

*The*

# RADIO AMATEUR

*incorporating*

## SHORT WAVE NEWS

Vol. 7  
Number 4  
APRIL  
1952



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**Notes on the Design of a VFO. An Inexpensive Top Band Tx. About Frequency Changers. Amateur Radio in the Netherlands. S.W. Programme Parade. Strictly for the Beginner. S.W. Broadcast, Amateur Band and VHF News, Club Notes, etc. . .**

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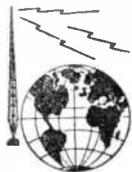
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# The RADIO AMATEUR

Vol. 7 No. 4

April



incorporating "SHORT WAVE NEWS"

Editorial & Advertising Offices : 57, Maida Vale, London, W.9

Tel. CUN. 6518

EDITOR : Arthur C. Gee. G2UK.

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### EDITORIAL.

In addition to our change of title, we have a number of other improvements to the magazine to announce this month.

First of all, we have managed to increase the number of pages by a further four—and we are happy to announce that this is being done without any increase in price. In spite of the terrific increase in production costs during recent months, we are managing to balance our budget and whenever possible we shall take any opportunity which presents itself to improve the magazine, without adding to its cost.

Secondly, we welcome Mr. Stanley Herbert, G3ATU, as a regular contributor. He takes over our Amateur Bands Commentary and we are certain that in his hands this feature will go from strength to strength. G3ATU is a well-known Dxer and we are very pleased indeed to welcome him to our pages. As he

mentions in his first contribution this month, all reports should in future be sent to him direct at his home, QTH, and incidentally, reports—particularly from transmitting readers—will be much appreciated.

Finally, readers will notice that our VHF feature is up this month by two additional pages. We are very pleased to be able to allocate this extra space to 6UH because it does show what an increase of interest is being taken in VHF work. 6UH has worked hard to build up this interest—both amongst our listening and transmitting readers—and he has been careful, too, to see that scientific accuracy comes before personal prejudices. We are quite certain that Amateur Radio will have to rely on the VHF's more and more in the future and we advise all who are wondering in just what direction to extend their activities, to "have a go" on 144 Mc/s.

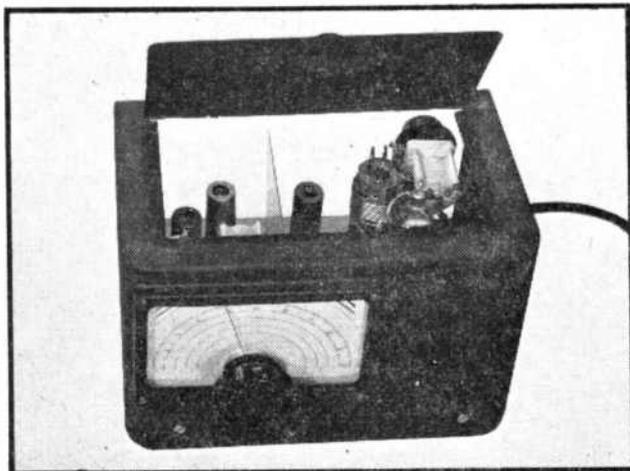
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THE EDITOR invites original contributions on short wave radio subjects. All material used will be paid for. Articles should be clearly written, preferably typewritten, and photographs should be clear and sharp. Diagrams need not be large or perfectly drawn, as our draughtsmen will redraw in most cases, but relevant information should be included. All MSS must be accompanied by a stamped addressed envelope for reply or return. Each item must bear the sender's name and address.

**Component Review.** Manufacturers, publishers, etc., are invited to submit samples or information of new products for review in the section.

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# NOTES on the DESIGN of a V.F.O.

by  
J. N. WALKER, G5JU.

Constructional Data.

**I**N the previous article information was given on many of the factors affecting the design of a variable frequency oscillator for amateur use and now follows two practical instruments embodying the principles previously set out. It is not considered necessary to go into great constructional detail as most of the features can be seen in the photographs and layout drawings.

The first instrument employs four valves plus a stabiliser and gives more than sufficient output to drive directly an 813 or similar type of PA valve on 14 Mc/s to the maximum permitted input. The VFO can also be utilised for direct drive on 28 Mc/s, the fourth valve (an 807) then acting as a quadrupler instead of a doubler.

The second instrument is somewhat simpler and is for the lower frequency bands. The oscillator operates around 900 kc/s and is followed, first by a buffer stage and then by a combined doubler/output stage. It is intended to give output on 1.8 Mc/s but, with a suitable coil, a useful output can be obtained also on 3.5 Mc/s. A coaxial link connects the VFO to the transmitter and it is assumed the latter incorporates the necessary additional doubler and/or buffer stages to provide sufficient final drive on 7 and 3.5 Mc/s.

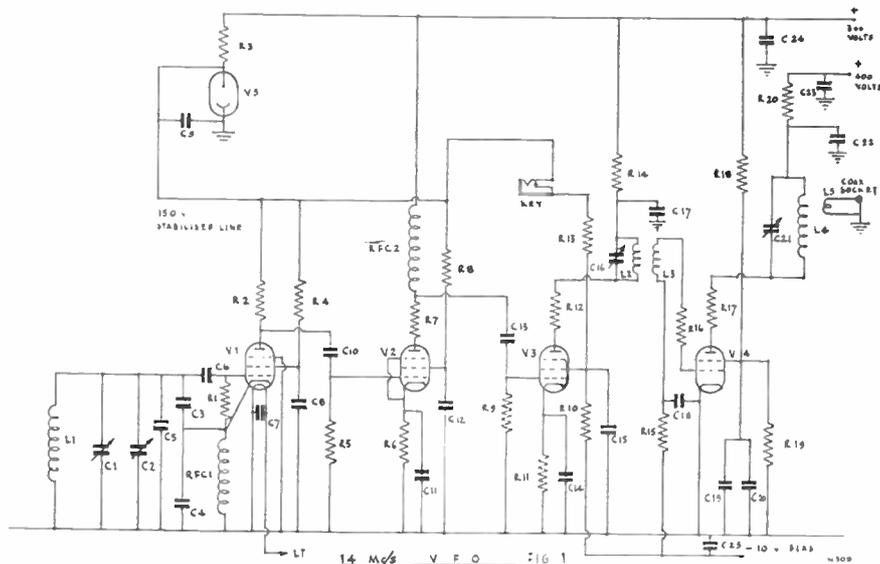
## Instrument No. 1.

The complete circuit diagram appears in Fig. 1. The first valve is an *Osram* Z77 (a *Mullard* EF91 or *Brimar* 6AM6 is equally suitable) operating on a fundamental frequency of 3.5 Mc/s, with every care taken to ensure the highest possible degree of stability. Then follows a buffer valve of the same type, the amplified output being fed to a doubler

stage, again using a Z77. A form of wide-band coupler is employed to transfer the drive to the final valve. The latter has to provide several watts of RF power to allow for transfer and other losses and an 807 is a good choice for this position, although, as mentioned in the earlier article, an *Osram* N78 will give sufficient output for the purpose. The anode voltage on the final valve is 400 but this and the screen voltage can be reduced or increased to vary the output, according to individual requirements.

The stabiliser valve, of the VR150 30 type, supplies a constant voltage to both anode and screen of the oscillator valve and advantage is taken to provide a stabilised voltage to the screens of the two following valves—their anodes take the full 300 volts. For good efficiency, the 807 requires some 250 volts on the screen and it is, therefore, supplied *via* a potential divider from the 400 volt line. Should a lower output suffice, a single 300 volt line voltage can be used and the screen of the output valve may then well be taken to the stabilised 150 volts but some reduction in the value of R3 will be necessary.

The key jack is located in series with the screen supply to the third valve. Cut-off is not complete when HT is removed from the screen unless the latter is made slightly negative with respect to the cathode and, in Fig. 1, a fixed 10 volt bias supply is assumed. Should this not be readily available or possible to arrange, the circuits around V3 should be changed to conform to Fig. 2. Further, a bias resistor (200 or 250 ohms, 1 watt) must then be inserted in the cathode of the 807, shunted by a .01  $\mu$ F by-pass condenser. It will be noticed that



two condensers in parallel are used to by-pass the screen of the 807, with a definite improvement in stability.

Anti-parasitic resistors are inserted where necessary. Generally, no trouble has been experienced with parasitic oscillations, probably because the grid and anode leads of each stage are reasonably short.

**Layout.**

The layout of the instrument is given in Fig. 4, exact dimensions being given only where they are important, but all being true to scale. The chassis is an Eddystone, Cat. No. 643, of diecast aluminium, housed in a cabinet of appropriate size. A metal screen is bolted across the chassis to shield the oscillator components but no screening has been found necessary below the chassis. The first three valves are fitted with shield-cans although admittedly the cans do not make any noticeable difference. The dial comes over to the left of the panel and whilst perhaps this does not give a symmetrical appearance, it does make for a better layout.

**Constructional Points.**

The bracket holding the condenser C2 must be carefully positioned so that the spindle matches up properly with the flexible coupler and driving head. The distance of the bracket, as indicated in Fig. 4, is for a medium coupler—the longitudinal setting is best determined after the dial has been fixed in position on the face of the cabinet. Reliance for an earth return should not be placed on

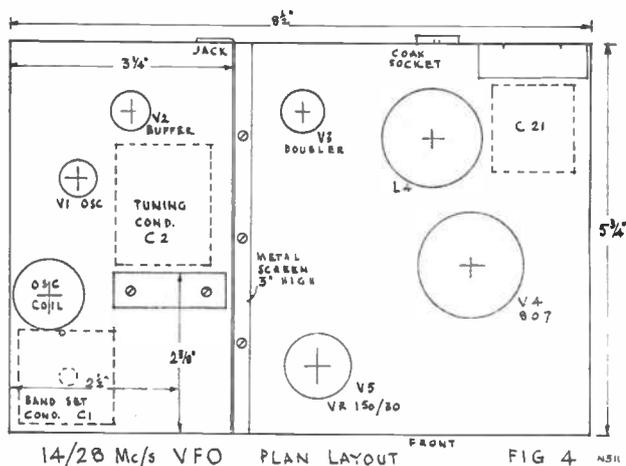
the bracket but a separate lead taken from the large tag on the condenser bearing bush.

The bandset condenser is mounted on the floor of the chassis and adjustment of it is made with a long-bladed screwdriver through the top of the cabinet (lid open). If a cabinet without a lid is used, it will be better to fix C1 on the rear wall of the chassis. The tuning condenser C21 associated with the output circuit is fitted to an insulated bracket.

The oscillator coil is mounted above the chassis as also is the output coil. As shown in the photograph L4 is fixed for 14 Mc/s, the pins being used as holding points, but it is, of course, a simple matter to fit a suitable base and then plug the coil in, as must be done anyway when 28 Mc/s operation is desired. The small former which takes L2 and L3 to form a wide-band coupler is below the chassis and in this case it is definitely more convenient to fit a base, the latter being sited to permit short connecting leads. The concentric trimmer condenser (C16) across L2 is soldered direct to the appropriate pins on the coil base.

The 807 valveholder should be sunk well below the chassis (say an inch at least) as otherwise the anode cap will not be clear of the top of the cabinet. Since this valve develops considerable heat, it is advisable to make some holes in the cabinet top immediately above the valve to aid dissipation.

On the rear wall of the chassis are fitted the keying jack, the coaxial output socket



*Chassis layout and dimensions, position of main components etc., recommended for the 14/28 Mcs. V.F.O.*

14/28 Mc/s VFO PLAN LAYOUT FRONT FIG 4 NSH

and an (optional) earth terminal. Power supplies can be connected by any convenient means—in the model illustrated an octal plug and socket are employed.

**Testing.**

The first thing is to set the oscillator coverage. With C2 at full mesh, the fundamental signal is tuned in on a receiver and preferably a crystal calibrator should also be available. With the values of L and C

specified for the oscillator circuit, the coverage should work out about right for 14,000 to 14,200 kc/s but slight adjustment to the number of turns in the coil may be called for.

Little can be done about V2 except perhaps to measure the volts across the cathode resistor R6—a reading of about one volt should be obtained and little or no change should be noticeable when V1 is temporarily caused to cease oscillating (by shorting grid or cathode to earth).

**COIL DATA**

Coil No.	Frequency Mc/s	Turns	Wire	Former	Detail
L1	3.5	14	20 swg	1" ceramic	wound in grooves, winding length 1 1/2"
L2	7	30	24 swg	Cat. No. 763	At top of former, which is 7/8" dia.
L3	7	38	30 swg	Cat. No. 763	At bottom of former.
L4	14	9	18 swg	Cat. No. 538	Single-spaced 1 1/2" former.
L4	28	4	18 swg	Cat. No. 538	Single-spaced 1 1/2" former.
L5	14 or 28	1	18 swg		Near earthy end of L4.

The volts across R10 in the cathode circuit of V3 may also be measured—a reading between 3 and 4 volts is to be expected. Little change of this voltage will occur when C16 is tuned and it is better to rely on the increase in anode current to V4, which can be readily observed by connecting the meter (set to a low range) across R20. Adjustment of C16, which will be found not at all critical, should be carried out with the VFO dial set at the mid-point of the range covered.

V4 will now be taking drive and on rotating C21 good RF output should be obtained—a neon lamp held near a "hot" point will glow quite brightly. With no load being applied to V4, tuning of C21 will be sharp

**Instrument No. 2.**

In this case provision is made only for a small RF output and three valves (plus a stabiliser) suffice. The circuit diagram is given in Fig. 5 and will be seen to be similar in many respects to that of the previous unit. As this particular instrument formed the experimental model on which much of the original work was carried out it is not suitable for photographing without rebuilding completely on a new chassis but the layout finally adopted is sketched in Fig. 6. As there is plenty of room, the full vision dial is centrally placed and this time is calibrated directly on 7 and 3.5 Mc/s. Little screening is necessary but it is well to mount a metal

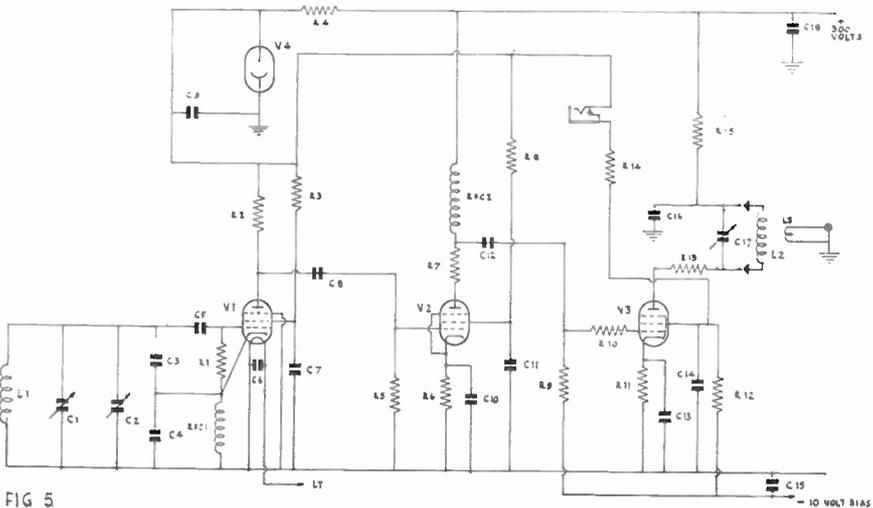


FIG 5

but once the RF energy is being properly transferred to the transmitter, tuning becomes moderately flat and readjustment of this condenser will be required only when large changes of frequency are made. The coil used in the grid circuit at the transmitter end should possess characteristics similar to L4, if anything tending towards a lower L/C ratio—that is, a smaller coil and larger effective capacitance. The grid drive will impose damping on this circuit and again only very occasionally should it be necessary to re-tune once set up. The coaxial cable connecting the VFO to the transmitter can be of any reasonable length—even twenty feet will result in no serious loss.

