of these tests that the RF power output was measured, the load consisting of a specially made 75-ohm non-inductive resistor rated at 150 watts, with a calibrated RF thermo-ammeter; for 120 watts DC input to the PA, it was found possible to get 90-95 watts RF output on all five bands. There is a distinct warming-up of the PA box at this power level, and it is advisable to ensure that there is good ventilation round the Transmitter. For long runs, a detachable grille in the top of the cabinet (*not* the PA box cover) can be removed for more air circulation. The heating is not enough to distress the valves or cause any component failure, though it might be a point to watch in a tropical climate.

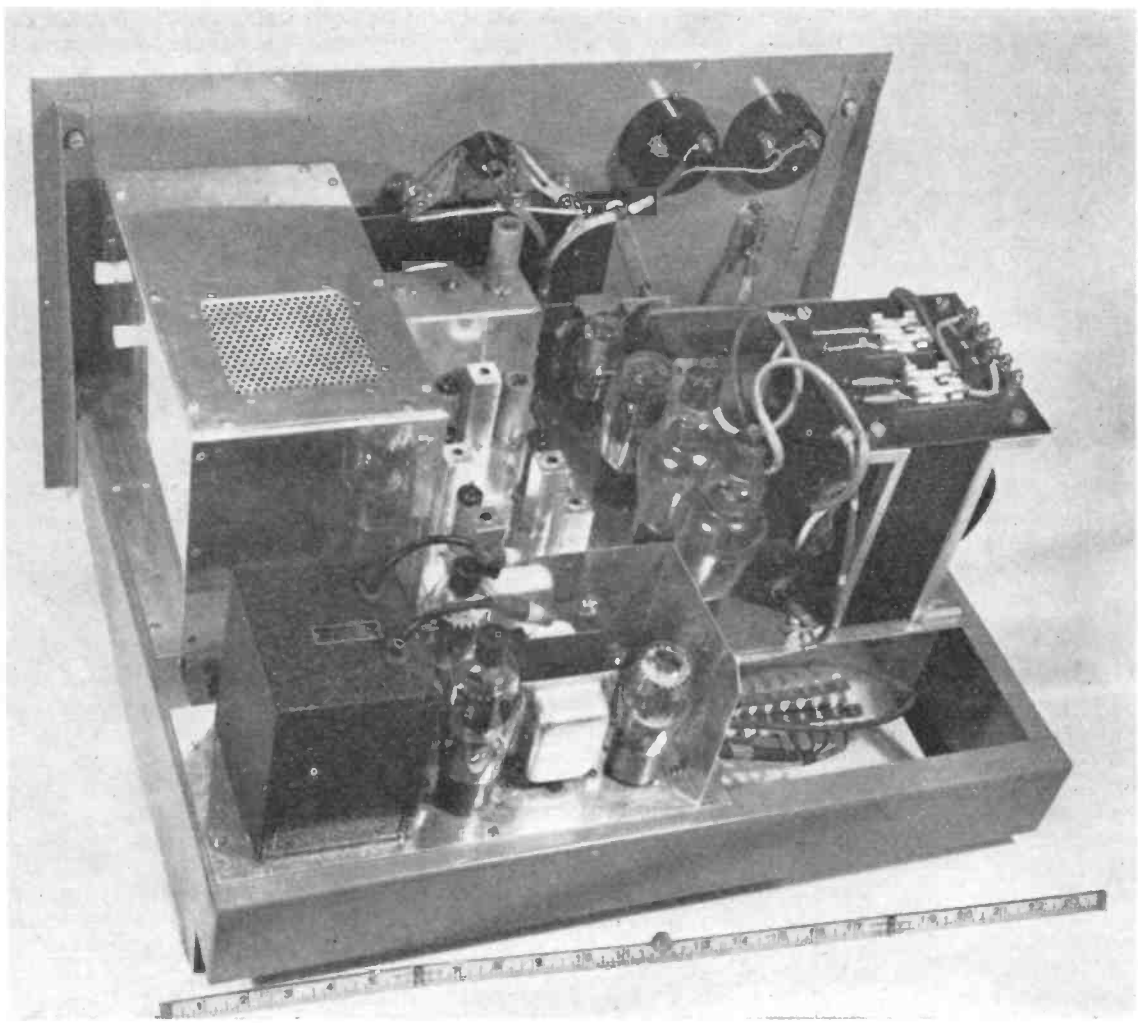
Speech-Amplifier-Modulator

The circuit complete of this unit is shown in Fig. 3. For its size and simplicity, it gives a remarkable output—up to 80 watts of good quality speech from a crystal microphone. This is ample for the PA at any attainable input and, in fact, there is always plenty of audio gain in hand. The speech-amplifier circuit is arranged to attenuate frequencies above about 4,000 cycles/sec., so that the amplifier performs mainly within the normal speech range.

Because the modulating transformer T3 is fixed-ratio for an output impedance of 3,500 ohms, it follows that there will be some mis-match at PA inputs different from that which the manual gives as the optimum; this is of no great consequence, and will not affect quality noticeably, as the modulator can be run at a lower input (by audio gain adjustment) and the transformer itself is heavy enough to stand any degree of mis-match likely to be encountered in practice.

An ingenious tell-tale indicates the modulation setting: the main HT fuse is a panel lamp, and the depth of modulation is correctly set on the audio gain control when this lamp just flashes on speech peaks. If the modulation is pushed too far, the lamp (as a fuse) will blow —and you have to start all over again!

On modulation, with full gain, the output



Inside view of the Minimitter "Mercury," which is designed and built as a series of four main inter-connecting units. At left foreground is the speech amplifier-modulator section, with the fully screened-off PA unit immediately behind. The VFO-Exciter assembly is to the right of the PA section, with the VFO itself in the screened box; to the right again is the power supply section. In operation, the "Mercury" is absolutely hum-free, both acoustically and on the carrier on telephony at all settings of the audio gain control. The foot-rule in the foreground, for size comparison, is opened out to 24 inches.

of the speech amplifier is quite hum-free, and in the ordinary way it is not possible to detect (except on a bench monitoring circuit) when the Transmitter is switched from CW to phone. A suitable screened microphone input plug is provided, and will take any of the usual screened-cable sizes.

Power Supply Unit

From the circuit at Fig. 4, it will be seen that a single large power transformer supplies two rectifier sections and all LT feeds. On the HV side, this transformer is rated at 800-0-800v. As shown by one of the photographs, it is of very generous dimensions and, in fact, it runs virtually cold to the touch at full load. As checked under varying load conditions, the regulation is excellent.

At 235v. mains supply connected to the 0-240 input taps, the HT on the plates of the PA under full CW loading is 680v. With modulator on, and the same loading, this drops to 660v. Under full modulation (talking into the microphone) the voltage swing at the main HT feed point is less than 50v.—that is, when the modulator valves are being swung through the full current range. The mercury-vapour rectifiers are, of course, working well within their ratings under these conditions, as can be seen from the relatively light "blue-glow" that they show when the Transmitter is on full power.

As the VFO-Exciter unit takes HT feed from the LV section of the pack, and the regulation of the mains transformer itself is so good, there are no voltage variations of any consequence on the Exciter, while the VFO itself is supplied *via* the stabiliser.

The HT unit is adequately fused throughout —and the fuses are accessible, no more than the cabinet cover having to be removed to get at them—while another very useful feature is an automatic-delay circuit which prevents any live switching until the mercury-vapour rectifiers and valve heaters have had an adequate warm-up period.