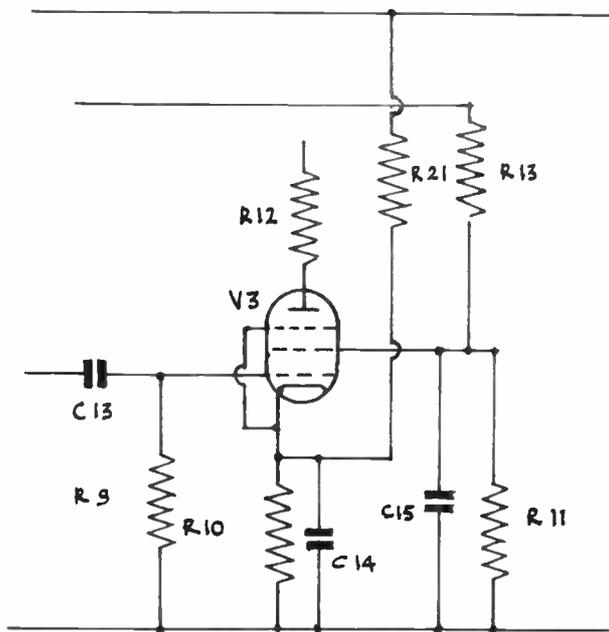
Keying should be found clean and chirpless. If any clicks are apparent, the usual type of filter—for example, a 2,000 ohm resistor in series with a condenser of .02 to .05 μF—can be shunted across the key contacts, either externally or inside the VFO chassis.

plate as shown to screen off the output stage from the rest of the unit.

Octal valves are quite suitable and considerable latitude in choice of types is possible, bearing in mind that V2 must possess a reasonably high slope if results are not to be disappointing. The valves actually used are (in sequence) 6SJ7, 1852 (6AC7) and 6V6, with a VR150/30 stabiliser. When the experimental prototype is rebuilt, the valves will probably be changed to Z77, Z77 and N78.

**Coils.**

The oscillator functions over the range 875 to 950 kc/s, corresponding (when multiplied up) to the full 3.5 Mc/s band. Output is drawn off in the 1.8 Mc/s band but a fair output on 3.5 Mc/s is also obtainable when L2 is changed. Again, the output coil can be fixed or made to plug-in, according to individual requirements.



*Modification to be made to circuit of V3 when no fixed bias is applied. The cathode resistor (R10) should be 1,000 ohms. The grid resistor (R9) 33,000 ohms. R21 (100,000 ohms) is added to the circuit. R11 (R10 in Fig. 1 and R12 in Fig. 5) should be 220,000 ohms for the first instrument and 100,000 ohms for the second instrument. R12 is of 22 ohms in first instrument and 12 ohms in the second. Similar cathode bias arrangements must be made for V4 in the first instrument.*

FIG 2

N310

Coil L1 has 44 turns 24-gauge enamelled wire tightly wound on a plain ceramic former 1" in diameter. As this type of former may be difficult to obtain, a coil of 30 turns on a 1½" ribbed former may be substituted. Coil L2 has 80 turns of 28-gauge enamelled wire on a 1½" former, with a coupling winding of 10 turns wound close to but not touching the low potential end of L2. For 3.5 Mc/s, a coil with 40 turns in the tuned circuit and 5 or 6 turns in the coupling winding will be suitable. At the transmitter end, the coaxial cable link is terminated in a wide-band type of coil, similar to L2 but having rather more turns (about 100) in the grid winding which makes it roughly self-resonant. If the response is not sufficiently wide, a 20,000 ohm ½ watt resistor can be shunted across the grid input circuit.

**Other Points.**

As in the higher frequency VFO, a small fixed bias is used to ensure the output valve is completely cut off with the key up. Again, if no such bias is available, the circuitry around V3 should be changed to conform to Fig. 2.

Because of the comparatively low fundamental oscillator frequency and of the high value of capacitance used for C3 and C4, no

compensating condenser has been found necessary—to all intents and purposes frequency drift is nil.

The remarks made earlier regarding setting-up, testing and keying apply also to this second instrument which is so straightforward that it is unlikely any difficulty will be experienced.

**List of Components (First Instrument).**

- 1 Chassis, Cat. No. 643, Eddystone.
- 1 Cabinet, Cat. No. 644, Eddystone.
- 1 Full Vision S/M Dial, Cat. No. 598, Eddystone.
- 1 Microdenser, 140 or 160 pF (C1), Cat. No. 586 or 1131, Eddystone.
- 1 Microdenser 140 pF (C2), Cat. No. 586, Eddystone.
- 1 Microdenser, 28 pF (C21), Cat. No. 588, Eddystone.
- 1 Adjustable Bracket (for C21), Cat. No. 1007, Eddystone.
- 1 Metal Bracket (for C2), Cat. No. 708, Eddystone.
- 1 Flexible Coupler, Cat. No. 529, Eddystone.
- 1 Knob (for C21), Cat. No. 2416, Eddystone.
- 1 Coil Former (for L2/L3), Cat. No. 763, Eddystone.

- 1 Coil Base, Cat. No. 707, Eddystone.
- 1 Coil Former (for L4/L5), Cat. No. 538, Eddystone.
- 1 RF Choke (RFC 1), Cat. No. 737, Eddystone.
- 1 RF Choke (RFC2), Cat. No. 1022, Eddystone.
- 1 Insulated Jack, P72, Igranic.
- 3 Valveholders, B7G with screening cans, McMurdo.
- 1 Valveholder, Octal (for V5).
- 1 Coaxial Output Socket, Pyc or Belling-Lee.

*Condensers (fixed and semi-variable).*

- 10 or 12 pF, Ceramic, N750 type, C5.
- 3/30 pF Air Trimmer (circular or flat), C16.
- 100 pF Silvered Mica, C6, C10, C13.
- 1,000 pF Silvered Mica, C3, C4.
- .0005 or .001  $\mu$ F Moulded Mica, C7, C8, C11, C12, C14, C15, C18.
- .002  $\mu$ F Moulded Mica, C17, C19, C22, C23, C25.
- .01  $\mu$ F Moulded Mica, C9, C24.
- 0.1  $\mu$ F Paper, C20.

*Resistors.*

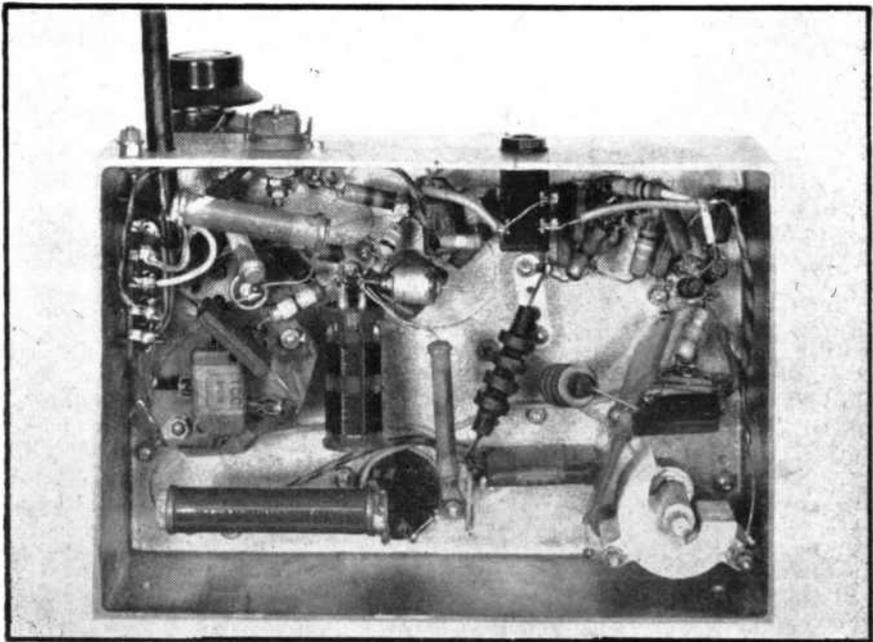
- 12 ohm (or 2  $\times$  22 ohm in parallel), R17.
- 22 ohm, R7, R12.
- 47 ohm, R16.

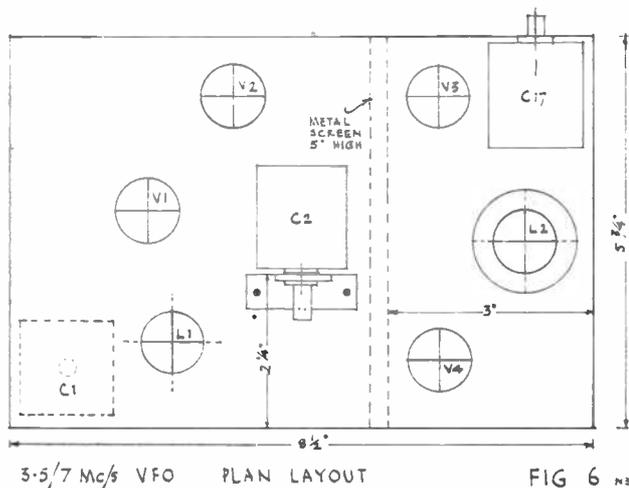
- 100 ohm, R20.
- 220 ohm, R6, R11, R14.
- 470 ohm, R8, R13.
- 10,000 ohm, R2, R15.
- 27,000 ohm, R18 (1 watt).
- 33,000 ohm, R9.
- 47,000 ohm, R1, R4.
- 47,000 ohm, R19 (1 watt).
- 100,000 ohm, R5.
- 220,000 ohm, R10.
- 10,000 ohm, R3 (wirewound 5 watt or more).
- All resistors  $\frac{1}{2}$  watt unless indicated otherwise.

**List of Components (Second Instrument).**

- 1 Chassis, Cat. No. 643, Eddystone.
- 1 Cabinet, Cat. No. 644, Eddystone.
- 1 Full Vision Dial, Cat. No. 598, Eddystone.
- 2 Microdensers, 140 pF (C1, C2), Cat. No. 586, Eddystone.
- 1 Microdenser, 100 pF (C17), Cat. No. 585, Eddystone.
- 1 Metal Bracket (for C2), Cat. No. 708, Eddystone.
- 1 Insulated Bracket (for C17), Cat. No. 1007, Eddystone.
- 1 Flexible Coupler, Cat. No. 50, Eddystone.
- 1 Knob (for C17), Cat. No. 2416, Eddystone.
- 1 Coil Former, Cat. No. 537, Eddystone.

*Under the chassis view of the first instrument.*





Recommended layout for the 3.5/7 Mcs. V.F.O. with chassis dimensions and position of main components.

- 1 Coil Base, Cat. No. 964, Eddystone.
- 2 RF Chokes, Cat. No. 1066, Eddystone.
- 1 Insulated Jack, P72, Igranic.
- 4 Valveholders, Octal.

*Condensers (Fixed).*

- 100 pF Silvered Mica, C5, C8, C12.
- 2,000 pF Silvered Mica, C3, C4.
- .001 or .002  $\mu$ F Moulded Mica, C6, C7, C10, C11, C13, C14, C15.
- .01  $\mu$ F Moulded Mica, C9, C16.
- 0.1  $\mu$ F Paper, C18.

*Resistors.*

- 12 ohm, R7, R13.
- 22 ohm, R10.
- 300 ohm, R6, R15.
- 470 ohm, R11, R14.
- 10,000 ohm, R2.
- 33,000 ohm, R9.
- 47,000 ohm, R3, R8.
- 100,000 ohm, R1, R5, R12.
- 10,000 ohm, R4 (wire-wound, 5 watt).
- All resistors except R4,  $\frac{1}{2}$  watt.

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# TV FAULT - FINDING

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# AN INEXPENSIVE "TOP BAND" TRANSMITTER

by

GRAHAM F. WILSON, GW3BZH

THE transmitter to be described can be built for little more than the cost of the valves by the amateur with a reasonably well-stocked "Junk Box." None of the component values are very critical and suitable government surplus items are freely available, so that, even if everything has to be bought, the cost need not be excessive. The transmitter is simple to build and very effective in operation.

For convenience the transmitter is built in two units :

- (1) The ECO and Power Amplifier ; and
- (2) The Speech Amplifier and Modulator.

Thus, in the event the constructor is not interested in phone working, only the first unit need be built. At this station all apparatus is run from a single large power supply, and for this reason a power supply was not incorporated, but details are given of a suitable power pack. Both units are mounted, by self-threading screws, on a common panel of 14-gauge aluminium cut to fit the outer case of a TU5B unit. The transmitter and modulator subpanels are finished in black lacquer, whilst jade lacquer is used for the main panel. With the black crackle finish of the TU5B case the effect is a very pleasing departure from the conventional, and the use of lacquer for the panels has the advantage that scratches resulting from working the aluminium are effectively hidden. Fig. 1 shows the panel layout of the complete transmitter.

It should be mentioned in passing that a metal-cutting fretsaw was used for all panel and chassis cut-outs. The amateur who does not already use a fretsaw will be well advised

to obtain one. If aluminium is used there are very few constructional jobs that cannot be tackled by this useful tool.

A partially stripped 18 Set Transmitter chassis and panel (purchased locally for 2/6) provided the main tuning capacitors, drives, aerial tap switch and key and microphone jacks. The 18 Set chassis was used for the ECO-PA, but in case such a unit is not available the suggested layout is given in Fig. 2. If a fretsaw is used, the necessary cut-outs should be made before bending this chassis, and this remark also applies to the modulator unit chassis. If the 18 Set is available the existing panel may be used if desired, but this will leave some unused holes which are unsightly. It is a better plan, and worth the little extra trouble, to use the 18 Set panel as a template for the necessary cut-outs in a new panel. Should the 18 Set not be available the constructor will probably use components already on hand, and panel detail will depend on these. In general, the layout shown will prove satisfactory.

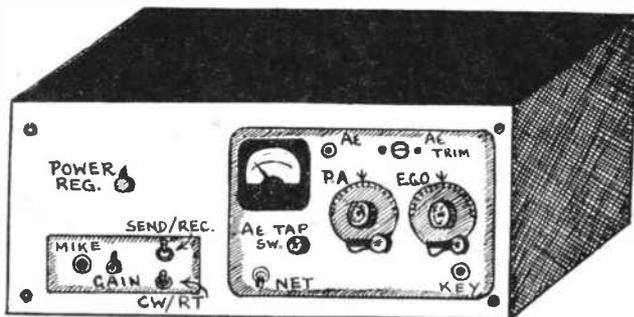
Fig. 3 shows the suggested layout for the speech amplifier and modulator unit. Here again, some modification may be necessary to accommodate components that are on hand, but it should be possible to follow the general scheme in most cases.

The circuit used (Figs. 4 and 5) is very simple. An EL32 ECO drives a 6V6 Power Amplifier. Choke modulation of the Power Amplifier plate and screen is used, the 6F6 modulator being driven by a 6J7 speech amplifier which is designed to operate with a government surplus moving coil hand microphone.

Fig. 1.

The complete transmitter.

The transmitter and modulator units are mounted on a common panel and housed in a TU5B case.



It will be seen from the circuit diagram that a rather unusual keying circuit is employed, inasmuch as the oscillatory circuit is completed by returning the cathode tap via a .005  $\mu$ F capacitor, whilst keying is effected by interrupting the cathode DC circuit. Apart from ensuring proper operation of the ECO, the cathode resistor, together with the .005  $\mu$ F capacitor, forms a filter network which materially reduces key clicks.

Keying is remarkably free from chirp, and the writer is indebted to GW3ALV for this circuit. This method of keying has been used both at GW3ALV and GW3BZH over several years and has always proved satisfactory.