Switching and Controls

Any good amateur-band transmitter must be capable of being operated either by direct switching, or by full relay control. This is duly provided for on the "Mercury," in that

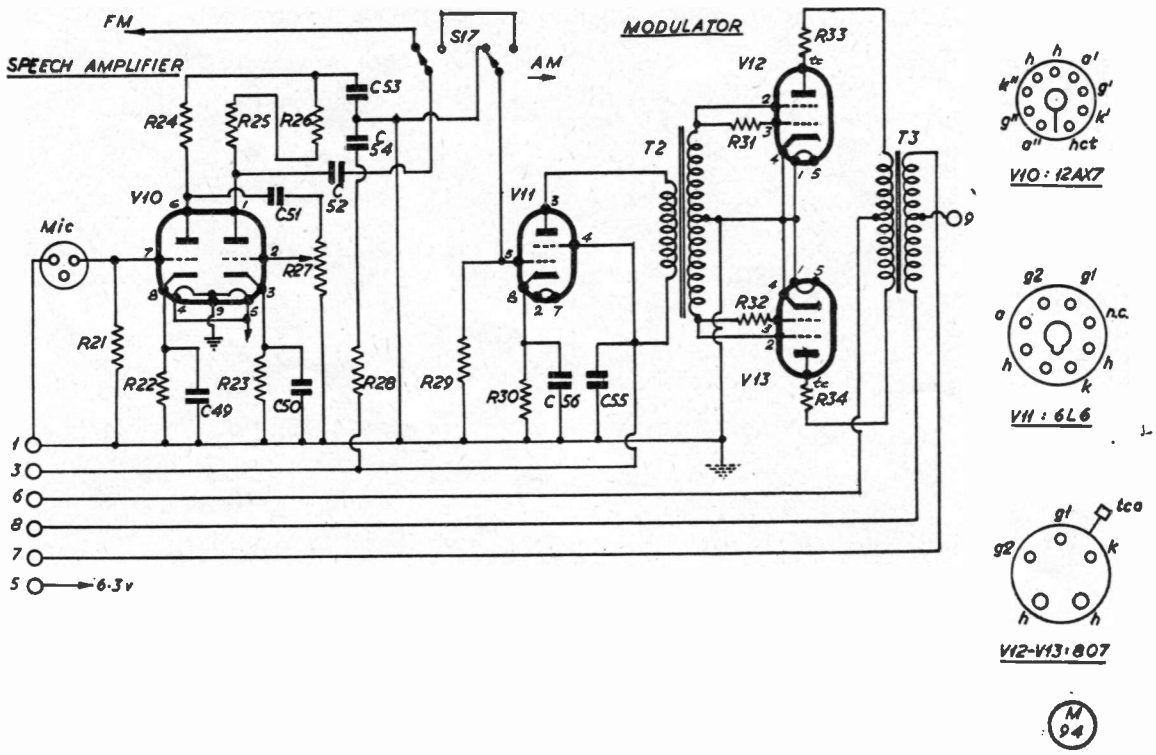


Fig. 3. The speech amplifier-modulator circuitry used in the Minimitter "Mercury." The amplifier is entirely hum-free in operation and provides enough drive for full swing at the grids of the modulator valves, V12-V13, which are 807's in zero-bias Class-B, capable of up to 80 watts of audio into the fixed-ratio modulation transformer T3. In the FM mode, V11-V12-V13 are dead, and the output of the speech amplifier is taken direct to the VFO — see Fig. 1.

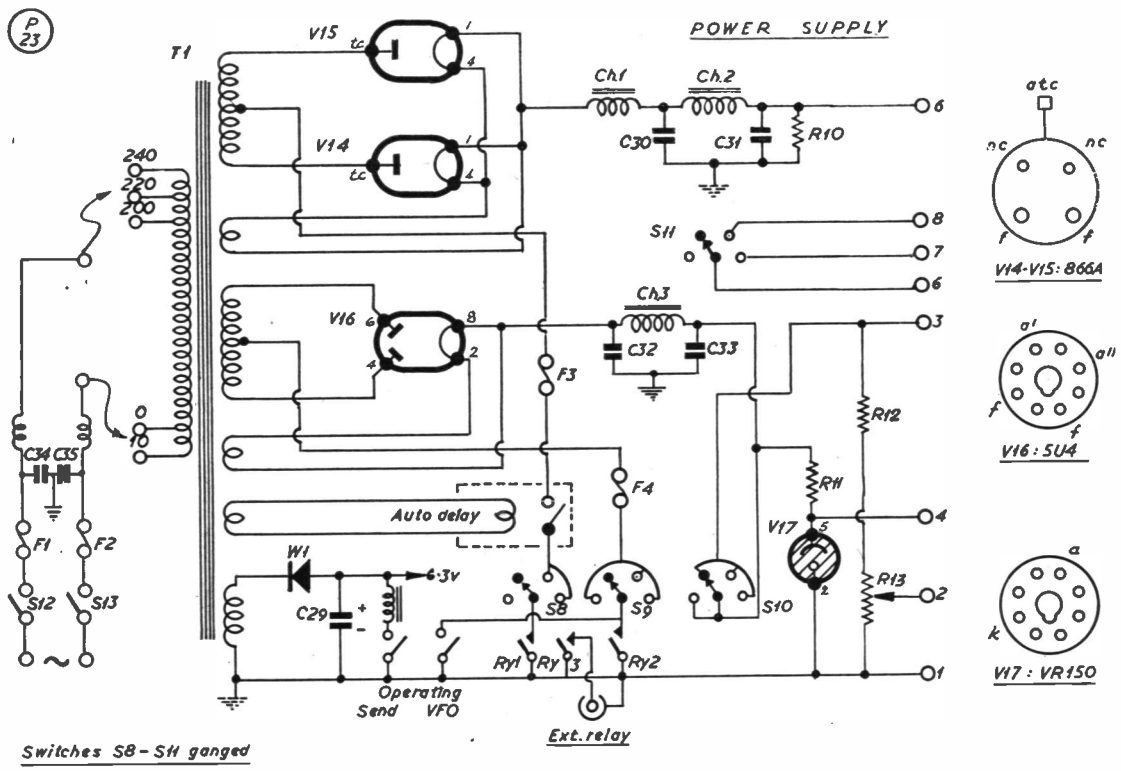


Fig. 4. Circuit of the Power Supply side of the Minimitter "Mercury," which is generously rated for its purpose, with all components running comfortably within their ratings. The mains input wiring incorporates a screened filter unit and a DPST on-off switch — which in itself is a not unimportant refinement. The auto-delay arrangement is for the switch-on protection of the mercury-vapour rectifiers.

it can be brought up either by a send/stand-by switch on the front panel, or by external relay, through the station switching, for which an inlet is fitted. For complete operation (CW and Phone, with relay control) five external connections are necessary—and so that there can be no confusion or horrid accidents, these five connectors are all made different, and the necessary plugs and sockets are included in the pack-up.

The knob controls are given with the front-view photograph; all work smoothly, and are clearly marked. Once one has got accustomed to the control layout and functioning, setting up for any band is quick and easy, and, as the PA knobs are scaled, their positions can be quickly repeated once the adjustments for the different bands have been found.

FM Telephony

As mentioned earlier, the Transmitter can be run on FM phone, which is a very useful facility in those locations where a steady carrier does not cause TVI, but amplitude-modulated phone produces a pattern. The whole trick in getting good speech output on FM phone (which is brought in automatically by the switching when it is wanted) lies in the setting of the audio gain control, which controls the deviation when on FM.

Because the FM is applied to the primary oscillator circuit, the frequency of which is multiplied up from band to band as one goes from 3·5 to 28 mc, it follows that the setting for correct deviation on 80 metres is very different from what it is for, say, 15 metres. Hence, if using FM, a change of band means that the deviation must be re-adjusted, and this can only be done by checking, at the output frequency, on the station receiver; for working with normal receivers, *i.e.*, those not fitted with a discriminator for FM reception, it is as well to keep the deviation as low as is consistent with readable speech. The adjustments for FM are quite easily made, and it is only a matter of practice to get them right.

Aerial Connection

The RF output tank circuit constants are such that for full and proper transfer of energy

Table of Values

Figs. 1-4. Circuits of "Mercury" Transmitter Units

C1, C17, C21, C22 = 30 $\mu\mu$F, var.
C2, C4 = 50 $\mu\mu$F, var.
C3, C47, C48 = 150 $\mu\mu$F, var.
C5, C6 = .001 μF, silver-mica
C7, C9, C11, C18, C20, C23, C28 = 100 $\mu\mu$F, ceramic
C8, C10, C12, C13, C14, C15, C16, C19, C24, C25, C26, C27, C34, C35, C36, C37, C38, C39, C40, C41, C57 = .001 μF, ceramic
C29, C49, C50 = 50 μF, 12v. elect.
C30 = 4 μF, 1000v. paper
C31 = 8 μF, 1000v. paper
C32 = 16 μF, 450v. elect.
C33 = 32 μF, 450v. elect.
C42 = .002 μF, 2000v. mica
C43, C44 = 340 $\mu\mu$F, var.
C45, C46 = 500 $\mu\mu$F, 2000v. mica
C51, C52 = .03 μF, paper
C53, C54 = 32 μF, 350v. elect.
C55 = 8 μF, 350v. elect.
C56 = 50 μF, 50v. elect.