The ECO grid components are mounted on terminal tags in the screened compartment on the top chassis. These components should be the best available to the constructor, for the best ECO circuit in the world will have a poor keying characteristic if the grid constants are not really constant. The grid resistor should be generously rated, and the grid capacitor should be a high-grade mica, or, preferably, an airspaced variable. The ECO plate and screen components are assembled below the deck as close as possible to their proper valveholder tags. In the interests of stability, all ECO wiring is carried out with 18 swg wire, and all components are anchored to terminal tags.

In the Power Amplifier, a combination of drive-developed, and cathode, bias is used. In the "key down" condition Class C bias is provided for the 6V6 by the drive current through the grid resistor, and additional bias is derived from the 500 ohms resistor in the

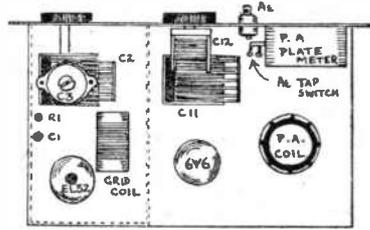


Fig. 2. The E.C.O. and P.A. Unit.  
Layout of principal components.

cathode circuit. If this resistor were not included there would be no bias in the "key up" condition, and plate current would be at a level which would speedily and permanently damage the valve.

This method of operation serves also to prevent the radiation of key clicks. The 6V6 is operated in Class C when the key is down, and Class A when the key is up. The plate current therefore remains substantially constant. Now the regulation of small power supplies, such as one would use for operation of this transmitter, is generally rather poor, and a change in load of 30 to 40 mA might cause a change of as much as 25 HT volts. This means that the voltage applied to the PA valve at the instant of closing the key would be considerably higher than what obtains when the full "key down" current flows. The radiated waveform in such a condition would be as shown in Fig 6A. Due to its steep wavefront, such a wave would cause "shock" inter-

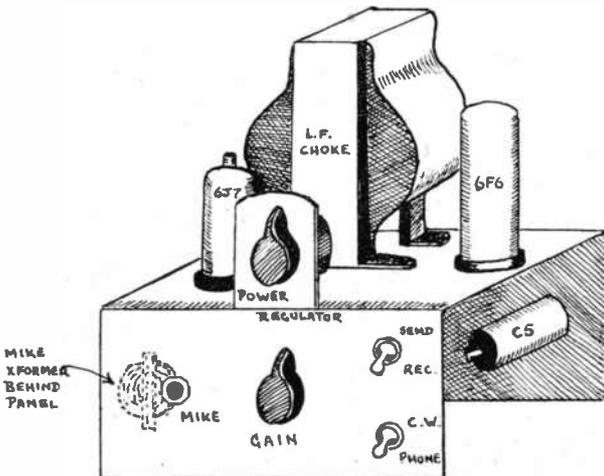


Fig. 3. Speech amplifier and modulator unit.  
Suggested layout of principal components.

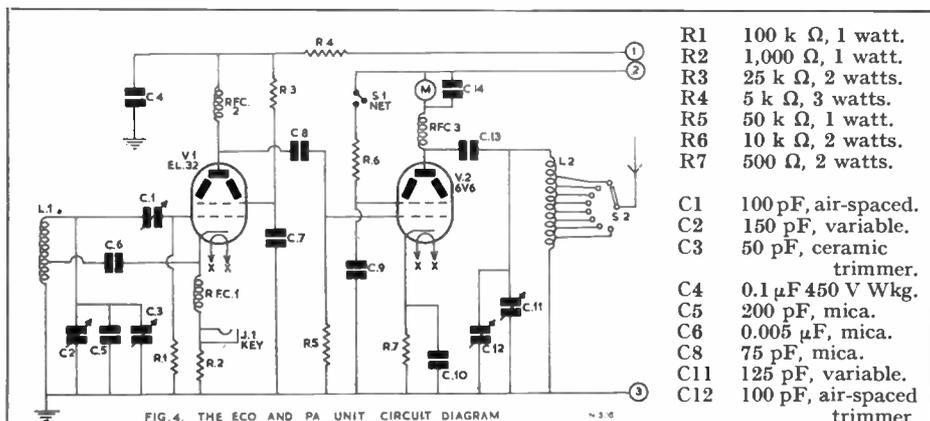


FIG. 4. THE ECO AND PA UNIT CIRCUIT DIAGRAM

- R1 100 k  $\Omega$ , 1 watt.
- R2 1,000  $\Omega$ , 1 watt.
- R3 25 k  $\Omega$ , 2 watts.
- R4 5 k  $\Omega$ , 3 watts.
- R5 50 k  $\Omega$ , 1 watt.
- R6 10 k  $\Omega$ , 2 watts.
- R7 500  $\Omega$ , 2 watts.

- C1 100 pF, air-spaced.
- C2 150 pF, variable.
- C3 50 pF, ceramic trimmer.
- C4 0.1  $\mu$ F 450 V Wkg.
- C5 200 pF, mica.
- C6 0.005  $\mu$ F, mica.
- C8 75 pF, mica.
- C11 125 pF, variable.
- C12 100 pF, air-spaced trimmer.

C7, C9, C10, C13, C14 : 0.01  $\mu$ F, mica.

*Coil Data.*

- L1 ECO Coil. 50 turns, 28 swg enamelled, closewound on  $\frac{3}{4}$ " former. Tap at 13 turns from earthy end.
- L2 PA Coil. 42 turns, 24 swg, enamelled, closewound on  $1\frac{1}{4}$ " former. See text for taps.

- J1 Closed circuit jack.
- S1 SPST switch.
- S2 SP, 8-way switch.
- M Milliammeter (see text).
- V1 EL32.
- V2 6V6.

RFC 1, 2, 3 : RF chokes. These should be dissimilar to avoid the possibility of parasitics.

ference in adjacent aerials. Because of the steady plate current and the filter action in the ECO cathode circuit the actual waveform radiated conforms to that of Fig. 6B, which is satisfactory.

Metering of the PA plate circuit only is necessary. An ex-T1154 100 mA FSD meter is used. Actually, a lower full-scale deflection would have been more suitable, but it was desired that the transmitter should be as inexpensive as possible, and the T1154 meters may be bought for as little as 3/6. It is quite satisfactory.

A switch is provided in the PA screen supply, by which the 6V6 may be disabled to provide "netting" facilities.

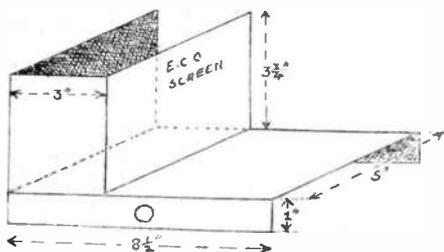
Matching to the aerial is achieved by tapping down the tank coil. The tap may be a single one permanently connected, or, as in the writer's case, a number of switched taps may be provided. The 8-position SP switch from the 18 Set Tx is eminently suitable. The actual process of matching is dealt with more fully below. Winding of the PA coil should be deferred until all other work is completed.

The speech amplifier and modulator circuits require little explanation. They are quite standard, and the only point that requires special emphasis is that the microphone lead should be screened, as should all

wiring in the speech amplifier grid circuit, and the leads should be as short as possible. The input transformer used was an ex-service type with taps for either carbon or dynamic mike. A 500 ohms resistor is included in the 6F6 output circuit. The function of this resistor is to drop the PA anode voltage sufficiently that 100% modulation may be obtained. A DPDT switch selects phone or CW operation. In the CW condition this switch breaks HT to the modulator and applies full HT to the PA.

Also included is a power regulator, a 10 watt 1,000 ohms variable resistor. This regulator is necessary because with 325 volts available it is possible to run the PA to about 13 watts input on CW. It should be remembered, however, that the 20, or so, volts developed across the 6V6 cathode resistor may be deducted from the measured HT voltage when calculating the power input. The regulator should be used to work on reduced power whenever possible. Under good conditions as little as 4 watts may be used with no significant drop in "S" points.

Fig. 7 shows the circuit of a suitable power pack. If desired, this and the modulator unit can be built on one chassis, and it should still be possible to accommodate the whole "works" in a TU5B case. If only CW operation is to be catered for, 60 mA will be a



Chassis dimensions for ECO and PR Unit.

generous rating for the transformer HT winding.

When wiring is completed and checked, the ECO should be tested before attempting to put the unit on the air. With the PA screen circuit broken by the "Net" switch and heaters warmed up, apply HT and check the frequency coverage of the VFO. With the values given there should be a few kilocycles to spare at either end of the band, but some adjustment of the trimmer capacitor may be necessary due to circuit capacitance and component tolerances. The note and keying should also be checked. Anything less than a pure T9 note will almost certainly

be due to the use of a defective or poor quality component. If an air-spaced capacitor has been used in the grid circuit as recommended, any slight tendency to chirp will most likely be eradicated by adjustment of this component.

The ECO functioning satisfactorily, PA adjustments may now be made. With no aerial connected there will be a pronounced dip in PA anode current when the tank is tuned to resonance. With the aerial connected, the correct tap for optimum match will be that which gives the highest anode current whilst still maintaining resonance, as indicated by a slight dip when "on tune." Alternatively, and obviously, if an aerial ammeter is available, the correct tap is that which gives maximum aerial current. Note that in testing, the tank circuit should be retuned each time the tap is altered. At GW3BZH, where a 132 ft. aerial is used, the matching procedure adopted was as follows. The tank coil was first roughly wound with taps distributed equally over the "cold" half of the coil. A quick test showed which of these gave optimum, and the coil was then finally wound with the 8 taps spaced 1 turn apart around this point. A very good match resulted.

When the constructor is satisfied that the ECO and PA are behaving correctly, modulation may be applied using a dummy load.

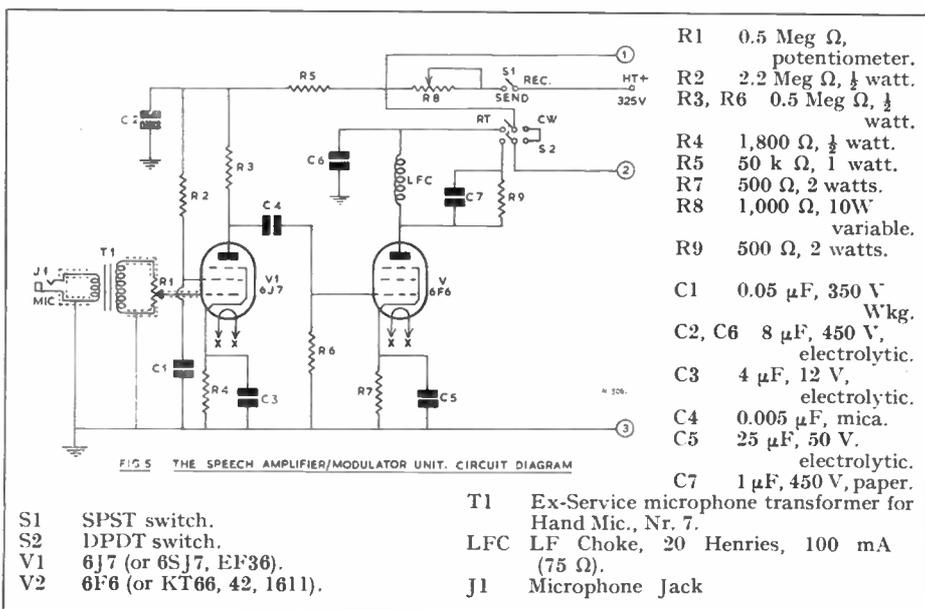


FIG. 6 (A) KEYED CW WAVEFORM RESULTING FROM POORLY REGULATED POWER SUPPLY. THIS WILL CAUSE TROUBLE BY "SHOCK" EXCITATION OF NEARBY AERIALS

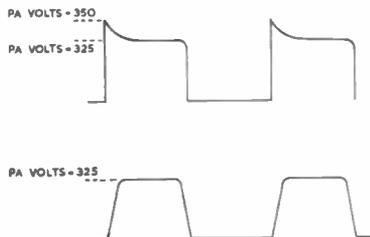


FIG. 6 (B) SATISFACTORY KEYED CW WAVEFORM OBTAINED BY MAINTAINING CONSTANT CURRENT DRAIN AND FILTERING KEYING CIRCUIT.

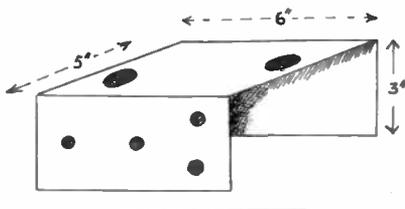
This can be a 24 volt 15 watt lamp for current-fed aerials. With the PA driving fully into this load, the transmitter can be put into the "Phone" condition and modulated. Use a monitor to check quality. If an over-modulation indicator or oscilloscope is not available, the following procedure can be followed to set up for approximately full modulation. The modulator gain control should be advanced whilst closely watching PA anode current. If the PA feed current rises on peaks, overmodulation is present and the gain should be "backed" until the PA feed remains steady. With the aerial connected, a further check can be made if a fairly sensitive aerial ammeter is available. If adequate modulation is being provided, a sustained whistle should lift the aerial current visibly, but if more than about 15%

increase in current is observed it is more than likely that the Tx is being overmodulated. If the PA meter kicks downward on modulation, insufficient drive is indicated, but this condition should not occur with this transmitter.

As is to be expected with such a simple circuit, there is a slight "pull" when the PA is being tuned, but once tuned the stability leaves nothing to be desired, and in practice the "pull" is of no consequence whatever.

The transmitter as described has been in use for about 8 months and has proved entirely satisfactory. During this period about 100 stations have been worked in about 300 QSOs. Good speech quality has always been reported, and CW reports have always been at least T9 with quite a few T9X. Best phone range from a very poor location in Cardiff has been Darlington, whilst on key GM, GI, EI and DL2 have been worked. However, the writer is by no means a Dx enthusiast, and a much more important result has been many hours of enjoyment in really "solid" local QSOs.

Modulator chassis dimensions



- T1 Power Transformer.  
350-0-350 V at  
100 mA,  
5 V 2 amps,  
6.3 V 3 amps.
- LFC 10-20 Henries,  
100mA LF Choke.
- C1 8  $\mu$ F, 450 V Wkg,  
electrolytic.
- C2 16  $\mu$ F, 450 V Wkg,  
electrolytic.
- R1 50 k  $\Omega$ , 5 watts.
- S1 DPST switch.
- S2 SPST switch.
- V1 5Z4 rectifier.

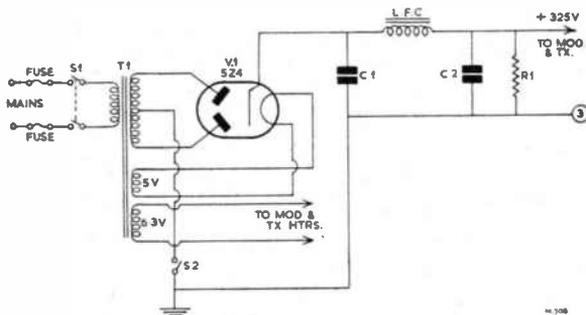
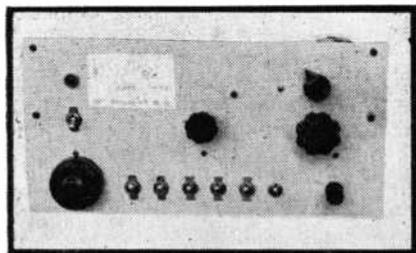


FIG. 7. A SUITABLE POWER PACK CIRCUIT DIAGRAM



# A CRYSTAL CALIBRATOR UNIT

by

C. B. RAITHBY, G8GI.

**W**HERE some means of accurate frequency measurement is required, this unit should prove useful. It provides the following facilities:

- (a) RF output at 75, 100, 500, 1000 and 10 kc/s intervals, at a high degree of accuracy.
- (b) These outputs may be audio-modulated if desired.
- (c) Ability to peak the chosen output or its harmonic on the amateur bands up to 28 Mc/s.