R1, R2 = 47,000 ohms
R3 = 330 ohms
R4 = 22,000 ohms
R5 = 1,500 ohms
R6 = 560 ohms
R7, R9 = 33,000 ohms
R8 = 27,000 ohms, 5-w.
R10 = 30,000 ohms, 50-w.
R11, R14 = 7,500 ohms, 2-w.
R12 = 3,500 ohms, 7-w.
R13 = 20,000 ohms, variable drive control
R15, R16, R17 = 47 ohms
R18, R19, R33, R34 = 100 ohms, 1-w.
R20 = 20,000 ohms, 50-w.
R21 = 3.5 megohms
R22, R23 = 3,300 ohms
R24, R25 = 270,000 ohms
R26, R28, R31, R32 = 20,000 ohms
R27 = 0.5 megohm audio gain control
R29 = 560,000 ohms
R30 = 200 ohms, 5-w.

VALVE COMPLEMENT

VFO-Exciter:	RF Amplifier:
V1, V2 = EF91	V7 = 6L6
V3-V6 = 6AQ5	V8, V9 = 807
Speech-Amplifier/Modulator:	**Power Supply Unit:**
V10 = 12AX7	V14, V15 = 866A
V11 = 6L6	V16 = 5U4G
V12, V13 = 807	V17 = VR-150/30

from the Transmitter into an aerial, the loading imposed must be between 50 and 100 ohms, and the aerial connector as fitted is intended for coaxial line.

This means that for best results—indeed, for almost any normal amateur-band application—an external matching circuit, or aerial tuning unit, is essential. It is absolutely no use pushing a random length of wire into the orifice marked "Antenna" and then hopefully tuning up; there will almost certainly be a violent mis-match, and most of the RF power will be dissipated not in the aerial, but inside the PA box, with disastrous consequences.

For our on-the-air tests with the "Mercury," the aerial tuning unit as described in the January, 1957, issue of *Short Wave Magazine* was used, with entirely satisfactory results. In fact, that particular tuning unit might have been made for this Transmitter. For testing on artificial load, a coax line connected to the output measuring devices.

There is another reason why the aerial must be matched correctly to the output tank: Any reflection back of RF power from the load will make the whole Transmitter "RF hot," with the risk of nasty burns from unexpected metal parts, and the certainty of getting RF into the speech-amplifier circuit, making phone working impossible.

If this Transmitter gives the slightest trouble on these two counts—which during our tests were checked to see if they could be made to happen—it is because there is a bad mis-match between the output and the aerial, and for no other reason. The contingency is easy enough to avoid, and is dealt with here to emphasise its importance.

Subject of TVI

Many readers will be interested in this, which could be made the subject of a long article to itself. But as most will know, TVI can still be caused by a transmitter which by every test is of itself blameless — due, of course, to bad design of the TV receiver, which may be wide open to signals which have no relation to the frequency to which it is supposed to be tuned.

Hence, it is not possible to say that this, or any other, transmitter is absolutely TVI-proof in the accepted sense. Certainly, every reasonable anti-TV precaution has been taken in its design and construction and the harmonic output is at a very low minimum—and in a bad TV location, this could be eliminated almost to vanishing point by the use of a suitable low-pass filter unit, fitted externally, in the output lead between transmitter and aerial tuning network.

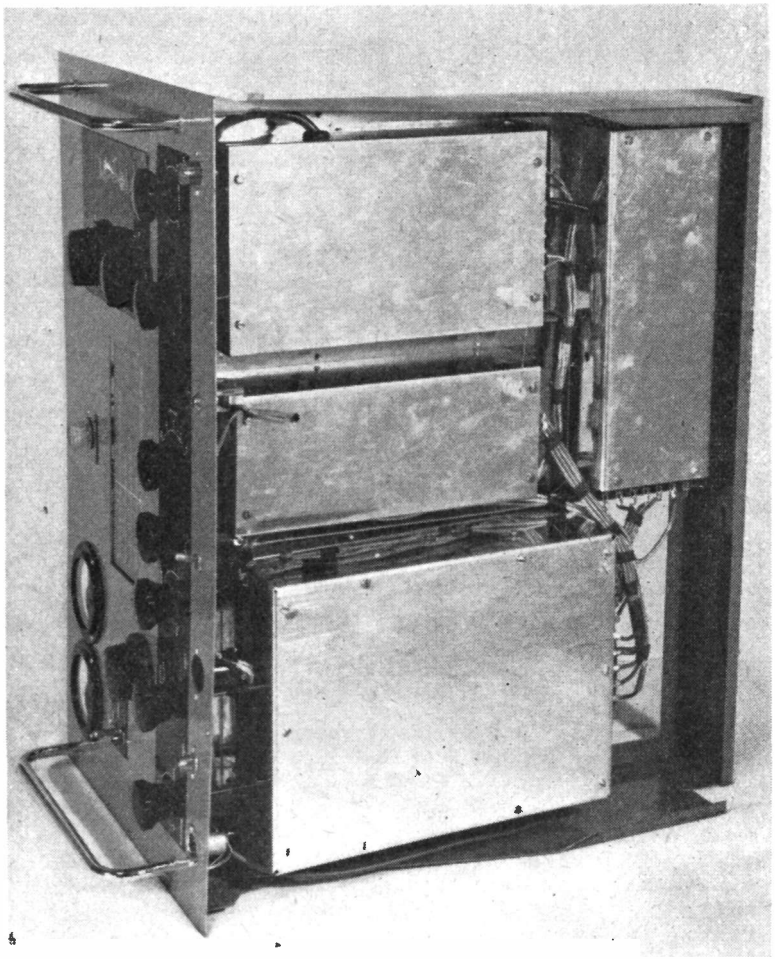
What it comes to is that in some locations the "Mercury" could be absolutely TVI-proof, while in others it might not. In view of the many different TV channels now in use, the varying types of TV receiver, and the differing levels of TV field strength from place to place (and even between different parts of the same locality) no honest opinion could go further than to say the Transmitter ought to be TVI-proof, it could be—but it might not be, for reasons that are not the fault of its design.

For those wanting a more definite statement on the freedom of the "Mercury" from spurious or harmonic radiation, what we can say is that throughout our bench tests the Transmitter stood beside a VHF/FM broadcast receiver tuning through 20 mc in Band II, and no interference that mattered was noticed in the course of many hours' work on the "Mercury," through all five amateur bands. Though this would be enough for most people, it still does not guarantee that a harmonic might not be thrown on the vision-channel in some remote part of the country, where the signal comes from a low-power TV slave transmitter.

Some General Points

The Transmitter arrives beautifully packed in a heavy wooden crate with carrying straps, and is so protected by the method of packing that it should travel anywhere without getting damaged. The valves are separately packed, inside the cabinet, and apart from fitting them and connecting up power, microphone and aerial, no other preparations are necessary—except one—for getting the Transmitter on the air.

The exception is that before the valves are fitted and any connections are made to the Transmitter, the instruction book should be carefully studied ; from it a great deal can be learnt about the working, setting up and operation of the Transmitter. The " Mercury " manual is not perhaps the best of its kind that we have seen, but it is quite adequate and gives all the essential information. So much so, that we have intentionally refrained from discussing here points that are covered in the manual.



There is not much to see underneath the " Mercury " because each of the four main units are completely boxed in for screening purposes. The section at lower left is the under part of the power supply unit, above it is the exciter section and above that is the screening for the PA chassis. To the right is the speech amplifier-modulator side. All inter-connecting wiring is run in screened cable, bonded to chassis. The various units are secured to the main chassis by self-tapping screws, and all fastenings are readily accessible.

Conclusion

For those who have in mind for their operating requirements a band-switched CW / Phone transmitter, covering all five communication bands, running up to full power, of modern design, well engineered and of very good appearance, we have no hesitation in recommending the new Minimitter " Mercury," as described and illustrated here, which is manufactured by The Minimitter Co., Ltd., 37, Dollis Hill Avenue, London, N.W.2, and sells at £103 19s. complete. It is also available in the four units separately at a total cost (for the four) of £80 15s. cash, or on h.p. terms.

POSTAGE, PLEASE !

We must again remind readers that all enquiries demanding Editorial attention should be accompanied by an s.a.e. The same applies to correspondence with contributors. Though enquiries are dealt with as expeditiously as possible, there are periods during the month when all the staff time available has to be devoted to the preparation of the following month's issue.

SCIENCE MASTERS' EXHIBITION

This year the Members' Exhibition of the Association of Science Masters was held at the University of Leeds, during January 1-3, and was organised by G3LQJ, assisted by G3LZZ and G3MAB. One of the exhibitors was G3HMO (Stowe School), on ranging the Satellites, and among other visiting science masters holding amateur call-signs were G2FLH, G2QM and G6BX.