Some of the unit's uses are:

- (1) Checking receiver calibration, e.g. every 75 or 100 kc/s on the Long and Medium wavebands, or every 500 kc/s or 1 Mc on the amateur band.
- (2) Checking and calibrating signal generators.
- (3) Checking and calibrating VFO's.
- (4) As a band edge marker for amateur communication receivers.

## Circuit.

V1, 2 and 3 are in similar circuits, namely, the modified Colpitts crystal oscillator circuit, and use 75, 100 and 500 kc/s crystals respectively. All these particular crystals have been, and some still are, available from surplus equipment. If desired, the 75 kc/s section may be omitted. V4 is in a Pierce crystal oscillator circuit; this was chosen as it seemed to give greater output than the Colpitts, and the 1 Mc crystal output harmonics are required up to 30 Mc/s. V1, 2 and 3 are EF50's as these happened to be available but other types such as the 6SK7, 6SG7, 6AC7, 6K7 and SP61 may be used instead. Any one of these, triode connected, can be used for V4, but here a 6J5 will do.

V5, an ECH35, combines two functions. Firstly, it acts as a harmonic amplifier, the output from the crystal oscillator selected being fed into the signal grid. Secondly, the output from the multivibrator V6 is fed into the oscillator grid via C22. The oscillator anode of V5 is unused.

Considering the first function, there is a radio frequency choke in the anode of V5, and in parallel with this (via C16) is a tuned circuit with four positions (Sw 7). As is

shown, Sw 7 brings into circuit L2 and C17 covering the 28 Mc/s band and is intended to be used with the 1 Mc crystal oscillator. Strong harmonics will be audible on a receiver at 28, 29 and 30 Mc/s. With the 500 kc/s crystal in use, weaker harmonics should be heard at 28, 28.5, 29, 29.5 and 30 Mc/s.

The next switch position covers the 14 Mc/s band and following that is the position for 7 Mc/s. In the fourth position no tuned circuit is used and satisfactory harmonics are available from 75 kc/s to 7 Mc/s. The output is taken from V5 anode via C18 to a bushed terminal on the front panel. Depending on the order of the harmonics and the degree of output required, either a small aerial, say 12 inches long, can be attached to the terminal or a lead taken from it to wherever required.

V6, a 6SN7, is in a multivibrator circuit intended to be used with the 100 kc/s oscillator. By adjustment of R18, it will be found possible to "lock" the multivibrator so that it gives outputs every 10 kc/s from the 100 kc/s input. If preferred, R18 may be a preset control. The multivibrator will also "lock" with inputs from the other oscillators but not necessarily at 10 kc/s. The output from this stage is fed via C22 into V5 oscillator grid.

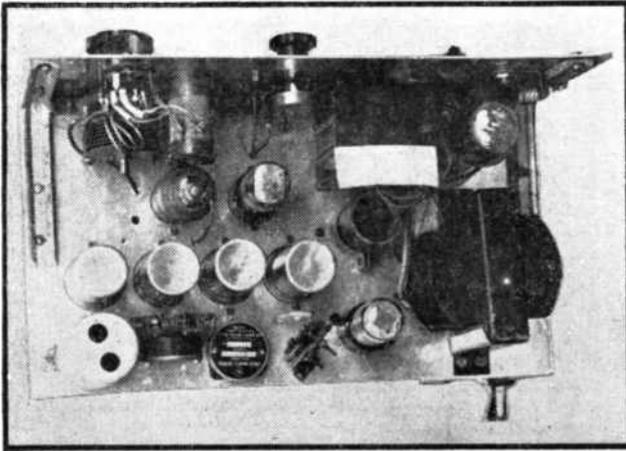
When using the unit for receiver calibration it is helpful to be able to identify the oscillator outputs from other signals. To help here, audio modulation is available via V7 and the associated circuit. T2 is an old audio transformer and it is suggested that some experiment is made here by trying various values for R26 and C27 and also by trying various values of capacitors across either windings. Good waveform is not required here, in fact the more unusual the note the better it will prove to be in practice. For a reasonable depth of modulation, R22 should be varied according to individual preference.

V8 and the rectifier circuit are quite orthodox.

## Construction.

The unit is built on an aluminium chassis 14" x 8" x 2½", with a front panel 7" high.





*Photo showing  
general  
arrangements  
of the  
components*

The chassis layout is in no way critical. Separate switches are used for each oscillator and there are definite reasons for this. Firstly, each crystal can be checked against one of the others by listening to the beats or audio note. Secondly, identification is simplified for, with the 1,000 kc/s harmonic located at 14 Mc/s, it is easier to locate the 140th harmonic of the 100 kc/s oscillator, etc. It will, of course, be necessary to peak C17 to obtain such high order harmonics satisfactorily.

The other item requiring explanation is the coil section. L1 consists of 40 turns of 30 swg, double silk-covered wire, on a 1" diameter paxolin former and tapped at 6 and 14 turns from the "hot" end. L2 is a separate coil, wired directly across the switch contacts and is of 2 turns, 1" diameter. 18 swg plated copper wire is used with approximately 1/4" spacing between turns. This was found necessary to get satisfactory harmonic amplification up to 30 Mc/s.

#### Operation.

Close Sw 8, check dial light and rectifier filaments, all glass valve heaters. Close Sw 9 then check each crystal in turn by using a receiver tuned to an appropriate frequency. Check operation of the harmonic amplifier V5, adjust L1 or the tapping points, and L2 if necessary. Close Sw 5 and check the audio modulation. Switch off audio, close Sw 2. Tune a receiver to 1,000 kc/s (easily located by V4), identify the 100 kc/s harmonic and then find 1,100 kc/s on the receiver bandspread dial. Close Sw 6 to bring into circuit the multivibrator, then adjust R19

till the 100 kc/s from 1,000 to 1,100 kc/s is divided into ten spaces, i.e., eleven points of oscillation from 1,000 to 1,100 kc/s inclusive.

#### Component List.

- C1, 5, 9, 13, 20, 27, 25, 26, 27. 0.01  $\mu$ F.
- C2, 4, 6, 8, 10, 12, 15, 18. 70 pF.
- C3, 7, 11, 23, 24. 0.001  $\mu$ F.
- C14. 25  $\mu$ F.
- C16. 0.002  $\mu$ F.
- C17. 100 pF.
- C19. 0.1  $\mu$ F.
- C21, 22. 10 pF.
- C28. 88  $\mu$ F.
- All capacitors 350 DC working electrolytic.
- T1. 250-0-250 V, 50 mA, 6.3 V 3 A, 4 V 2.5 A.
- T2. Intervalve transformer.
- CH1. Choke 10H, 50 mA.
- RFC1. 2.5 mH choke.
- Sw 7. 3-pole, 4-way Yaxley.
- X1, 2, 3, 4, 75, 100, 500, 1,000 Xtals.
- V5-ECH35, V6-6SL7, V7-6SN7 or 6J5, V8-U12.
- R1, 5, 9, 24. 25 K.
- R2, 6, 10, 13. 500 K.
- R3, 7, 11. 10 K.
- R4, 8, 12, 15, 16, 25. 100 K.
- R14, 20, 21. 50 K.
- R17. 250 K.
- R18. 20 K Variable.
- R19, 23. 20 K.
- R22. 200 K.
- R26. 150 K.
- R27. 560.
- L1, L2. See text.
- Sw 1, 2, 3, 4, 5, 6, 9. On/Off toggle.
- Sw 8. Double-pole on/off.
- V1, 2, 3, 4. EF50.

# ABOUT FREQUENCY CHANGERS

by

H. E. SMITH, G6UH.

WHEN the design or rebuilding of a communications receiver is contemplated, it often occurs that while considerable thought is given to the question of a high gain RF stage, or extreme selectivity in the IF stages, the mixer, or frequency changer, is left to look after itself. The valve chosen for the frequency changer is often the one that happens to be lying about spare, and is pressed into service irrespective of whether it is entirely suitable for the circuit or the frequencies that are to be covered. We will deal firstly with the short wave receiver covering from 3 to 30 Mc/s. What must we look for in choosing a suitable frequency changer? The six most important points are as follows:—

- (1) Maximum conversion gain on the higher frequencies (20-30 Mc/s). This does not necessarily mean choosing a valve with the highest conversion conductance figure. Certain types have a high anode impedance figure, which offsets to a large degree the lower conversion conductance figure which may apply.
- (2) A good signal to noise ratio. This is only of the highest importance when no RF stage is used, as will be explained later.
- (3) The valve must be of a type which will allow the application of AVC without frequency shift.
- (4) Freedom from parasitic oscillation at the higher frequencies.

(5) When of the Triode-Hexode type, good oscillator stability relative to changes in HT supply voltage.

(6) Freedom from "flutter" effects and modulation hum.

Taking first of all the question of gain, the equation given herewith represents the gain figure of a frequency changer when the load is a parallel-tuned circuit.

$$\text{Gain} = \frac{C_c R_a R_L}{R_a + R_L}$$

$C_c$  = Conversion Conductance figure.

$R_a$  = Anode Impedance.

$R_L$  = Impedance of tuned circuit at resonance.

This equation is not presented as a possible method for everyone to arrive at the gain figure of a frequency changer, as  $R_L$  value will be difficult to determine for most. It is presented rather as an indicator of the relationship between Conversion Conductance and Anode Impedance. It will be seen that if on the one hand the Conversion Conductance is given as 0.3 MA/V, and the Anode Impedance as 0.5 megohms, and on the other the Conversion Conductance as 0.5 MA/V and Anode Impedance as 0.3 megohms, there will be no difference in the *gain* figure of the two valves provided each is operated according to manufacturer's data. In actual practice, it is possible that the valve with the *lowest* Conversion Conductance figure may

*To ensure oscillator stability, its H.T. supply should be taken direct from the rectifier through a separate filter circuit as shown here.*

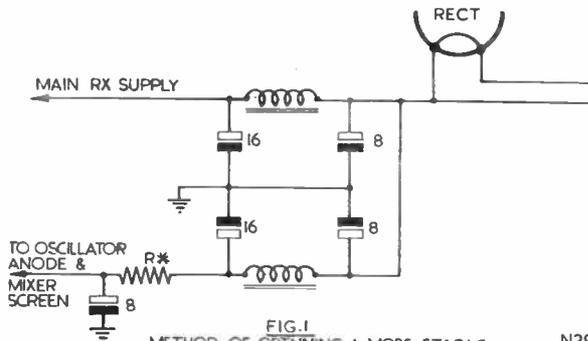


FIG. 1  
METHOD OF OBTAINING A MORE STABLE  
OSCILLATOR H.T. SUPPLY. ( $R^*$  = VALUE ACCORDING  
TO VOLTAGE REQUIRED)

N297

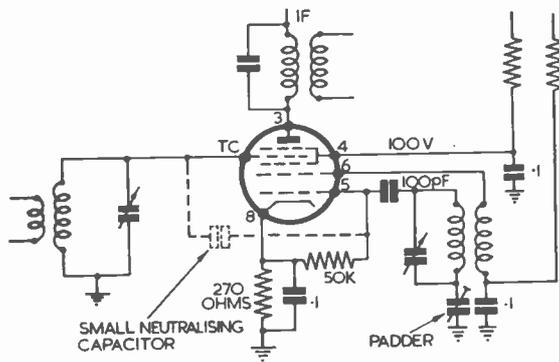


FIG. 2  
TYPICAL 6A8 FREQUENCY CHANGER

*For satisfactory results on frequencies up to 30 Mc/s, valves of the 6A8 class need careful circuit arrangements. Some form of neutralisation as suggested here improves performance greatly.*

N298

give the better performance, in view perhaps of its lower total cathode current and consequent lower signal to noise ratio. Considering this question of signal to noise ratio, we must decide whether or not an RF stage is going to be used ahead of the frequency changer. For serious work, the RF stage is an absolute necessity, so we will assume that one will be used. The noise from the frequency changer grid may be referred to the grid of the RF valve, and "frequency changer noise" may be considered as being negligible, provided there is sufficient oscillator voltage injection to fully modulate the frequency changer current. It is not proposed to delve further into the "noise" question as it is somewhat outside the scope of this article, but it should be clearly understood that provided the RF stage is correctly loaded and matched, and the oscillator injection voltage of correct proportion, there is little to choose between most types of frequency changer from a purely "noise" point of view.

If AVC is to be applied to the frequency changer stage, it is almost certain that a valve of the triode-hexode type will have to be used. In most of the "pentagrid" types, the high impedance grid return due to the AVC network causes positive grid current to flow, and as this in turn causes an increase in negative bias, the sensitivity is impaired. Although this may be overcome to some extent by including some fixed bias and increasing the anode volts, it is not good practice. In general, AVC should not be applied to a pentagrid type valve when maximum sensitivity is required, and for that matter, a pentagrid does *not* make the best frequency changer for short wave operation in any circumstances.

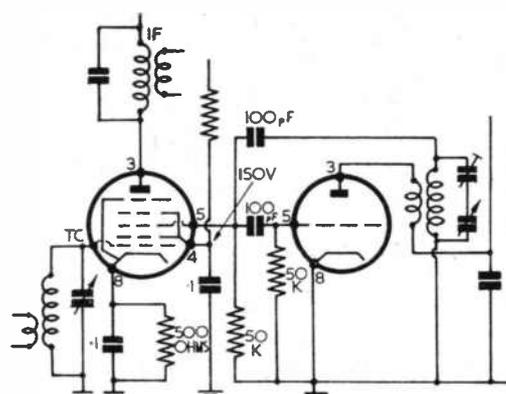
Oscillator instability due to changes in HT potential is most prevalent in the pentagrid type of frequency changer. With the triode-hexode, however, precautions must be taken

to ensure that frequency drift will be at a minimum. The two vital feed points in the matter of frequency drift are the hexode screen and the oscillator anode. One good method of supplying the oscillator anode and hexode screen is to take the HT supply direct from the rectifier through a separate smoothing choke and filter circuit, and use series dropping resistors to obtain the required value of HT (Fig. 1). The adoption of this system is also advisable even when a separate oscillator valve is used, as the changes of HT voltage taking place (under strong signal conditions) across the main smoothing choke, are often quite considerable.

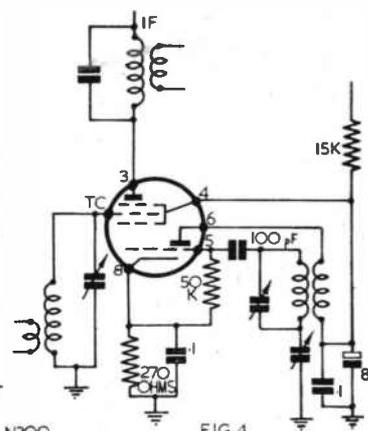
"Flutter" effect and modulation hum can be avoided and eliminated by the use of the above system, but in all cases it is best to fit an 8 MFD electrolytic capacitor as a by-pass in the oscillator anode circuit.

#### American Types.

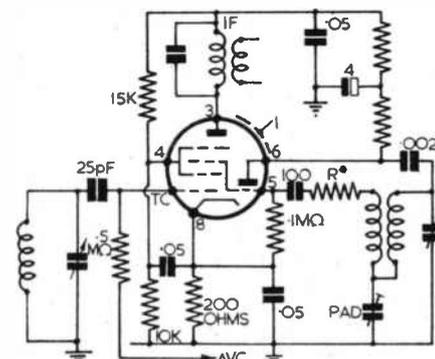
Valves such as the 6F7 (triode pentode) were widely used as frequency changers some years ago, but are now considered as obsolete. The 6J8 (triode-heptode) is another which is no longer current. Taking the 6A8 (heptode) as our first example, we find that several important precautions must be taken in order to obtain anything like satisfactory results on the SW bands. A typical circuit is given in Fig. 2. With the 6A8, appreciable capacitive coupling is present between the signal grid and oscillator grid, and as this is in phase with the space charge coupling, some form of neutralisation must be used to prevent a lowering of the conversion gain on the higher frequencies. As with most valves of this class, the 6A8 suffers from frequency drift if AVC is applied to its grid. It must, therefore, be operated with fixed bias. Extra good filtering is required on the oscillator anode grid in order to avoid modulation hum.



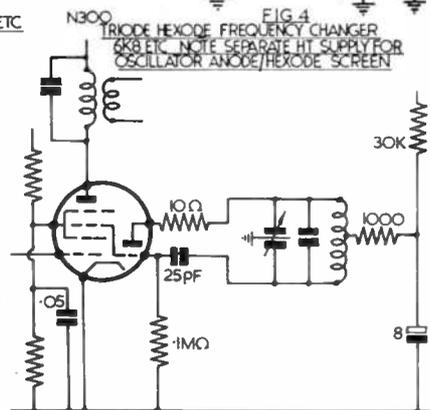
N299 **FIG 3**  
6L7 WITH SEPARATE OSCILLATOR 6C5 6J5 ETC



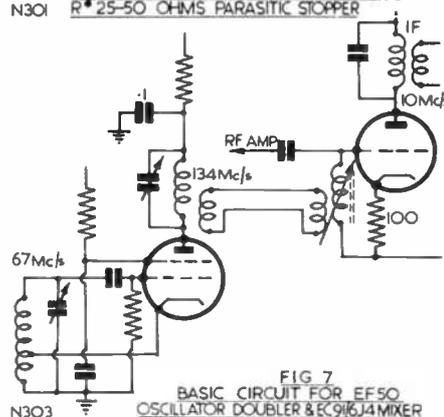
N300 **FIG 4**  
TRIODE HEXODE FREQUENCY CHANGER  
4K8 ETC. NOTE SEPARATE HT SUPPLY FOR  
OSCILLATOR ANODE/HEXODE SCREEN



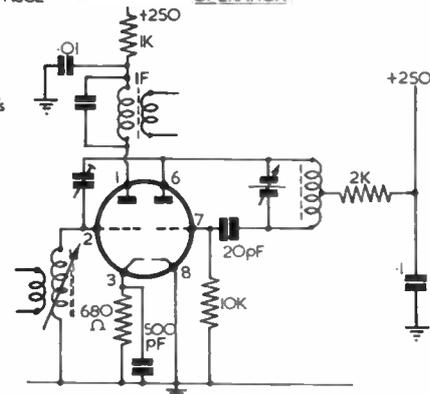
N301 **FIG 5**  
RECOMMENDED CIRCUIT FOR X61M 3-30mc/s  
R\* 25-50 OHMS PARASITIC STOPPER



N302 **FIG 6**  
X61M CIRCUIT MODIFIED FOR 30-60 Mc/s  
OPERATION



N303 **FIG 7**  
BASIC CIRCUIT FOR EF50  
OSCILLATOR DOUBLER & EC 916J4 MIXER



N304 **FIG 8**  
2A7 MIXER OSCILLATOR FOR VHF OPERATION

[Note.—It must not be thought that valves of the 6A8 class are generally inferior. As a general purpose frequency changer for broadcast frequencies they perform well, and our comments apply solely to the question of optimum performance up to 30 Mc/s.]

The 6L7 (pentagrid) is almost invariably used as a mixer with separate oscillator (6C5, 6J5, etc.). A basic circuit is shown in Fig. 3. On frequencies of 20-30 Mc/s this valve also shows a strong tendency to frequency drift with AVC applied, and it is usual to increase the fixed cathode bias resistor to 500 ohms, and increase the screen HT supply to 150 volts to maintain sensitivity on the higher frequencies. The additional precautions applicable to the 6A8 also apply to the 6L7.

We come next to the 6K8 (triode-hexode) which is the best SW frequency changer we have discussed so far. Its anode impedance being approximately 0.6 megohm, some benefit will be derived by using a high inductance type IF transformer. The maximum HT which may be applied to the oscillator anode is 100 volts. Although the circuit (Fig. 4) shows fixed bias, this valve may be operated with AVC at all the usual SW frequencies, provided that the oscillator anode and hexode screen are fed through a common resistor, plus an 8 MFD (or more) by-pass capacitor. A recommended value for the dropping resistor, when the common HT supply is 250 volts, is 15,000 ohms. So much then for the better-known American types.

#### British Types.

The Marconi/Osram X61M is an outstanding example of good valve design. Its high conversion conductance and relatively low cathode current provides a good signal to noise ratio. This valve will give excellent and stable conversion up to 60 Mc/s and even higher, provided the necessary precautions are taken in using the correct type of oscillator circuit at these higher frequencies. The X61M will, therefore, make a satisfactory frequency changer for Television frequencies. Fig. 5 shows a suitable circuit for use on the 3-30 Mc/s bands, and Fig. 6 is a modified version which should be used for frequencies of between 30 and 60 Mc/s.

The design of the X61M is such that best results are usually obtained with a higher frequency IF than the usual one of 465 kc/s. It would, therefore, be a highly suitable valve for use in a receiver with double frequency changing with a first IF of, say, 2 Mc/s, followed by the second at 465 kc/s. The makers recommend that the heater supply should never be less than 6 volts, and it is permissible to run it at 7 volts with safety.

The Marconi/Osram X65 is another useful triode-hexode. It has a somewhat lower conversion conductance figure, but will operate quite successfully with a hexode anode potential of 100 volts. Its general operating conditions are otherwise similar to the X61M.

A much later Marconi/Osram product is the X81 B8C based triode hexode. This is a single-ended valve designed for operation up to 100 Mc/s. Its conversion conductance is even higher than that of the X61M, and it has the unique feature that frequency stability is reached in 4-5 minutes after switching on from cold. [Note.—The X61M and other octal based types usually take up to 30 minutes.] There is less tendency for "pulling" effects if a tuned anode system is used for the oscillator section.

Above 20 Mc/s, the signal grid and oscillator circuits should be well screened from each other to avoid interaction. Oscillator injection voltage may be adjusted by the correct choice of the value of the oscillator grid coupling condenser. For normal operation this should be of 47 pf.

The Marconi/Osram X79 is also a triode-hexode (B9A base) designed for operation up to 100 Mc/s. With a conversion conductance still higher than the X81, it has an equivalent noise resistance (referred to G1) of only 150 ohms. This renders it especially suitable as a frequency changer in Television receivers. Operating conditions are similar to the X81, except that G2 + 4 voltage should be 75 for optimum operation.

Remember that the stability of the oscillator section of a frequency changer is governed to a great extent by the components used. Compression-type trimmers should always be avoided, and the oscillator coil itself should be quite rigid. As stated previously, the HT supply should be quite constant, preferably stabilised. We are now coming to the matter of VHF frequency changers, and the above points are of far greater importance when operating on frequencies in this region.

#### The VHF Frequency Changer.

Many VHF operators used a triode mixer with separate oscillator. The oscillator valve often acts as a frequency doubler, thus avoiding any "pulling" effects. A good arrangement for 145 Mc/s is to use a 6J4 (EC91) as the mixer and an EF50 as oscillator/doubler (Fig. 7). The only snag with this system is that it is often impossible to obtain a real "T9" note, due to modulation hum from the EF50 heater. A simple cure is to use 6 volt metal rectifier to supply the heater of the EF50. This will, of course, entail using a separate transformer capable

*(Continued on page 135)*



# DX COUNTRIES NO. 5 IRAQ YI

by  
J. C. SYMES

**W**HEN a temperature of 80°F is recorded in England it makes headlines. Can you imagine 125°F in the shade and very little shade, too? This is the summer temperature in Iraq. The country has been portrayed as the very home of romance—glittering\* mosques, handsome sheikhs in golden raiments and glorious, mysterious, veiled houris in fancy pyjamas. Don't you believe it! I lived in Baghdad for two years and explored the country from end to end. Certainly there are mosques and minarets, most of them very faded and dirty. Certainly there are sheikhs, but their "golden raiments" consist of utility garments more suitable to the climatic conditions and desert donkey rides. Certainly there are veiled girls, but the majority are literally swathed from head to foot in black, many have cheap "Xmas cracker" rings in their noses, and I definitely was not privileged to see one in fancy pyjamas, HI!

The true romance of Iraq lies in its ancient history, in Babylon, in the Arch of Ctesiphon still standing after more than a thousand years, in the devil-worshippers of Nineveh, and in the primitive implements of agriculture used by the Arabs on the banks of the Tigris and Euphrates Rivers.

Iraq, formerly known as Mesopotamia, is mainly desert. Hundreds of miles of scorched plains radiate from Baghdad in all directions. The monotony is broken only by the fringe of

date palms on the river banks. Desert life has its dangers in the form of scorpions, snakes and large hairy spiders.

North of Mosul, the scenery changes completely. Foothills, gradually giving way to mountains, replace the flat desert. Stately trees, flowers and soft fruit make the 400-mile journey from Baghdad to Ser Amadia worth while. The mountain road is a death trap to the unwary. Blind corners, sometimes as many as seven hairpin bends in succession, necessitate concentration and often perspiration as a wheel edges towards a 3,000 ft. precipice. With the change of scenery comes a change of population. Tough Kurdish tribesmen, with rifles, bandoliers and wicked-looking knives, roam the countryside. Syrians, in their colourful costumes, wave you to stop in order to sell you great bunches of grapes for a few pence.

A few weeks of mountain air, exhilarating climbs and baths in the cool waters of the River Zab give one sufficient courage to face the heat, the flies and the smell of Baghdad once more.

Few "hams" find their way to this land voluntarily. Those rare signals bearing the YI prefix are generally the work of servicemen. For some time the only active "ham" in Iraq was YI3ECU, but a new call, YI3BZL, is now very prominent on 20 metres. Spare him a thought this Summer—125°F—whew!

# AMATEUR RADIO IN THE NETHERLANDS

by

E. KALEVELD, PAΦXE.

AS soon as Marconi had made his first tests of wireless telegraphy in England, all those "private experimenters" throughout the world who experimented with electricity and mechanical gadgets set about trying to duplicate his results. There were such people in the Netherlands too, but it was not until after World War I, when the vacuum tube, developed by Lee de Forest, was released for civilian use, that radio as a hobby really could get going.

The first noteworthy successes on short waves were realised in December, 1924, when a Dutch amateur, PC11, established contact with several American stations during the transatlantic tests on 100 metres. There were no licences at that time in Holland and when PC11 was caught transmitting shortly after his success, the judge fined him the lowest fine after having complimented him on his results and having excused himself for having to fine him!

It was not until 1927 that finally licences were issued in Holland, and by 1939 about 400 stations were operating under the prefix PAΦ. With the declaration of war in September, 1939, activity had to cease for the time being. That time came in 1940, when the Netherlands were over-run and occupied by the German army. Very shortly afterwards Dutch amateurs were transmitting again, this time not for "experimental purposes" as the official wording of their licences had specified, but for the sake of freedom, against Nazi suppression. In 1945, when the underground workers emerged from their hiding places, they found that a large number of their fellow radio operators had died before the German firing squads. Their call signs will forever be silent as PTT, the Dutch GPO, will never more issue them.

However, amateur radio had proved its usefulness in times of danger and at the end of 1945 the 28 Mc/s band was released for

*Amateur TV camera in action at a public demonstration in Holland.*



## OUR FRONT COVER

*Shows PAΦXE at the key. No he is not left handed, he is ambidextrous, which is a most useful characteristic for the radio operator be he amateur or professional.*

amateur activity. At the beginning of 1946, PTT started issuing new licences and the number of PA $\phi$ 's has continued to grow ever since, reaching a total now of about 900.

In January of this year, a new system of licences was adopted. The Type A licence permits 50 watts input on the 3.5, 7, 14, 144, 420, 1215, 2300, 5650 and 10,000 Mc/s bands and 100 watts on 28 Mc/s for both phone and CW. ICW is not permitted. An exam, which is oral, is held about three or four times a year at the Hague and comprises knowledge of the principles of magnetism, electricity and radio, the legal regulations concerning amateur radio and ability to send and receive morse at a speed of 12 wpm.

After having held licence A for at least a year, one may apply for a QRO licence called the B licence, allowing a maximum of 150 watts on all bands. An additional exam must be taken for this licence consisting of a more thorough knowledge of technical principles, especially UHF, VHF, TV and BCI, together with a further morse test at 18 wpm.

In addition to these licences, there is a special C licence for radio-controlled model builders, which is valid only on the VHF bands. The exam is the same as for the A licence except that the morse test is omitted.

One may choose one's own call-sign out of two or three available ones—but as mentioned already, those previously used by deceased underground operators may not be used again. The cost of the licences is 15, 20 and 15 guilders respectively, a guilder being slightly less than two shillings. One also has to pay a further 12 guilders a year which incidentally applies to broadcast listeners as well.

The radio society of the Netherlands, "VERON," has about 5,000 members but includes transmitters, SWL's, TV amateurs, AF and sound engineers and service-men. A monthly magazine, *Electron*, is published, and the QSL Bureau—Box 400, Rotterdam—is well known all over the globe. The society and the QSL bureau is run entirely by volunteers.

The position of the Dutch amateur regarding equipment is worse than that of his British colleagues. In the Netherlands there is no such thing as a surplus-market and only occasionally can surplus radio gear be bought. Even new parts are not readily available and the word "no" is very often heard in the radio shops!

Most of the receivers used by the amateur are home-constructed, as are practically all the transmitters. Most people use superhets and the VFO-controlled transmitter is almost universal.

The activities of the Dutch amateur cover pretty well the whole field. The 1.7 Mc/s

band is not permitted for amateur use, but 3.5 Mc/s is a favourite for the homely rag-chewer. 7 Mc/s is far less popular than in England but 14 Mc/s is by far the most popular band with the dx chasers. 144 Mc/s receives quite a bit of attention and even on 420 Mc/s very successful work has been done, contacts having been made between Rotterdam and Paris. The higher frequencies are mainly a vast silence probably due to lack of suitable equipment.

In Groningen an amateur TV group is transmitting on 144 Mc/s from its own amateur studio with non-paid artists, while in Rotterdam a similar service will soon be started.

Taken as a whole, the amateur in the Netherlands is very much like his colleague in England, France or anywhere else. When you visit him in his sanctuary, he first of all apologises for the mess, and then goes on to explain that just that piece of gear for which you were visiting him is in the course of reconstruction. He is never ready and never satisfied with results, constantly tearing apart, building and rebuilding. In short, he is an amateur in the best sense of the word.

### THIRD ANNUAL VHF CONTEST (145/420 Mc/s)

The Third Annual VHF Contest is being organised to take place during the weekend of May 24th/25th. Rules and conditions will be similar to the two previous contests with one or two modifications. Listeners are cordially invited to participate. Full rules, conditions and details of awards will be announced in our May issue. Keep the dates open—May 24th/25th.

### ECONOMY.

The present high cost of publishing is in part due to the price of paper. Some of the circuits in this issue are not as large as we should have liked, but they are big enough to serve their purpose. In order to give our readers as good value for money as possible, we have, too, restricted our page margins and we use a medium size type. The paper thus saved goes to provide more space for reading matter.



# AMATEUR BANDS

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## COMMENTARY

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Conducted by **STANLEY HERBERT, G3ATU.**

**C**ONDITIONS, to the Radio Amateur, are always bad. If you doubt the accuracy of this remark, just listen for a few moments on one of the Amateur Bands! "Hr condx terrible," "Sri, OM, the Band's almost dead," "Hope cuagn when condx are better," and similar 'happy remarks can be heard echoing from Poona to Peoria (Ill).

After hearing the "Boys" chatting thuswise, a newcomer might well wonder how anyone ever managed to make a QSO at all!