NEW QTH's

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

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The Other Man's Station

G2HKU

JUST about ten years ago, we showed here the old station of G2HKU, owned and operated by E. H. Trowell, 4a Clyde Avenue, Sheerness, Isle of Sheppey, Kent — he started up immediately after the war, using first HT batteries only and later a motor-generator run off a car battery. Then came 230v. *DC* mains which, though a good deal more convenient than the generator, still limited G2HKU more or less to QRP operation.

His mains supply is now AC, like everyone else's, and the station has been completely rebuilt, to the very neat and convenient layout shown in our photograph: Top, left to right, modified Class-D wavemeter and two absorption types, harmonic indicator covering television channels, loudspeaker, and Top Band aerial tuning unit; next is the VFO and buffer/PA stage for this band. Last item is the aerial tuning unit for 3.5 to 30 mc, consisting of a Z-match with built-in forward and reflected power ratio bridges, artificial 72-ohm load and a multiple low-pass filter.

At bottom, left to right, comes the main receiver, a modified HRO with new "front end," an El-bug and valve keyer, and the main transmitter. This is VFO and buffer on 3.5 mc. with switched wide-band couplers, to an 807 PA stage with clamper valve, running 50w. input. Inside the console are the various power supplies and the modulator, which is 6SJ7-6J5-6SN7-P/P KT66. The microphone is a crystal insert and the stand is home-made from a Sellotape tin and copper tube.

The "console" itself is made from floorboards, hardboard and quartering; either side is a control panel with switches applying mains voltage to the various power supplies, with indicator lights above the HRO. The whole assembly is relay controlled by a foot switch, with an emergency switch in full view of anyone in the room. The station operates with the television receiver two feet from the transmitter without interference on any band.

The equipment is mainly home-built, the HRO and Class-D wavemeter having been modified to the standards of today. The aerial at present in use is a multi-band dipole built on the lines of a recent *QST* article; the system involves two tuned traps resonated at 7150 kc. Only a 66-foot section of this aerial is horizontal, due to space limitations, with the remaining 21 feet folded down at each end.

The present DX standing is 134 countries in 36 Zones, with 45 states worked, and certificates are DXCC, BERTA, WBE, WAC, WNACA, WABC, DUF-1, WAE-1, WASM and CAA, with RCC and FOC membership and a 25 w.p.m. VERON code proficiency certificate. Interests are working DX, building aerials and general construction, with a home-built outside workshop available. The site at G2HKU is only a few hundred yards from the sea—most of the gear was lost in the flood of 1953; hence the re-build! One compensation for that is a nice conductive, salty ground!

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Deadline for March Issue : FEBRUARY 14)

IT looks as though a very interesting feature of the coming season will be inter-Club work with mobiles in the field. Even one mobile among the membership of a Club lends added interest to the traditional Sunday-morning net, and we know of several who are already thus equipped.

We would therefore like to hear from secretaries of those Clubs who are in a position to put one or more mobiles on the road, with details of the band worked. (Top Band is at present the ruling favourite.) We envisage a mobile outfit as a means of invading another Club's territory (and Top-Band net !) from the adjoining region, and it might be possible to organise an inter-Club mobile contest, if enough support is forthcoming.

Please let us know, therefore: *(a)* Does your own Club boast a mobile, either as a concerted effort or as the property of an individual member ; and *(b)* On what band does it work?

And so to this month's Activity Reports, rather more numerous than usual on account of their absence last month, when this space was taken for the annual MCC review.

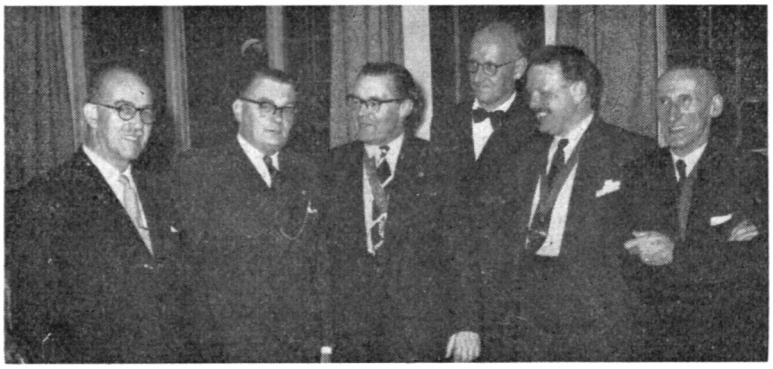
At **Scarborough's** recent AGM, G3GBH was put into the presidential chair, once again ; G8KU was elected hon. secretary, a post he has now held for many years. Having a very reasonable surplus of cash-in-hand, the Club was able to buy itself not only a Panda Cub, but also a lot of other useful gear as well. And there is still some money left ! This happy state of affairs has been achieved by keeping some large tea-chests at Club Hq. for the accumulation of unwanted fragments of copper, brass and aluminium, and it is the sale of this non-ferrous metal which has built up the balance. We give this idea space here because it is something other Clubs could do equally successfully ; keep the different metals in separate boxes and, when they are full, get the scrap merchant along to give a price for them. As they have found at Scarborough, it's amazing how it mounts up ! Their meetings are every Thursday, 7.30 p.m., at Chapman's, North Street, and one of their most prominent members is G3DQ, well known in the north-east.

Ashington have recently had a change of secretary *(see* panel). They meet fortnightly (next dates February 10 and 24) in The Blue Room, Grand Hotel, Ashington, and hope to attract many new members in the New Year.

Bradford forward their new syllabus, showing a formidable series of meetings for 1958. On February 18 there will be a Junk Sale, and on March 4 a talk on Amateur Television by G3KLZ. Meetings are at 66 Little Horton Road, Bradford, with Morse instruction from 7 to 7.30 p.m.

Brighton continue to meet every Tuesday evening, 8 p.m., in the Clubroom at the Eagle Inn, Gloucester Road, Brighton, 1, where all visitors and prospective members are welcome. The **British Two-Call Club** does not hold meetings, but membership is open to all G licensees who hold, or have held, at least one overseas call-sign. Details from the hon. sec.—*see* panel.

Bury meet at the George Hotel, Kay Gardens, on the second Tuesday of each month—all are welcome. On February 11, G3EJF will be talking on The Elements of Radio Astronomy ; the March gathering will have TVI Prevention as its subject. **Calder Valley** report for the first time, although they have been in existence for two years. Started with a rented room one evening a week, they are now the occupiers of a five-roomed house ! They have three licensed members and others on the way, and will



Four well-known Amateur Radio clubs are represented in this photograph — Coventry, Midlands, Rugby and Slade — with G2AK of Slade in the centre of the group, between G5ML (left) of C.A.R.S. and G3HBE (right centre) wearing his chain of office as president of M.A.R.S.

be pleased to see anyone interested on Wednesday nights.

Cornish Radio and Television Club met in January and heard the tape lecture on Aerials by G6CJ. At the February meeting (no date given) there will be a tape lecture on Receivers, and in March the subject will be Transmitter Design and TVI. Tea is now served at 8.30 p.m. Meetings are at the YMCA, Falmouth.

Crystal Palace hold their AGM on February 15, and will also meet on Tuesday, March 4—at Windermere House, Westow Street, S.E.19, as usual. **Midland** will be holding a Morse class every Thursday at the British Red Cross Society, 16 Highfield Road, Edgbaston, 7.30 p.m., when G3HBB will be officiating. They are getting ready for the North Midland Mobile Rally, to be held at Trentham Gardens on Sunday, April 20—car park for 120 and room for everyone. Normal meetings, third Tuesday at the Midland Institute.

Liverpool have forwarded their News Sheet, "*5 & 9*," but as there is no information about their forthcoming meetings, we cannot propagate it. Recent events were their Construction Contest, a Children's Party and a Hamfest.

For the last seven years, Grafton have run a stand at the Islington Town Hall Handicrafts Exhibition. Here is the set-up for their most recent appearance at this event, with G3KQX working the DX and G2CJN, honorary secretary of Grafton, surveying the scene. With 25w. to home-built equipment, plenty of DX was raised in the 14, 21 and 28 mc bands. The Grafton Radio Society, of which G2CJN has been an active official for many years, is one of the most successful and progressive Clubs in the London area — it is surely the only one that meets regularly three nights a week, and always has done. Grafton also has an impressive record of success with the R.A.E., for which special classes are organised every year.

North Kent also circulate a *News-Letter*, in which a very informative *resumé* of a previous lecture is published. (In this case, it was a lecture-demonstration on the Jennings Electronic Organ.) Meetings are held on the second and fourth Tuesdays in the Congregational Hall, near Bexleyheath Clock Tower. Five films were shown on January 9; on February 13 there is a talk on Valves, and on February 27 the subject is Tape Recorders.