Yet, as a glance through this month's reports will show, there's still some good stuff coming through. The Dx is still there and if it IS a little more difficult to unearth, the digging thereof is still good fun, even if a trifle exasperating at times.

We'd hazard a guess, too, that when the next sunspot maximum comes round, the QRM on all bands will be so colossal that it will be a darned sight more difficult to work the rare ones than it is today! The more we practice now, the easier it will make things when the bands really start to sizzle once more.

And so to the month's doings; "Twenty" once more carries most of the traffic, so let's start with . . .

### 14 Mc/s.

**N. C. Smith (Petts Wood)**, wielding the Eddystone 750 with his customary expert touch, reports on phone, CR6AN and 6AR, EL9A, T12CHV/T13, VP3LF, ZS2MI, ZS7C, sundry OQ's, VQ2's, 4's and 5's, the Exhibition station VS7RSC and lastly, ZD9AA, who should come in for plenty of attention, once more!

CW produced, among other good ones, CR7, JA2, KG6, UG6, U18, VK7DW, this latter at 1300 GMT, FN8AD, VK9DB (1320), Z14BH, VQ3BM and ZD6HN. A very interesting "near miss" was YA2??, heard on Phone at 1720 GMT. Norman thinks this may be the Portuguese Diplomatic Mission to Afghanistan (vide CT1BW) and would like to hear more from this one. So would we!

The score for this year already stands at 131 Countries in 34 Zones; good going, to say the very least.

**GW2ADZ (Llanymynech)**, takes time off from VHF to sample the "Long Waves"! Despite the fact that, as befits a "VHF Man," his LF aerials are all lower than his beam arrays, Bill worked EA9BI, EK1CW, ZS3U and ZS5JN. Did you organize 'em for 2 metres, Bill?

A welcome newcomer is **R. Pitter (Farnham)**, who, with an R107 and a 60-foot wire in the roof-space, hears such things as CR7AJ, HR1SO, KV4AQ, W4CG/KV4, ST2AB, VP3LF, 3HAG, VP5BP (Caymans), ZP7AW and sundry KP4's. Very nice, too.

R.P. queries one,  $\phi$ BIGKU. This we would guess to be ZBIGKU.

We welcome, also for the first time, **B. Kenyon (Liverpool, 8)**. B.K. uses an O-V-1 with an indoor aerial, and hopes his efforts will serve to encourage others working in similar circumstances.

So far, 100 stations in 23 Countries have been heard on 14 Mc/s, and the log includes EL9A, TA2EFA and 3AA, VP6, VQ4, ZD4, PY, and a station signing YL3GL. Would this one be YO3, perhaps?

**M. Lillington (Orpington)**, is breaking in a new S740, which separated the following from the QRM. EL9A, HC1FG, HZ1AB, MP4KAC, VP9G, XZ2SY, YV3AU, ZD9AA, lots of ZS's and other good stuff.

**P. Martin Harrison (Darlington)**, despite inactivity, due to staggered duty shifts, but aided by a new 14 Mc/s dipole, offers, on Phone, CE3AX, HP1AL, CR6AH, VS1AX, PY, SU, KP4, KL7, 5A2TH, ZS2MI, to mention the plums. The CW end provided VE8RH, PJ5FN, VS6BZ, KH6AI, KG6AAE, KL7PI and ZL4HP.

Martin gives TB2AC as a MARS station and singles out for special mention TA2EFA, probably still S9 on a crystal set; and ZS2MI, heard on twelve separate occasions. Its the Rhombics that do it!

"Van," of '2MI, is, of course, a commercial operator, and still experiences difficulty in coping with the howling mob which greets his every appearance. In consequence, he's rather tricky to work!

**B. J. C. Brown (Derby)**, now recovered from a bout of flu, thinks things are improving,

although still patchy. His best for the month includes EL9A (everyone but G3ATU appears to have heard this one !), CO2VW, EA8AW, EA9AS, HP1LA, T12TG and YV5AU.

**G3ATU** admits working, on CW, FB8BD, FN8AD, VK1WO, FB8ZZ, CR9AF, and on Phone, VP5BP. This latter has now left Cayman Is. for his native Canada, but don't worry, he's liable to be back one of these days.

Heard at 'ATU were FK8AI, 559 (0900), HS1WR (T6) (1900), ZS7D and ZS7F, both apparently using the same rig. All these on CW.

An interesting one, active both on A1 and A3, uses the peculiar call 4UAJ. He's perfectly genuine and is the United Nations Radio Station, situated at Jammu, in Kashmir. The present operator is Ted Gull, who hales from Middlesbrough, and the rig is a BC610 used with a sloping long wire.

While on the subject of "cock-eyed" callsigns, several readers mention the new 5A2 series. Yes, 5A2 denotes the Kingdom of Libya, comprising the three provinces of Cyrenaica, 5A2C, Tripolitania, 5A2T, and the Fessan, which, when it possesses an amateur station, will presumably be allotted 5A2F.

We shouldn't be a bit surprised one of these days to hear a QSO between 5R4GY and 6V6GT/G!

### The 28 Mc/s Band.

Poor old "Ten," which continues to take an almighty hammering from present conditions, is dismissed by most people, either in silence or with considerable rudery. Judge, then, our surprise on receiving a report which almost restores our faith in "Good Old Ten." It shows just what can be done by giving one band our undivided attention.

**G3HCU** (Chiddingfold, Surrey), the man in question, using 150 watts Phone, has worked 27 Countries, including VU2DZ (16 contacts during the month), W3, 4, and φ, ZE, ZS, PY, HC, OQ5, ZL, VK2, 3, 4, 5 and 6, VE, LU, ZB1, MI3, TA, KP4, MD2, 4X4, ZL2JH/MM, W5MET/MM, VQ1RF and lots of European Countries on short skip.

There's life in the old band yet!

And so we pass on to that heterogeneous mixture of assorted noises, the 7 Mc/s band. The "Roaring Forties," jam packed as it is with every conceivable kind of QRM, makes Dx digging just about as difficult as it could possibly be. Even when the fourth or fifth layer has been penetrated and a juicy piece of Dx laid bare, something in the RST592C category is apt to sit on the frequency, calling its mate and generally making things nice and cosy!

But let 'em all come, the Dx is there and its being brought to the surface, despite everything.

**N. C. Smith**, for instance, dashed into the fray and emerged with the scalps of CT2BO, FM7WF, KZ5RM, M13DD, T12TG, VK2EO, VK3CP (2010), VP4CQ, VQ4AQ, W6NKR, WφHEL, ZE3JP, ZS1LF, ZS3K and almost a dozen ZL's.

**GW2ADZ**, using the aforementioned low-slung aerials, raised ZB2I, heard most W districts and lots of ZL's and VK's which, unfortunately, couldn't be persuaded to take any notice. Bad luck.

Possibly the most interesting and productive time for 7 Mc/s is the time from just before to just after daybreak. The broadcast stations are for the most part inactive and, besides the more or less usual ZL and W signals, it should be possible, on occasion, to hear some of the Pacific Islands. FK8AI is known to be on from time to time and KH6, KC6, yes, even KM6, all use Fourty for many of their "Stateside" QSO's.

A last word concerns VU5AB (Car Nicobar Is.), whose frequency is reputed to be around 7015 kc/s. He has already been worked by at least one lucky "G," but it's going to be really tough winking him out, now that Radio Pakistan has seen fit to camp out on, of all places, 7010 kc/s, on which frequency, every evening, it radiates test transmissions to Europe and the Middle East. Still, it's worth a try and we'd suggest around 1700 GMT as being as good a time as any for the attempt.

The only news of the two LF bands comes once more from the indefatigable N. C. Smith, who has combed both 3.5 and 1.8 Mc/s as follows.

On 3.5 Mc/s, Phone yielded the following: FA8CF, FKS8AA, K2USA, KP4CP, VE1QW, VE3AGK, VE3RCS, VP6SD, VQ4RF, W's 4AIM, 4IYE, 4CPG, 5ZAB and I1YAK/Trieste.

CW activity is represented by CT2BO, FA8BG, FA8GO, V04A, W4SVQ and WN3SRS. These "WN" stations are interesting in that they comprise the new "Novice Class" Ticket Holders, who are limited to frequencies between 3700 and 3750 kc/s, and are restricted to low power, at least by "W" standards! We, ourselves have tried, unsuccessfully, to raise some of these chaps and we imagine that most of them would appreciate a report on the reception of their signals over on this side.

Although activity on Eighty Metres tends to fall off around the approach of Spring, at least from a Dx point of view we well remember the terrific signals provided by PY7WS and KV4AA, even at the height of Summer last year, while signals from ZL, when they

did come through, were often considerably stronger than during our winter months.

Current activity includes OY2Z, who is prepared to prove his genuineness by providing a QSL!, EK1CW, several 4X4's and much besides.

Within the last few days, too, we came across KP4KD, who worked a really choice one—to wit, KH6QY/KC6 (Ponape Island). We could use that one nicely on any band!

I3NDB has also been heard around, but don't panic, he gives his QTH as Mantova, which isn't a long way from Northern Italy.

### Summary.

During the month things really seem to have picked up very considerably, especially on "Twenty," a band for which we should be truly thankful.

The early mornings produced several good openings to the Pacific Islands and Alaska, mid-day often saw the appearance of Central American and West Indian stations, the phone signals from VP6SD being consistently good, as usual.

Early afternoons provided lots of Asians, and sometimes a good path existed to the Phillipine Is. Amateurs in that island are, apparently, still forbidden to contact stations outside the U.S.A. and Possessions, as the "DU" boys will tell you while in QSO!

The late afternoon and early evenings saw Europeans working VK1BS and VK1WO (Macquarrie Is.), FB8BB and 8BD, both Madagascar, FB8ZZ (New Amsterdam Is.) and FR7ZA.

Not too bad, considering the Sunspot Cycle, and with the approach of summer we should once more be able to use 14 Mc/s for the greater part of the twenty-four hours.

### The BERU Contests.

By the time you read this, the first part of this popular event, the Telegraphy section, will already have taken place.

The Telephony section runs for twenty-four hours and if condx are anything like reasonable it should, as usual, provide a fine opportunity of snagging some of those rarer Empire prefixes which are so rarely heard at other times. So good hunting, and keep your fingers crossed!

### Rotten Notes and All That.

At the risk of seeming to flog a dead horse, we feel impelled to make a plea for honest reporting. We are by no means the first to raise this point and doubtless will not be the last, but despite all that has so far been said, the multitude of chirps, clicks, buzzings and all the other unnecessary noises which infest our bands, too often go unchecked. After all, if a station is RST586c (listen around—

there are plenty even worse), and he gets a 589 report, he'll just press happily on, but if enough people tell him to invest in some smoothing, chuck his rig out of the window, take up knitting, or something equally to the point, he MAY do something about it!

Which winds up this month's proceedings, except to wish you all continued "good hunting" and to suggest that you send your reports and comments, please, direct to:—

S. A. Herbert, G3ATU,

Roker House,

South Cliff, Roker,

Sunderland (Co. Durham).

Reports should reach me first post May 6th. 73, and CU next month.

### LATE FLASH.

VS1EV will shortly be operating from North Borneo, using a VS4 call sign on 7 and 14 Mc/s Phone. Times of operation, mainly 1100-1600 GMT.

Thank you, "Onda Corta," for passing along this information.

### ADDENDA.

D. E. Lord (MEAF10), writes from Egypt, where he is serving with RAF Signals. He now uses an RAF R1475 eleven-valve receiver, which covers 2 to 18 Mc/s, and mentions that his Section is able to monitor the bands 24 hours a day. What a pity that receiver doesn't cover "Top Band"! A report from the Middle East would really be something.

Stations heard recently are: AP5B, CN8FX, EA8BB, FR7ZA, IS1's BFJ, EHN, OG, MZ1TA, MI3LK, OQ5RU, SUIAS, TA2EFA and 3AA, VK4NJ and 5EO, VQ8AD, VU2CN and 2FN, VU7SV (sounds interesting, this' one! We wonder if he's India or perhaps somewhere more exotic), VS2CY, VS7BR, YI3BZL, ZB1AJX, ZE2JO and Z55MP. All this on Twenty, we presume.

On the Top Band, "NCS" was rewarded by hearing EK1FM, GM3DJT, GW3CCZ, GW8WJ, OK1AEH and OK1OCD, all using CW. W2SKE, broadcasting in the Radio Amateur Programme, put-out over the VOA, tells that WIBB, in an effort to provide better 1.8 Mc/s transatlantic reception, tried out a 1,000 ft. long wire. He found, however, that the extra gain provided by this massive sky-wire, was offset by the local noise which it picked up.

The Top Band, although now starting its seasonal decline, from a Dx viewpoint, can still be relied upon to provide much of interest and it's always worth attention, even if only for the pleasure of listening to the genuine T9x notes which are so usual up there.

# RADIO AMATEUR TECHNICAL AWARD

Whilst in contact with other stations, we have often noted descriptions of home-built equipment which, we feel, would be of interest and use to other enthusiasts.

In order to encourage the home construction of amateur radio equipment, we have decided to offer two prizes of 5 Guineas each; one for the best article describing a home-constructed double superheterodyne receiver, the other for the best description on building a home-constructed medium power transmitter.

In judging the entries, consideration will be given to: (a) technical standard; (b) ease of construction; (c) frequency coverage; and (d) presentation of the entry, i.e. quality and usefulness of material submitted, and other similar factors which will enable the design to be satisfactorily reproduced by readers.

Closing date will be 30th September, 1952, and all entries should be addressed to the Editor. Covers should be marked "Technical Award."

## ABOUT FREQUENCY CHANGERS. *(Continued from page 128).*

of delivering about 10 volts, but it is well worth the extra trouble. An unstabilised HT supply to the oscillator will cause frequency drift, and the converter will be useless for serious work. If low impedance coupling is used between the oscillator and the mixer, it will be possible to vary the coupling to the mixer grid, and so obtain the optimum amount of injection voltage. In general, this can be adjusted by inserting a microammeter in the mixer grid return, tightening the oscillator coupling until grid current begins to flow, then slacken off the coupling until there is the barest flicker on the meter. In practice, it may be found better to carry out this adjustment on a weak signal, in which case the microammeter will not be required. The 6J6 (ECC91) is often used as a mixer/oscillator. The internal capacity existing between the two grids provides about the right amount of coupling from the oscillator section. A certain amount of "pulling" exists with this system, as the oscillator generally needs to be tuned to the "signal frequency less the IF" in order to obtain sufficient injection. Some success

has been obtained, however, by using the oscillator as a doubler, but this may require the fitting of a 2 or 3 pf capacitor from anode of oscillator to the grid of the mixer.

The 12AT7 (B9A base) will operate satisfactorily as a frequency changer up to 500 Mc/s. It has an extremely high conversion conductance (2.5 MA/V). Oscillator injection voltage is fairly critical, and is best adjusted by the microammeter method described above. The coupling from oscillator to signal grid should be a 1.5 pf air-spaced trimmer, and when the correct setting has been obtained, this may be sealed with wax. A basic circuit for a mixer-oscillator of this type is shown in Fig. 8.

There are, of course, many other systems of obtaining frequency conversion, such as diode and crystal mixers, but it will be appreciated that we have only dealt with the more popular types.

[References: "Radio Designers Handbook." Acknowledgments are also made to the M.O. Valve Co. for permission to quote from their valve data sheets and application reports.]

# ON THE HIGHER FREQUENCIES

## Monthly Notes and News

Conducted by H. E. SMITH, G6UH

### IARU Contest.

In our February notes we gave a list of the placings for the above Contest. This list was copied from the result sheet supplied by VERON and we mentioned that we were doubtful as to the accuracy of the various heights above sea-level. One glaring error that we failed to correct was G3BLP being quoted as being 950 feet above sea-level!! His height is approximately 450 feet, and we hasten to make this correction. When you come to think of it, 450 feet ASL is not exactly a mountain top location, and G3BLP is to be congratulated on the consistency of his Dx and contest achievements. We hope Johnnie will forgive us for inadvertently elevating his QTH!