Plymouth continue to meet every Tuesday, 7.30 p.m., at the Virginia House Settlement, St. Andrews, Plymouth. **Purley** are together on the first Friday of the month at the Railwaymen's Hall, Whytecliffe Road, Purley.

Ravensbourne report new members and the opening of a beginners' class on Tuesday evenings. Normal meetings are on Wednesdays, 8 p.m., at Durham Hill School, Downham. G3HEV, the Club station, is on Top Band with an R.1155 and a BC-348.

Reading will meet at their Broad Street headquarters on February 22 (7.30 p.m.) to hear Mr. S. Woodward, A.M.I.Mech.E., on the subject of Selsyns and Desyns—of interest to rotary-beam operators.

Torbay mention that G3CMT is acting as their experimental manager; their Annual Dinner and Social is on February 22 at 7.30 p.m., for which tickets are available from John Oldway, 9 Hoyels Road, Paignton, or the hon. sec. On February 8, G3CMT will be talking on Aerials.

Wellingborough are gathering to hear about Basic FM Detectors (Mr. G. Abrams) on February 13, and about a home-built TV receiver (6-in. model) on February 27 — both meetings at the Silver Street clubroom, 7.30 p.m.

Wirral have now settled down in their new clubroom at 4 Hamilton Square, Birkenhead, where they assemble on the first and third Fridays at 8 p.m. (refreshments available). On February 7 they join forces with **Liverpool** for a Quiz, and February 21 is "Mystery Night." An R.A.E. course, with G3EGX as instructor, is under way, and G3CSG radiates slow Morse on the Top Band each Sunday at 1100.

Aldershot meet on alternate Wednesdays at The Cannon, Victoria Road, and their most recent meeting took the form of a discussion on the Club's future activities.

Barnsley announce a Junk Sale for February 14 and an "NFD Natter" for the 28th. They meet on the second and fourth Fridays, 7.30 p.m., at the King George Hotel, Peel Street. On January 10, G4JJ and his son gave a lecture-demonstration on VHF Transmitter Construction.

Clifton have their Constructional Evenings and Ragchews on February 7 and 21; a talk on Receiver

Alignment on the 14th, and a Quiz on the 28th. The Club Tx, G3GHN, was on the air on Christmas morning giving personal greetings to many members and friends. Meetings every Friday, 7.30 p.m., at the clubrooms, 225 New Cross Road, London, S.E.14.

Slade are to have a lecture on The Development of Magnetic Recording Tapes on February 14; on February 28, G3JZF will talk on the Design of Audio Amplifiers, and this will be preceded by a special meeting, to consider alterations to rules.

Surrey (Croydon) met on January 14 for a "different" programme called "Sound and Speech (including scientific fun with a tape-recorder)." The Club Dinner has now been fixed for Friday, March 7, at the Greyhound, Croydon.

Worthing will be holding their Annual Dinner on February 22 at the Channel View Hotel, Splash Point, 8 p.m. Meanwhile, Morse classes, technical instruction and practical work are a regular part of Club activities.

Cray Valley will have their AGM at the Station Hotel, Sidcup, on March 25, at 8 p.m. The business will include the usual presentation of the annual report and balance sheet, and election of the officers for the coming year.

Flintshire held their AGM in January, and elected GW2CCU chairman, GW3JGA hon. sec., GW3FPF treasurer. Meetings continued at 7.30 p.m. on the first Monday of the month, at the Railway Hotel, Prestatyn.

Nottingham (Amateur Radio Club) meet every Tuesday and Thursday at Woodthorpe House, Mansfield Road, where new members will be welcomed. Top-Band is being worked regularly from the clubroom, where there are good facilities for constructional work. Morse practice and discussions on all aspects of the hobby are a feature of meetings.

South Shields visited the Rediffusion Studios at Newcastle on January 29. The February meeting will include a talk by G3ELP and K. Sketheway on Aerials, Fixed and Mobile. Three competitions—for transmitting, receiving, and construction—started on January 1 and will be adjudged at the May meeting.

Stockport have recently had lectures on Feeder Termination (G2IG), The Leak FM Tuner (G3AYT) and The Manufacture of Accumulators (G3JRQ). On February 12 the subject is Hi-Fi, and on the 26th Neon and its Uses. All meetings at Blossoms Hotel, Buxton Road.

Enfield forward their excellent news sheet, *Lea Valley Reflector*, from which we learn that the January meetings included the AGM and a talk on Impedance Matching by G6OT. The February meeting will be a Film Show, on February 16, at the George Spicer School, Southbury Road, Enfield.

Grafton continue to meet on Mondays and Wednesdays for R.A.E. and Morse, and on Fridays for club night, at the Montem School, Upper Hornsey Road, London, N.7 February 7 is booked for a Junk Sale, February 14 for a Practical Evening, and there is a lecture by G2MI on the 21st. Visitors and new members will be welcomed to any meeting, at 7 p.m.

Leicester are holding an Open Night and CW class on February 10; on the 17th they will have lectures on Tx Design and TVI; and on the 24th an Open Night, followed by "A Matter of Interest," by G3DVP, whose lectures have the reputation of causing considerable discussion. The Club Tx is coming along, and it is hoped to issue a club magazine shortly.

At **Bournemouth**, the recent AGM resulted in the elections of G3HLW as chairman, G3JAU as hon. secretary, and SWL J. Glass as hon. treasurer. Of their present membership of 45, no less than 24 are licensed; meeting-place is the Cricketers' Arms, Windham Road, on Fridays, at 7.45 p.m., and the next is on February 7, the day we publish. Bournemouth's annual "hamfest" is dated for the next evening, Saturday, 8th, when a large attendance is expected; anyone wishing to be there should get in touch with G3JAU. *(Tel.: Winton 4078).*

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

ALDERSHOT: S. E. Hume, 25 Kingsway, Aldershot.
ASHINGTON: J. F. Wood, Teviotdale, Hagg House, Ellington, Morpeth.
BARNSLEY: P. Carbutt, G2AFV, 19 Warner Road, Pogmoor, Barnsley.
BOURNEMOUTH: C. R. Davies, G3JAU, 107 Talbot Road, Winton, Bournemouth.
BRADFORD: D. M. Pratt, G3KEP, 27 Woodlands Grove, Cottingley, Bingley.
BRIGHTON: R. Purdy, 37 Bond Street, Brighton 1.
BRITISH TWO-CALL CLUB: G. V. Haylock, G2DHV, 63 Lewisham Hill, London, S.E.13.
BURY: L. Robinson, 56 Avondale Avenue, Bury.
CALDER VALLEY: H. Chew, 6 Church Steps, Todmorden, Lancs.
CHELTENHAM: F. J. Dickenson, G3HVB, 372 Old Bath Road, Leckhampton Hill, Cheltenham.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
CORNISH: J. Brown, G3LPB, Waterworks, Penryn.
CRAY VALLEY: S. W. Coursey, G3JJC, 49 Dulverton Road, London, S.E.9.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
ENFIELD: V. Croucher, G3AFY, 15 Nelson Road, London, N.15.
FLINTSHIRE: J. Thornton Lawrence, GW3JGA, Perranporth, East Avenue, Bryn Newydd, Prestatyn.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
LEICESTER: R. Parry, G3HDG, 71 Braunstone Avenue, Leicester.
LIVERPOOL: W. D. Wardle, G3EWZ, 16 Mendip Road, Liverpool 15.
MIDLAND: P. G. Turton, 2 Holloway Road, Birmingham 1.
NORTH KENT: D. W. Wooderson, G3HKX, 39 Woolwich Road, Bexleyheath.
NOTTINGHAM: F. V. Farnsworth, 32 Harrow Road, West Bridgford, Nottingham.
PLYMOUTH: C. Teale, G3JYB, 3 Berrow Park Road, Peverell, Plymouth.
PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
RAVENSBOURNE: J. H. F. Wilshaw, 4 Station Road, Bromley, Kent.
READING: A. B. Hutchence, G3IKA, 12 Chiltern Bank, Peppard, Oxon.
SCARBOROUGH: P. Briscombe, G8KU, Roseacre, Irton, Nr. Scarborough.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTH SHIELDS: K. Sketheway, 51 Baret Road, Walkergate, Newcastle-on-Tyne 6.
STOCKPORT: G. R. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
TORBAY: G. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.
WELLINGBOROUGH: P. E. B. Butler, 84 Wellingborough Road, Rushden.
WIRRAL: H. V. Young, G3LCI, 9 Eastcroft Road, Wallasey.
WORTHING: J. R. Tootill, 113 Kings Road, Lancing.
WREXHAM: T. F. Corcoran, 3 Lea Road, Wrexham.