### Conditions.

Late February and early March gave us some fairly good weather conditions, with the result that activity peaked up to a somewhat higher level. Your conductor is glad to report that he is now on the air again fairly regularly. A new beam is in use, and judging by the signals and reports being received, is performing much better than the previous one. The new effort is a six-element Yagi, wide spaced, and it is going to be interesting to compare the results over a period.

### G3IMI.

Further to the comments of G3WW in our February issue, we have received a letter from G3IMI! of South Harrow. The call was issued to him in September, 1951, and at the moment he only operates on 3.5 Mc/s. Since April, 1951, a pirate has been using this call on 3.5, 7 and 14 Mc/s. G3IMI would be pleased if this "gentleman" would call round sometime and collect the fruits of his labours. We suggest that G3IMI should come and join us on 145 Mc/s.

### The VHF Newcomer.

Several readers have written in on the subject of RF gain on 144 Mc/s. Using a push-pull RF amplifier of the 6J6 type, the problem appears to be that although signals are much louder with the RF stage connected, the noise level seems to have increased out of all proportion to the increase on signal.

This is a common occurrence, especially where the 6J6 is used ahead of another RF stage, such as an EF54. An improvement in the signal to noise ratio is seldom observed under these conditions. It is far better in

these circumstances to remove the second RF stage and couple the 6J6 amplifier direct to the mixer. Great care should be taken to ensure that the 6J6 stage is correctly *neutralised*. Poor neutralisation will result in regeneration taking place. Local signals will be received at greatly increased volume, but weak signals will disappear in the additional noise generated by the re-generation. If, in spite of careful neutralising, there is still a tendency to excessive hiss, this may be kept at a minimum by tight aerial coupling. Using a grid to grid inductance of 5 turns on a  $\frac{3}{8}$ " former, the aerial coupling coil for various feeder impedances should be as follows (in each case, coupling should be as tight as possible).

300 ohm ribbon ..	5 turns	$\frac{3}{8}$ " dia.
100 ohm balanced ..	4 turns	$\frac{3}{8}$ " dia.
80 ohm twin ..	3 turns	$\frac{3}{8}$ " dia.

Unbalanced (or coaxial) input to a push-pull stage is not satisfactory, and when coaxial feeder is used, a "balun" should be fitted to the receiver end of the feeder. A simple "balun" for coaxial feeders of the solid polythene types, 50 to 100 ohms, may be made up by using a  $13\frac{1}{2}$ " length of the feeder. This should be taped securely in parallel with the end of the feeder. The outer of the short length only is used, and is soldered to the outer of the main feeder at the  $13\frac{1}{2}$ " point. The inner of the main feeder is then soldered to the outer of the short length and this connection goes to one side of the coupling coil. The other end of the coil connects to the *outer* of the main feeder. Thus, the coaxial feeder is transformed into a balanced feeder and there will be no undesirable reactive effects in the grid circuits.

To obtain a more correct balance in the grid circuit, it is better to remove the centre tap of the coil from earth and fit a 100K resistor from each grid to earth.

Special attention paid to all these small points will result in an improvement in overall performance.

### Station Reports.

"Harry" Wilson, E12W (Dublin) will be operating from the 1st of April at 2200 GMT on 144.144 Mc/s with his new 32-element stack. The permanent shack has now been completed, and is 760 feet ASL. E12W will welcome reports, and these should be addressed to E12W, c/o IRTS QSL Bureau, 97, St. Stephens Green, Dublin. A spare workshop

at the business QTH has been used for the construction of the array. Sixteen radiators backed up with sixteen reflectors! E12W looks like "going to town" this season.

**Dr. Folan, EI6W** in the "Cittie of the Tribes" (Galway City) will be operating on 2 metres in the near future. Two frequencies will be in use, 145.278 and 145.350. Reports and QSO's with "G" stations will be welcomed.

**J. R. Garrett-Pegge, G3MI** (Chesham, Bucks.) is welcomed as a new reporter to these columns. G3MI is situated in a poor location with the Chilterns rising all round him, and conditions have to be good before he can hear any Dx. Activity has not been as high as usual owing to the fact that the 6-element stack was blown down and 3MI is waiting for better weather in order to re-erect it. The receiver consists of an all 6J6 converter. A new converter consisting of 2 CV66's with acorn mixer and oscillator is being tested out, and it is hoped to have this in operation in a few weeks. The transmitter runs 15 to 20 watts input, using an 832 in the final. G3MI has some caustic comments to make regarding "natterers" on 145 Mc/s and the long discussions which take place between certain stations, during which other stations' equipment is derided and sneered at, and in general, the conversations are far removed from the true "Ham spirit." "This sort of thing disgusts me," says G3MI [and so it does us, OM, and many others.] We hope the day is not far distant when the authorities will decide to clamp down on these people who are abusing a privilege, and cluttering up an interesting band with a lot of peurile nonsense. Our answer, of course, is to boycott such stations, even at Contest times. They deserve absolutely no encouragement. This remedy may not sound to be in accordance with the true "Ham spirit," but the more they are encouraged, the greater will be their nuisance value.

**Bill Parker, GW2ADZ** (Llanymynech) reports that during February he had 9 QSO's with G2FKZ on 70 CMS and 9 with G3EHY—2,430 miles of 70 CMS Dx for 18 contacts! Any challengers? On February 26th G3EHY's signals were blocking the S640 at GW2ADZ. Since G3EHY uses only an 832, this shows what North/South conditions were like.

Two-metre working has been quite good for 150-200 miles. New stations worked include G3HXS, G3GDR and G6TA. GW2ADZ comments on the IARU Contest, and notes that the result sheets did not show how many QSO's were made by each station. He thinks such a list would be extremely interesting, and since most VHF working is limited to up to 150 miles, it is the highly populated areas that must win every time,

not the station with the most efficient gear. [We have already voiced our own comments on this aspect, and the IARU Contest result certainly does not give any indication of relative efficiencies. Points alone are no indication of efficiency.] GW2ADZ is all for Contests, but they should be for a shorter period.

**Jim Tovell, G5LQ** (Chiswick) has made his first QSO with G6YU (Coventry). Jim has been spending more time on the converter, and is getting some success with the G6VX crystal converter, using 12AT7 RF/mixer and 6J6 oscillator. G5LQ says he thinks he has the world's worst QTH for 145 Mc/s. [Your conductor knows just how bad a poor QTH can be, and sincerely sympathises with him. At the same time, G5LQ is a real sticker and a determined character, and other stations situated in poor locations should take heart from his efforts to beat the QTH "bug".]

**John Letts, G8IL** (Salisbury) has found activity to be at a low ebb for some weeks. GW8UH (Cardiff) was worked in January, but until late February, nothing spectacular took place. During the last week in February, G3WW, G3HAZ, G2BVG and G2UN were worked (G2UN is at Lancing, Sussex). Other stations heard during this period were G6YU, G4GR, F8AA and the inevitable G5YV. The 70 CMS converter has now been completed and John is hoping to receive signals from Southampton as soon as the temporary 4 over 4 is finished. The transmitter will be an 832 tripler. As soon as the installation is complete, efforts will be made to contact G2CNC in Jersey.

"Louis," G3EHY (Banwell) says that the Dx season seems to have opened much earlier this year. After the first week in February, a really stable period was in evidence for the remainder of the month. There were few nights during this period when 150 mile Dx could not be worked, and on most nights a much longer path was open to the North. On 27th February, G3BW (232 miles) was a good signal, and a QSO resulted just before midnight. G3FMI (Chester) was worked on this same night. Quite a number of new stations in various parts of the country have been heard, including Derbyshire, Northants, and London area, and all were good signals. G3EHY says it is nice to hear so many enthusiasts among the new ones getting on the band so early in the season. Louis says, when one has worked fifty counties it is a tricky business finding a new one, but on the 2nd March a test signal was heard trickling through from the wilds of Cardiganshire in the shape of GW3FYR. He came back to a call from G3EHY and a solid QSO resulted. Louis says: "However he got through the

Cambrian Hills, plus the Black Mountains I can't imagine!" On 70 CMS, contacts have been maintained with GW2ADZ, but G3EHY comments on the difficulty of finding many 2-metre stations who are also interested in 70 CMS.

**Malcolm Rix, G5GX (Hull)** is active each night on 70 CMS, before, during and after T/V hours, and would appreciate reports and contacts. This is the only band he is equipped for at the moment. G6OS and G3CC will both be on shortly.

**John Armstrong, G3EJR (Whitehaven)** will be on 145 regularly in the near future, using an SCR522 and G2IQ converter. John will also be active on 420 Mc/s and has an APQ9 on the way for these experiments. The QTH is a very poor one, being right at the bottom of a valley, and G3EJR says he envies the lofty perch of G3BW. John is hoping to get G2RF (also of Whitehaven) interested in 420 Mc/s as he has already carried out some experimental work on the band.

"**Monty**" **Banks, GC2CNC (Jersey)** has found conditions to be exceedingly poor, even when the weather has appeared hopeful. Schedules are being run with G8IL each Sunday at 2230. (Frequency of GC2CNC is 145.130 Mc/s.) The 70 CMS gear is slowly taking shape in face of lack of equipment, and "Monty" wishes to place on record his thanks to two Hams who have been exceedingly helpful and considerate to him since he started—G8IL and G3BLP. "The GC QSL position appears to be in some doubt," says Monty. GC3FSN and GC2CNC will QSL upon receipt. If no QSL is received, it will be assumed that a card is not required. Listener reports should contain a 2½d. stamp if a QSL card is required.

**R. F. G. Thurlow, G3WW (Wimblington, Cambs.)** has been recently chasing a suspected fracture in the feeder. After several tests, the tubular feeder was found to have been trapped in the garden gate outside the shack, and the encased wire cut through as with a knife. The 8-element stack has been compared with the 5 over 5, and on 28th February the stack, with a top element height of 50 feet, gave louder signals from Northampton than the 5 over 5 with a top element height of 63 feet. Again, on the 28th, G3EHY was heard working a London station and a quick check revealed that the stack gave quite definitely the better signal. Further tests are being made on East and West stations as the stack cannot be rotated very easily. A "Lazy H" with ½ wave spaced reflectors has been tried out at 10 feet. G2WJ was received at S8 on the 27th February. It is hoped to raise the height to 25 feet or higher.

**Alan White, G3HCU (Chiddingfold, Surrey)** is still active on 145 Mc/s but has been spending a little more time on 28 Mc/s lately.

The frequency is still 144.803 Mc/s and the input 20 watts to an 832. Counties worked total 27, with 143 stations. Stations worked recently include: G2UN, PU, BN, BRR, DSW, G3FSG, BK, WW, GOP, EDD, FEX, HAB, G6TA, JP and G8HK.

"**Pip**" **Pearcey, G2JU (West Wittering)** has been inactive over the past few months, due to several kinds of QRM, but he tells us that he is now blowing the dust and cobwebs off the gear and hopes to be resuming weekend activity by the time these notes appear.

**Don Bradford, G3GBO (Denham, Bucks.)** has worked quite a few new ones over the past month. The schedule with G3DUP (Northampton) has proved fruitful on two Saturdays. Don is looking for further schedules with stations to the NW and due West of Denham, Gloucester, Warwicks., Hereford, Staffs., etc., which is by far his worst direction (and your conductor's!). No changes have been made in the gear. Input is 30 watts to an 832. Recent QSO's over 50 miles include: G2FTS, G3DAH, DUP, EDD, VM, GGJ. Heard recently: F8GH, G2XV, G3CSY, DIV/A, G4MW.

**John D. Baker, G3AJP (Fritton, Nr. Yarmouth)** is welcomed to these columns. John has been active on 145 Mc/s since September, 1951, using an SCR522 and G2IQ converter, with a 4-element Yagi at 26 feet. Tests are now being made with a 4 over 4 which will be erected to over 30 feet. John says conditions were good between February 24th and 29th, "but where were the London stations?" G3GDR (Watford) was heard consistently, and at times up to S9. G5YV and G2IQ were also good signals. ON4BZ was worked on each evening between the 24th and 27th February. [ON4BZ is operating on 144.920 Mc/s with a new 16-element stack 80 metres above ground!] G3AJP says: "Don't forget the boys in the 'bulge of East Anglia'." His QRG is 144,700 Mc/s, and he QSL's 100% to listener reports over 100 miles. Note.—G3AJP's postal address is Norfolk, but he is actually situated in *NE Suffolk*.

**G3HBN (Kenton, Harrow)** is also welcomed as a new reporter. Jimmy uses an SCR522 on 145.015 Mc/s and is active most evenings and at weekends. Activity will be curtailed somewhat in the near future as G3HBN will be spending his time in HM Forces. Since starting up on the band on 16th February forty different stations have been worked in thirteen Counties, including Derbyshire and Leicester. As the input is only 10 watts to an 832, and the 3-element Yagi only about five feet above the window of the shack, this represents an excellent effort. G3HBN tells us that another station in his locality is almost ready to start up on 145, G3EFP, so please look out for him.

**Fred W. Fisher, G3VM (Norwich)** reports

that the wide variations in weather during February made it a most interesting month, and he thinks that many stations did not take advantage of the excellent conditions prevailing at times. On February 12th, PEIPL was worked at 569, but no other signals except locals were heard for the rest of the day. Conditions were extremely good on February 26th with stations coming through at excellent strengths. G3GDR (S9), G2FVD (S5), G2BN (S7), G3EDD (S8), G6YP (S6), G4HQ (S8) and ON4BZ (S8). Fred says it is interesting to note that the contacts with PEIPL were carried out while the barometer was low and the weather bad with strong winds and snow storms. "How much of the quietness is due to poor conditions, and how much to low activity?" says G3VM.

**P. L. Jeffery (Jeff), G3HXS (Near Tring, Herts.)** reports on the periods of good conditions, but low activity. In spite of this latter condition, he has now worked 21 Counties, and the best QSO's recently have been with GW2ADZ, G2IQ, G3HAZ, G6YU, G5UF and G3FTS. The latter two not being actual Dx, but provided Jeff with two more Counties. G5YV has been heard regularly, but no QSO has resulted so far. F8GH has also been heard. Total "stations worked" score is now 50.

**Arnold L. Mynett, G3HBW (Wembley)** is still suffering some QRM from his National Service activities, and most of his spare time has been spent in rebuilding the gear. He now runs 150 watts on CW and phone on 145, and 20 watts on 432 Mc/s. Increasing the input on 145 Mc/s has apparently made it easier for Arnold to raise the weaker stations, but as it has only been in operation for a week or so, it is not possible to quote definitely on this point. G3HBW has reached 31 Counties and 4 Countries on 2 metres.

#### Listener Section.

**Len Whitmill, of Harrow Weald,** reports on the good conditions between 21st and 26th February. GW2ADZ, G81L, G3FAN, G2XC and the Cambridge stations all being well received. G6YU (Coventry), a new one for Len, was also heard well. Stations heard between 29th January and 26th February include: G2AVR, AIW, AHP, BN, CUA, DL, DTO, FTS, HCG, HDZ, KF, LW, MV, TP, WJ, WS, XC, YC. G3BK, BLP, BNC, BVG, CMF, CWW, DIV, DUP, EFP, EHY, ENI, FAN, FQS, FSG, GBO, GDR, GHI, GHO, GOP, HAB, HBN, HZK, SM, WW. G4HQ, HT. G5DT, QB, TP. G6GR, JP, NB, ON, TA, WU, YP. G8DV/A, HY, IL, OU, SK, SY, TB. GW2ADZ.