NEW METHOD OF CW RECEPTION DEVELOPED BY POST OFFICE

The problems of radio-telegraph reception have for some time been studied intensively at the Post Office Research Station, and, as a result, a new technique has recently been developed which, it is believed, will appreciably reduce the errors that occur in transmission. A number of papers covering this work were read before the Institute of Electrical Engineers in November, 1956, and the leader of the Post Office team, Mr. H. B. Law, has been awarded the "Kelvin Premium" in recognition of the contribution to scientific research contained in his offerings on the subject.

In this new technique, frequency-shift keying (FSK) is still used, but whereas in conventional equipment for the reception of such signals a limiter and discriminator are employed, the new method makes use of the fact that all the signalling intelligence is impressed both on the marking and spacing waves. In other words, the information in the mark-channel duplicates that in the space-channel. Consequently, if all the available intelligence is derived independently from each frequency and then combined, a double-diversity arrangement is obtained Frequency-selective fading conditions often cause trouble on radio-telegraph circuits, but using the new arrangement they can be turned to advantage—if, for example, the signal on the marking frequency has faded, there is a "second chance" of obtaining the required information from the spacing frequency. If, in addition, double-space diversity reception is combined with the new technique, the advantages of quadruple-diversity reception are obtained.

Some preliminary tests have recently been made between Australia and the United Kingdom which have confirmed that an appreciable reduction in transmission errors is likely to be obtained by this method. Arrangements are now being made with the Australian Overseas Telecommunications Commission for extended trials of this new technique on one of the London-Australia telegraph circuits.

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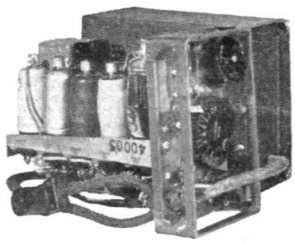

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SALE: HRO, power supply, 6 coils, speaker; would exchange for BC348, with cash adjustment. —G3HWU, 200 Quarmby Road, Huddersfield, Yorks.

SALE: AR88D in perfect physical and electrical condition, with manual and trimming tools, £45. "G4ZU" commercial beam, unused, in original packing, £11. Seen London area.—Box No. 1947, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE 358X, 1.5 to 30 mc, fine performer, power/pack, speaker, £9 10s. 0d.—J. Juleff, 41 Lesney Park Road, Erith, Kent.

QST, 1957, 25/-; KT66 (2), 20/-; ECC35, 35L6GT, 8/-.—R. Grain, 15 Waverley Gardens, Grays, Essex.

R107, £13 10s. 0d.; re-valved, re-aligned, calibration checked, S-meter, handbook, improved SM tuning, good order throughout.—J. J. G. Clayton, Crookham Lodge, Church Crookham, Hants.

WANTED URGENTLY: Service data, circuit diagram or any relevant information concerning the Hambander receiver. — E. J. Mannix, 2 Blacquiere Villas, Phibsborough, Dublin, Eire.

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You *must* be a good MORSE Operator to possess an Amateur Radio Transmitting Licence. A "slap-dash" 12 w.p.m. neither satisfies the authorities, yourself nor your operator friends. Morse operating is an exacting art unless your training is made simple and is based on sound fundamentals. For this reason the Candler System was invented to take the "grind" out of Code tuition and to turn a tricky subject into a pleasurable pursuit.

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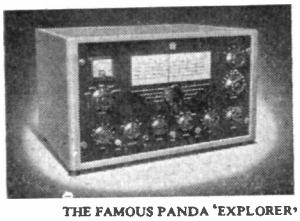

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COLVERN WIRE WOUND POTENTIOMETERS. 25 watts, 50k and 100k. Price 8/6 each.

AMERICAN ROTARY CONVERTERS. With cooling Fan Input 12v. D.C. Output 250v. at 90 mA. Completely suppressed. Brand new 19/- each. Plus P. & P. 3/-.

WHEATSTONE BRIDGE. Consisting of four stud switches: 0-10 ohms, 0-100 ohms, 0-Inf. Galvo-meter centre zero F.S.D. 2.5 mA. Ranges easily extended. Housed in oak cabinet 16 x 7½ x 6. Complete with instructions. 40/-. P. & P. 4/-.

WESTON 1 AMP RF METERS. 2 ins. circular. Brand new, 5/6. P. & P. 1/-.

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Also 6 v. input, 250 v. output at 100 mA, complete 4-pin vibrator, OZ4 rectifier. Fully smoothed, 25/6 each. P. & P. 2/6.

HIGH RESISTANCE HEADPHONES. Type No. 2, 4,000 ohms. Brand new 11/6 each. P. & P. 1/6.

BENDIX RECEIVER MN26.C. Covering 150-1500 k/s in 3 bands. Valves used 5-6K7, 2-6N7, 2-6J5, 1-6F6, 1-6L7, complete with switching motor and dynamotor. This superb unit has been modified for 12v. operation. With circuit. Only 80/-, carr. 8/6. Also 28v. model suitable for mains conversion, £3/10/0.

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SMALL ADVERTISEMENTS, READERS—*continued*

£45—LATEST MODEL Panda "Cub," original RF section, rebuilt modulator, pair KT 66's, completely separate power supply, 500v. or 250v. HT and separate 350v. for modulator; also Panda ATU150, with LPF. Buyer collects.—Hamer, 52, Seagrave Road, Coventry.

WANTED URGENTLY: Morse Code Records 33-78 r.p.m. — Please send details to A. B. Plant, 178 Clay Lane, Yardley, Birmingham.

EXCHANGE Garrard Automatic RC 120/4 amplifier, with bass and treble speakers, 6 new LP's, for HRO receiver, or similar.—Dennis Hall, 21 South Road, Dodworth, Barnsley, Yorks.

FOR SALE: Valves, Det. 25, 12E1, 15/-; KT66, SP42, 6F14, 85A2, 6FI, 8/-; 6F33, EF55, U50, 2050, ECC8, EF80, UD41, 6BX6, N78, 6BE6, 6/-; postage extra.—G. Whitby, 3 Lon Menai, Menai Bridge, Anglesey.

LG300 Tx, complete installation with companion power unit/modulator, as brand-new, £110. WANTED: Good AR88D with S-meter. Lancs. area.—Box No. 1946, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

28FT. STEEL LATTICE LOWER in two sections, 2ft. 6in. base, 6in. top, with or without rotating equipment, and 2in. dural driving shaft, giving maximum height of 40ft..—Box No. 1949, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MINIMITTER MULTI-Q, unwanted gift, £6. Labgear wide-band multiplier, removed from spare rig, £3 15s. 0d. Hallicrafter S36 receiver, 28-143 mc, AM/FM/CW, £26. Pair of 650-0-650v. transformers, £4 pr. All carriage paid.—Box No. 1949, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Labgear LG300, Mk. II, as new, complete with power supplies, modulator and remote control unit, £60. Panda "Cub" or similar QRP table-topper considered in part-exchange.—Box No. 1951, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WS21 TRANSMITTER/RECEIVER, covers 7, 21 and 28 mc, CW/Phone, complete with accessories, 6v. DC input, ideal for /M. Also Denco DCR-19 Rx, complete with new valves, but less coil turrets. Both in good condition. What offers?—G3FAU, 23 Shackledell, Stevenage, Herts.

EDDYSTONE S.640 for sale, £16. Buyer collects. London area. Bought last July for £30 from Universal Electronics.—Box No. 1952, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

B2 POWER SUPPLY, £5; B2 transmitter section, with coils and valves, £3, perfect. Crystals in holders, 3509, 3522, 3535, 3557, 7005 kc., 10/- each. — G8UA, 406 Higher Brunshaw, Burnley, Lancs.

REQUIRED URGENTLY: Woden Filament Transformer for 813, 10V/10a. Woden Filament Transformer, 5V/5a. c.t.; Woden 750-0-750v. 250 mA transformer, Woden 650-0-650v., 250 mA transformer, circuit data of Labgear LG-300 transmitter.—Box No. 1953, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS. READERS—*continued*

MUST SELL: HRO Senior, coils, speaker, p/pack, 50 valves, meters, coils, variables, many components. Offers? S.a.e. list.—G3DCT, 21 The Ridgeway, St. Albans, Herts.

W/S36, 75w. Tx, 10 to 60 mc, mod. unit, 3 p/packs, plus plate-screen mod., mint. Also CR100 Rx; swop for Panda "Cub," or Tx alone for HRO. — G3HTU, 40 St. Nicholas Road, Thannington, Canterbury, Kent.

POWERFUL GERMAN BINOCULARS, mint condition, on tripod, £45 0s. 0d. Exchange S750 or similar. Callers only. — J. Fawkes, St. Chlow, Amberley, Stroud, Glos.

OFFERS WANTED for *Short Wave Magazine* from July 1948 to December 1957 (November 1950 missing only). — Box No. 1950, Short Wave Magazinet, Ltd., 55 Victoria Street, London, S.W.1.

£50—S.750 with S-meter, only 15 months old, 1100-volt 500 mA pack, 866 rects., £8. UM3 mod. trans., new £4. Two each TZ40, 813, £1 each. Hi-Fi equipment: Osram "912-Plus," complete, £12; G.E.C. Metal Cone speaker, with presence unit, in G.E.C. cabinet, £10; W/B HF-1012 and T816 speakers, £3 each.—Hamer, 52 Seagrave Road, Coventry.

BC348Q with p/pack, £11; PCR3, built-in p/pack, £8; Navy-type Tx 59, CO-PA, 50w., £4. Calibrators (3), Type TD 100/1000 kc, xtal, G.P.O. app., £2 each. Class-D Wavemeter, mains, £5. W1191A Freq. Meter, 100 kc - 20 mc, £5. Rx R.104, £3; 813's, new, boxed, 30/-; SX28 Rx spares and coil pack, £5. Trans. 500-0-500v., 425 mA, 6.3v. 6a., 6.3v. 5v. 2a., twice, and Choke 20 Hy., 300 mA, £2. Buyer collects, or carriage extra.—E. Derrick, 407 St. Helens Road, Bolton, Lancs.

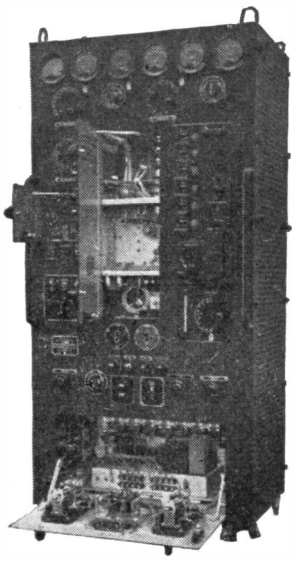
SX28 SPEAKER, spare valves, £45. Buyer collects.—M. Norton, 1 Emily Street, West Bromwich, Staffs.

FOR SALE: Eddystone 840A, Brown's phones (Type A), in perfect condition, £40.—Box No. 1955, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR DISPOSAL: Admiralty Receiver, Type B28 (CR100), 12 valves, 60 kc - 30 mc, good condition, 230/250 volts AC input, £15. Admty. Receiver, Type B40, 14 valves, 640 kc - 30.5 mc, monitor speaker, xtal filter, etc., good order, 250 volts AC input, £15. Transmitter, Collins TCS-12 (with manual), mod. for amateur use, complete with 2FB power units, metered, 19in. rack mtg., nice condition, £12. Amplifier Admty., Patt. N24 - 6J5/6J7/6V6 and Rect. (Parmeko transformers), 19in. rack mtg., beautiful job, new, 250 volts AC input, £6. Ex-1131L Transmitter, new, fully valved and metered, drive unit, Type 2, £4. Output unit, Type 200, £4. Items despatched in good transit case (non-returnable). Carriage extra at cost.—Please write Box No. 1954, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CANADIAN 58 Tx/Rx, mic/phones, manual; Class-D wavemeter, with xtal; valves, etc. Offers?—Box No. 1956, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TRANSMITTER NAVY MODEL TCK-7



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Complete with valves and instruction manual. Price £65 cash or £10 deposit and 12 monthly payments of £5—carriage extra at cost.

NOTE: Power packs are not supplied with these but full details of power requirements are given in the instruction manual.

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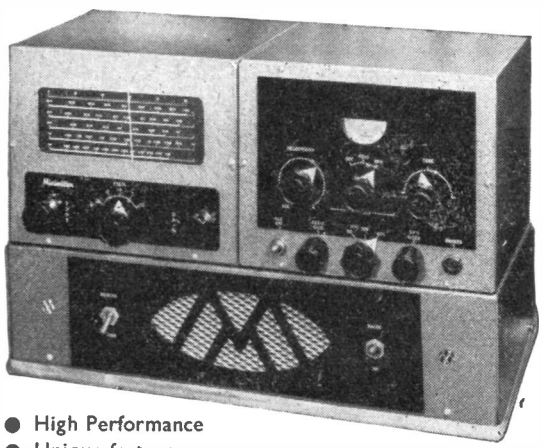

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R.C.A. ET.4332 TRANSMITTER CABINETS, totally enclosed, 52" high x 23" x 22", full-length rear door with latch, £9 (20/-). **E.H.T. POWER UNITS,** 200/250v. A.C. to 3000v 500 m/a D.C. in cubicle £25 (cost). **RACK MOUNTING TABLES,** 20" deep standard 19" wide, 25/- (5/-). 12v. **ROTARY POWER UNITS,** outputs: (1) 300v., 260 m/a; (2) 150v. 10 m/a ; (3) 13v. 5a. D.C. 35/- (7/6). **PUSH-TO-TALK SWITCHES** for mounting in lead, 2/6 (1/-); R.C.A. 25w. Projector Speakers, audible one mile, with universal input transformer, £14 10s. (30/-*). **STEP DOWN TRANSFORMERS,** 1,350w., totally enclosed double wound 230/110v., £6 (20/-). **TRANSMITTER CHOKES** by Woden 20H., 400 m/a, 20/- (5/-). **V.H.F. DIPOLE,** 700 m/cs. with 12-foot dia. Dish Reflector and connections, £9 (20/-). **BENDIX POWER UNITS,** Rack Mounting. 230v. input, 800v., 420 m/a output smoothed, 1 cwt., £8 (20/-). **BENDIX SUPER CHOKES,** 11H., 270 m/a. 6" x 4" x 4", 15/- (5/-). **DURADIO No. 9 TWIN CO-AX,** 15ft. lengths, 5/- (2/-). 30-ft. **HEAVY INSULATED BASE STEEL MASTS,** 4-section, 1¼" to 4" dia. all galvanised, £7 10s. (25/-). **GALVANISED AERIAL SPREADERS,** 10ft. x 2" x 2", lightweight cigar sections, 15/- (5/-). **DOOR SAFETY SWITCHES,** totally enclosed DPST, 2/6 (1/6). **VARIABLE TRANSMITTING CONDENSERS,** H.V., 40 μμF, 5/- (1/-); 60 μμF, 6/- (2/-); 100 μμF, 7/- (2/-); 300 μμF, 12/6 (2/6); 440 μμF, 20/- (3/-); 2.5 x 2.5 μμF, 5/- (1/6); 40 x 40 μμF, 7/6 (3/-). **G.E.C. CONTACTORS,** enclosed 15a. D.P., 24v. coil, 15/- (3/6). **T.1131 MODULATORS,** 85w. audio, £4 10s. (20/-). **VARIACS** (U.S.A.), 1000w., 230v. in. 0/270v. out. £12 10s. (10/-). **CONSTANT VOLTAGE TRANSFORMERS** (U.S.A.), 2 K.W., 230v. in. 115v. + or — 1 %. Two in series give 230v 9a. out. £27 10s. pair. **H.T. POWER UNITS** enclosed 200/250v. in 1200v. 200 m/a smoothed out. 1 cwt., £6 (20/-).

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Q.C.C. can now supply a set of four crystals for use in the G2NH SSB exciter, described in the December 1957 issue of the Magazine.

These crystals are of the high Q, gold plated and nodally wire mounted type. (Effective series resistance less than 1,500 ohms.), and are vacuum mounted in the standard B7G valve envelope.

Crystal 1 of nominal frequency 435 kcs. is designed for carrier generation, using any of the standard parallel resonance crystal oscillator circuits, in which the effective shunt input capacity can be adjusted to 30pf. Crystal 2 is adjusted to 434 kcs., and crystal 3 is adjusted to 432.6 kcs. These two crystals are the filter crystals and give a pass band of approximately 3,000 cycles band width. Crystal 4 is adjusted so that the series resonant frequency is the same as the parallel resonant frequency of crystal A and thus acts as a highly efficient carrier rejection filter. At the same time the spacing is designed so that it sharpens the pass band skirt very considerably on the high frequency side. (See Fig. 6, page 539, *Short Wave Magazine*, December, 1957).

These Crystals can be supplied for 435 kcs. on.y. but either lower or upper pass band are available at customer's option. Normally lower pass band types are supplied. The price of these crystals for amateur use is £8 per set of four, which is approximately half the current commercial price. At the present time, delivery delay is two to three weeks.

THE QUARTZ CRYSTAL CO. LTD.

Q.C.C. WORKS, WELLINGTON CRESCENT,
NEW MALDEN, SURREY

Telephone: Malden 0334 and 2988.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Hallicrafters S27 AM/FM Rx, 28 to 144 mc, £25. Also S38, 540 kc to 30 mc, £12. Both in excellent condition. — Anderton, 44 Tavistock Street, Nelson, Lancashire.

WANTED: Collins 75A3 or 75A4 Receiver; good price paid. FOR SALE: Morse Training Records (3-speed, L.P.). Beginners' or Advanced Course, complete with booklet. Send 45/- ; course by return.—G3HSC, 45 Green Lane, Purley, Surrey. *(Uplands 2896).*

AR88D, clean and in original condition, £45 ; also various Woden transformers, chokes. S.a.e., please.—G2HJV, 39 Northumberland Road, Leamington Spa, Warwicks.

AR88D Receiver with manual ; BC-221AK, latest, with modulator ; 1131B Transmitter (boxed) ; CR-100 transformers (boxed) ; s.a.e.—R. Wright, 17 Kent Road, Atherton, Manchester.

TABLE-TOP TRANSMITTER, with modulator, 25 gns.; Command transmitters, 12/6 ; Command receiver, 25/-; R.1155 receiver, with output stage and power/pack, 8 gns. Parallel 807 All-pi PA, professional, 9 gns.; 15-watt modulator, built-in power/pack, 9 gns.; Grundig TK5, new, 48 gns. Add carriage. — G3ATL, The Limes, Midland Road, Hugglescote, Leicester.

SALE: SSB Exciter, cascaded half-lattice filter, 464 kc ; needs final aligning. Bal. Mixer output, 8.814 mc, xtal control ; Diecast chassis 8½ins. x 5½ins., £9 10s. 0d.; carriage paid. R.C.A. Junior Volt-Ohmyst (valve voltmeter) and manual ; needs slight attention ; £6 10s. 0d.; carriage paid. W1191A Freq. Meter, with charts and 1000 kc xtal, £2. Buyer collects.—D. Youngs, 53 Salisbury Road, Norwich.

FOR SALE: American Single Side-Band Exciter and Linear Amp.; also valves, 813's, 805's, 6V6's, new. R.C.A. Transistor-Six, pocket radio, 6ins. x 3ins. x 1½ins.; internal londspeaker ; £18 18s. 0d.—Box No. 1957, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: National HRO60T, with coils and extra coil for 21 mc ; crystal calibration unit fitted. Also National NC183D. Both with manuals and in factory-new condition, used only few hours, cash offers invited ; these should not be confused with used Rx's (both are immaculate). Labgear LG.300, with modulator, etc., fitted mod. meter ; offers? Panda Tower, 32ft., complete with pitch motor, selsyns, desk indicator, power supplies, also Minibeam ; offers? Labgear E.5029 standing wave meter. Panda aerial matching unit. Two Hallicrafter speakers in cabinets. BC22/AJ in crackle cabinet, with charts and power supply fitted, as brand-new. Latest Labgear E.5039/A coax switching unit, unused. Eddystone frequency meter with coils. Labgear Bi-Square for 10 metres, unused. 0/240-volt Variac, as new. Meters, valves, switches, relays, etc. (many unused), manuals, etc. Direction compass in case (new). Eddystone mains filter, Type 732. Acos-type MIC 22-2 mic, on stand. Labgear Filter E.503L, unused. VHF152A, with manual, brand-new condition. Offers invited for all above. Only outright purchases considered.—Box No. 1958, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Eddystone 504 Receiver; must be in good working condition.—Wells, 8 Hambledon Road, Middlesbrough.

CR100/7, good condition, appearance and performance, £15. Crystal calibrator, Type 10, for 62 Set, £3. CV90, 15/-; 832, 7/6. WANTED: S27 or S36, and transformer for Cossor 339 'Scope.—Box No. 1960, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

INTERESTING WORK, preferably associated with Amateur Radio, required by licensed amateur holding some qualifications.—Box No. 1959, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TA12D: Modified Pi-output, T/R relay, modulator, p/pack, £10. Britannia Rx and p/pack, design *Bulletin* Oct./Nov., '55, FB Rx in Philpotts cabinet, but needs re-aligning on 15/10, £25.—G3LOD, Rodona, St. George's Hill, Weybridge *(Cobham 2762)*, Surrey.

RCA 710A Sig. Gen., 370-560 mc, carrier and mod. meter, manual, 230v. AC, £25. Sobell TE123B-pattern Gen., Band I London, 15 valves, circuit, £7. Sig. Gen. and Wavemeter, W1649, 140-255 mc, 5 valves, 5 mc crystal check, circuit, 70/-. Cossor 343 Ganging Osc., 80 kc - 20 mc, AM or FM, manual, £8. English Electric Induction Motor, 1/16th h.p., 1400 r.p.m., ½in. diam. spindle, silent running, 110v. AC, £2 (or with auto-trans., 50/-). Bowl fire, 750 watts, 17/-. Taylor multi-range Output Meter 160A, £8. Crystals: 100, 200, 500 kc, 1, 2, 5, 8 mc, 15/- each. Elliott Spindle-speed Indicator, 100-4000 r.p.m., £4. Advance Constant Voltage Transf., 190-260v. in, 230v. 100 watts out, £4. Super Ikonta 532/16, 2.8 Tessar, "synchro-compur," hood, 5 filters, ERC, £60. STC ball and biscuit mike, £6, mike stand, 50/-. Manuals: BC221 M, T. AC, AC, 10/- each; BC433, 15/-; AR88LF or D, 22/- each. — E. F. C. Owen, 33 Burleigh Road, Sutton, Surrey.

G3CGD required Lionel or McElroy bug key, complete, broken, or parts only. Please state price.—G3CGD, 30 St. Luke's Road, Cheltenham, Glos.

FOR SALE: Two Geloso G207 DR Receivers; one modified for muting to cut HT to audio also, and a coax socket for Q-Fiver fitted. Both modified to increase stability, otherwise as new. Prefer buyer collects; one Dorset, one Surrey, but could arrange buyer collects London, E.C. What offers?—Box No. 1961, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

PANDA PR120V, in good condition; first £60 secures; buyer collects but delivery can be arranged. BC-221T, unmodified, with AC power unit, £30. WANTED: One or two 2E26 valves.—Box No. 1949, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CONVERTERS (DX); separate converters for 14, 21 and 28 mc, but fitted to form one compact unit, with power/pack. DX results: Confirmed reception of 39 Zones, 225 Countries. Original cost, £20.—Offers to: Watts, 62 Belmore Road, Thorpe, Norwich, Norfolk.

WANTED: Manual for AR88. Please state price, etc.—P. Park, 48 High Street, St. Richen, Aberdeenshire.

SMALL ADVERTISEMENTS, READERS—*continued*

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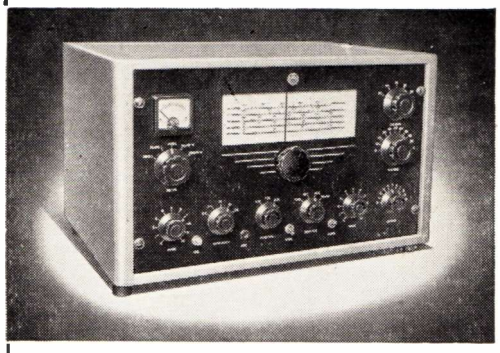

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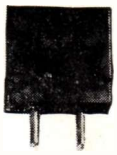

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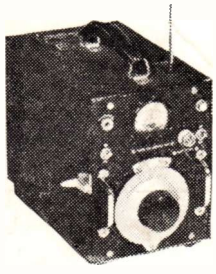

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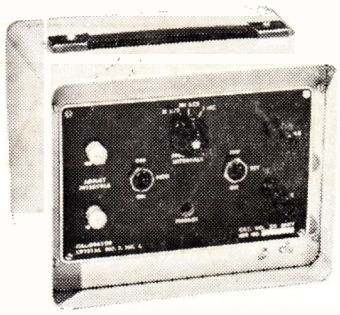

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