**R. W. Russell (Southampton)** has found conditions to be reasonably good for the time of year. He has a good local indicator for 2-metre conditions. If the smoke from the

local power station chimney stops rising at around 1,000 ft. there is every indication of a temperature inversion, and the band will be awake (other things being equal). On the 28th February F8AA was heard on phone. O. M. Russell has been making a real study of weather conditions relative to 2-metre conditions, and he finds that the following points hold good time after time: a cumulus cloud flattening out in the evening to a long, thin stable cloud could well mean layering at that height. Wisps of cirrus cloud coming up from the SW or West means the approach of a depression, and may well indicate super conditions, and he suggests that VHF operators should look up to the sky instead of at the barometer. Calls heard, February 22nd to March 2nd: G2DTO, FTS, BMZ, HCG, PU, XV, YC. G3AUS, CGQ, EDD, EYV, GAO, HBW, HXT, WW. G6NB. G8OU. F8AA. Local activity: G2XC, DSW, ATT, DGB. G3FAN, CGE, GOP, BHS, ESS, EUQ, ABH, ABH/P, HVO. G5UF. G6TS. G81L.

**Roy Bastin (Coventry)** reports that pressure of work has prevented his usual activity on 145 Mc/s. G6YU is still the most active station in the Coventry area (144.801 Mc/s). G5ML, G6XY and G8SK are on 3 or 4 nights every week. New stations active in the Midlands are: G8IK (Birmingham, 144.460 Mc/s), G2FWW (Coventry, 145.460 Mc/s), G31AI (Northampton). Ray is now using a BC455 for the IF channel, and wonders if anyone has a circuit for an effective noise limiter for this receiver. The aerials in use at the moment are two folded dipoles in the roof space. The 4 over 4 will be re-erected when the weather improves. 185 stations have now been heard on 2 metres, and Ray says: "I find the VHF bands to be the most absorbing and interesting of the Amateur spectrum, and only wish more SWL's would have a go at 2 metres and 70 CMS. [What about it, lads?] Best Dx stations heard since January 1st include G3GHI, BLP and G6NB.

We were overwhelmed by the bumper crop of reports this month, and we are more than gratified at the interest being shown and the support being given to our columns. A sincere thank you to all contributors for the detailed reports submitted, and we hope we have done justice to them all. The latest date for reports is the 6th of each month, and these should be sent direct to your conductor at 176, Station Road, Hayes, Middx. Don't forget to join in our Third Annual VHF Contest on the weekend of May 24th/25th, just a fortnight after the RSGB VHF Field Day. So until next month, good luck and Dx to all.

G6UH.

# BROADCAST BANDS REVIEW

"ONDA CORTA"

All Times GMT.

"Nf" :—New Frequency.

**M**AY we first of all place on record here, a brief and humble appreciation on behalf of all listeners, for the numerous sincerely sympathetic and suitably-presented transmissions that were broadcast by the various English-language Short Wave Services of many countries, on the announcement of the death of our beloved King George VI. All those we heard on February 6th, from Canada to the Belgian Congo, from Switzerland to Australia, were extremely appropriate and of admirable contexture, especially in view of the short period of time in which they must have been compiled.

## AFRICA.

**Gold Coast.** ZOY Accra is operating on 6049 kc/s at 1028-1200, and on 4915 kc/s at 1513 (Sat. 1543)—1830. (World Radio Handbook). Phil Allwood has been hearing the latter outlet fairly regularly amid the CW QRM, and says they present Gold Coast News at 1745 followed by the weather report, and at 1800 a relay of the BBC News. Sidney Pearce has received their QSL Card by Air Mail.

**Ethiopia.** "Radio Addis Ababa" has appeared again in the 15 Mc/s band and is logged on 15062 kc/s at 1814 with call and News in English, closing at 1820. (Manfred Lepple, Stuttgart.) Your scribe heard them one Saturday with this News Bulletin followed by some rather out-of-date dance records until the transmission suddenly broke off around 1905.

**Senegal (FWA).** "Radio Dakar" is heard until close-down at 2300 on 9710 kc/s (Nf) in parallel with 15346 to 2100, and then with 11895 kc/s to 2300; there is QRM from CHLR before 2200 and sometimes from Cairo (9715 kc/s) earlier in the evening. (Pearce.)

**Sierra Leone.** Freetown. A letter verification has just been received by your scribe from the experimental broadcasting station at Freetown; this was in reply to a report on those 9630 kc/s signals which we had, in error, previously attributed to Lagos. Quoting from the letter we find: "Owing to lack of funds, experimental broadcasting has been shelved, and transmissions ended on July 14th, 1951." Reference to our log agrees with this date.] "Most of the time we re-broadcast the BBC General Overseas Service, local programmes being broadcast when

available between approximately 2000-2100 GMT. The transmitter was located about 3½ miles from the studio, which is, in turn, located in Freetown . . . this studio houses rediffusion apparatus.

"Local programmes and the BBC transmissions were fed to the transmitter over a post office line using suitable matching devices and amplifiers, etc. There are no broadcasting stations in this country, but a rediffusion network is in operation for the whole of Freetown, providing a service for about 3,000 subscribers . . ."

The Tx used on 9630 kc/s was a Cosor Type 1509 of 300 watts output, and the antenna a half-wave dipole running N-S at 700 feet ASL. The schedule was: 1100-1400 and 1800-2200.

**South Africa.** "Springbok Radio," Johannesburg, on 4945 kc/s has been logged with varying signals recently from around 1930; "Variety Bandbox" is presented every Saturday at 2000. (Allwood.)

**Spanish Guinea.** "Emisora de Radio-difusion" at Santa Isabel is now on 7220 kc/s (Nf—from 7200) at 0630-0730, 1200-1400 and 1800-2000; the power has been increased from 500 to 750 watts. The latest news on the Fernando Poo 200 kW Tx is that it is being built in the U.S.A. and due to the defence programme has been side-tracked indefinitely. (WRH.) [So, you country-chasers, the only course open is to go for that 7220 channel—but oh, that QRM!]

**Portuguese Guinea.** Station QOM4 "Emisora da Guine," Bissau, 5839 kc/s (1 kW): Q4 S6-8 with American recorded music to sign-off at 2300. (Scribe.) Bissau is the chief port of the colony, and is situated on Bissau Island in the estuary of the Geba River; the island is one of a group of sixteen large and many small ones known as the Bissagos, or Bijagoz, Archipelago.

**Tangiers.** One transmitter of the "V. of A." Relay Base closes on 6085 kc/s (Nf) at 2315, and another opens at the same time on 6170 kc/s (Nf).

## ASIA.

**Japan.** There have been several conflicting reports concerning the International Service transmissions of NHK, but the latest news to hand (for which we are indebted to WRH) is as follows: Stations are JOA (7180 kc/s) and JOA2 (9675 kc/s) at Naxaki, and JOB

(6069 kc/s) and JOB2 (11705 kc/s) at Yamata. Schedule is 0500-0600 to North America (over 6069 and 9675 kc/s), 1100-1200 to North China and 1200-1300 to Central China (6069, 7180), 1400-1500 to Philippines and Indonesia, also 1530-1630 to India and Pakistan (both over 9675 and 11705). News in English is on the air at 0503, 1103, 1203, 1403 and 1533.

**China (Communist Govt.).** Radio Peking was noted around 0015 with S5 signals on 9020 kc/s (Nf), the previously-listed channel being 9040. (Scribe.) Tony Rigby, of Mellorbrook, Lancs. (one of our youngest readers), reports good reception of their 15060 kc/s frequency with English at 0900-0930; Sidney Pearce agrees that this is the best time of day to hear 'em, and adds that they now send a fine QSL Card printed in English, French and Chinese, also that they list a Japanese transmission at 1100-1130 on 9020 kc/s in parallel with 15060 and 11690 kc/s.

There is another (unlisted) Chinese station on approx. 6530 kc/s (not Harbin on 6430!) and logged here Q4 S7 at 2330.

**Korea (South).** Pusan is on 2510 and 7935 kc/s, and Taegu on 4777, according to WRH. These stations relay the "V. of A." Korean programmes at 1130-1200 and 2230-2300, also a repeat at 0230-0245 of a 1345-1400 "V. of A." transmission.

**Dutch New Guinea.** Sidney Pearce has recently added to his QSL collection that of "Radio Omroep Nieuw-Guinea" at Hollandia, which is certainly Vy fb indeed! [This one, together with FIQA Tananarive, gives Sidney two more fresh countries—see Honour Roll.] Hollandia have informed him that they intend to experiment on the 6 Mc/s band towards the end of February—after 1130 GMT. WRH says this station has moved back to the old channel of 7170 kc/s (presumably from 7126.6).

**Indonesia.** During the past few weeks we have discovered in the 60-metre band, four of the numerous low-powered Indonesia Home Service stations, all of which become audible during the late evening. YDA3 Bandoeng (Java) on 4945 kc/s (3 kW), has been a fair signal on several occasions from sign-on at 2230 (Suns. 2330), and YDK Palembang (Sumatra) on 4855 kc/s (300 watts) was dug out of the QRM once or twice opening at 2300 with S3-5 signals. YDP at Medan (also in Sumatra) was about the same strength on 4930 kc/s at 2330 onwards. YDJ Djogjakarta (Java) on 5060 kc/s (3 kW) is, however, the most consistent of the quartet, having been audible since last September, and is often QSA4-5 S8-9 from sign-on at 2230.

A good clue to the identity of YDJ is the time signal at 2330, which consists of four

"pips" and three long notes, followed by the announcement (usually by a YL): "Radio Republic Indonesia, Djogjakarta." English dance music in strict tempo is a regular feature of the programmes heard over all these stations, and it would appear that Indonesian listeners are particularly enthusiastic about Victor Silvester's rhythm at breakfast-time!

**Saudi Arabia.** Manfred Lepple lists Djeddah on 11850 kc/s with News in Arabic to close at 1820.

**Iran.** Sidney Pearce has received a letter veri from Radio Tabriz in reply to his report on their 6090 kc/s signals. They say they are broadcasting English language lessons at 2045-2100 Teheran time (that's 1715-1730 GMT—Scribe) on Sats., Mons. and Weds. . . . "which is a good sign to recognize Tabriz Radio Station." (Hi.)

**India.** WRH Bulletin lists three new AIR frequencies: VUC Calcutta on 3350 kc/s, also Delhi on 3250 and 11940 kc/s (the latter was quoted as approx. 11945 last month.) All the above carry the 1530-1545 Home News in English. Another new outlet on 4870 kc/s is regularly heard by your scribe at this same time, in parallel with VUD2 (4940 kc/s). Delhi is also heard near 17705 kc/s (Nf) from around 1200 to sign-off at 1230 with a transmission to Malaya, this being a different programme to that on 17740 or 17830 kc/s.

**Pakistan.** Radio Pakistan still operates the evening test transmissions to Turkey (at 1930-2015) and to the UK (2015-2100) over 7010 kc/s, but the 6235 kc/s outlet was replaced on Feb. 9th by 6035 (announced); the latter channel can, however, be found on the LF side of Monte Carlo. These transmissions appear to consist chiefly of popular western recordings. (Sidney Pearce and scribe).

**Malaya.** Since Feb. 10th the BFEBs, Singapore, has been using 15435 kc/s (Nf) instead of 15300, and is heard well on the new frequency in English at 1400-1415 and again at 1600-1630 (Suns. 1645). Announces also 7120, 9690, 11955 and 17755 kc/s (Pearce.)

**Vietnam (Indo-China).** "Radio France-Asie," Saigon, is heard well by Sidney Pearce on 11830 kc/s with English programme from around 0930 to close at 1015, including News at 1000. They are expected to move from this frequency to 11925 kc/s, to avoid Tangiers and the accompanying jamming. (World Radio Handbook.) 15430 kc/s is another frequency contemplated for the 0900-1030 service to the South Pacific. ("Australian Dx-ers Calling.")

## EUROPE.

**Vatican City.** The Vatican Radio have inaugurated a new 50 kW SW transmitter

which is now in service, writes Roy Patrick, who adds that it may be on the 9646 kc/s channel at 1815. John Leigh, of Macclesfield, is also hearing this frequency QSA5 S9 with the daily English programme at this time. This is the 21st year of broadcasting for "Radio Vaticano."

**France.** Paris is now using 7105 kc/s (Nf) and can be heard around 1830.

**Greece.** The Central Broadcasting Station of the Greek Armed Forces, Athens, is well heard in the late afternoons to sign-off at 2200 on approx. 3710 kc/s (Nf) in parallel with 6340. (Pearce.) WRH gives us the following alterations: "Radio Jannina" is now on 6230 kc/s; "Radio Macedonia" is using 8010 kc/s, and the FBS Athens mentioned above is at present working on 6275 kc/s.

**Spain.** "Radio Merida" has returned to an old channel of 7145 kc/s (from 7095). "Radio Juventud de Murcia" is still on 7100 kc/s, and quite recently this one was QSA5 S9-plus at 2230 when presenting those fascinating melodies by that master of the zither, Anton Karas.

**Monaco.** "Radio Monte Carlo" were broadcasting in English at 2200 during the Monte Carlo Rally, giving full details on this famous motoring event. (Roy Patrick. Tnx for the "gen" on the Swiss Dx Programme, OM.)

**PACIFIC.**

**Philippines.** DZH9, of the Far East Broadcasting Co., Manila, was logged by Ronald Thorndike on 11855 kc/s with rather weak signals in the late afternoon [presumably before 1700—scribe.] Ron says he hasn't much time for Dx-ing these days, as he is serving in the RAF. Best of luck, OM. DZH7 on 9732 kc/s was S5-6 at 1500 with an English programme "Radio Family Hour." (Scribe.)

The "Voice of America" Relay Station at Manila is now on 15245 kc/s (Nf), and logged here at 1200-1300.

**New Zealand.** G. H. Laurence, of Newcastle-on-Tyne, sends along the current schedule of "Radio New Zealand" which he has received with a QSL for reception of ZL2. "A" denotes transmissions for Australia, and "P" for Pacific Islands: 1800-2045 over (A) ZL2 and (P) ZL3; 2100-0645 over (A) ZL10 and (P) ZL4; 0700-Close-down over (A) ZL2 and (P) ZL3. Frequencies: ZL2, 9540; ZL3, 11780; ZL10, 15220; and ZL4, 15280 kc/s. Close-down is 1045 weekdays, 1120 Sats., and 1000 Suns. QRA: PO Box 2396, Wellington.

Sidney Pearce is now hearing ZL2 on Sundays announcing as "2YA Wellington" with BBC News at 1900 and weather report at 1915, followed by recordings.

**NORTH AND CENTRAL AMERICA.**

**Canada.** The International Service of the CBC is using another long-inactive frequency, CKNA on 5970 kc/s (in parallel with CKLO, 9630 kc/s) for the English programmes to Australia and New Zealand on Sundays and Wednesdays only, at 0840-0950. (John Leigh.)

**United States.** WRCA Bound Brook is now on 15340 kc/s (Nf), and can be heard at 1600 in the "Voice of America" European Service.

**Guatemala.** TGNA Guatemala City have sent their QSL Card to Sidney Pearce for reception of the 11850 kc/s frequency. Others now in use are 1180 kc/s (MW), 5952 and 9668 kc/s.

**Nicaragua.** Station YNEQ "La Voz de la Victoria," Managua, on 6065 kc/s has been noted with News in Spanish at 0000-0015. (Pearce.)

**SOUTH AMERICA.**

**Ecuador.** HCFB2 "Radio Nacional de el Condor," Guayaquil is now heard in the US on 6118 kc/s (Nf). (RTN.) Guayaquil is the chief port of Ecuador, on the estuary of the Guayas River, and is connected to Quito by rail; it was devastated by fire in 1896 and again three years later.

**Colombia.** Also from "Radio and Television News" we note the current schedule of "Radio Nacional de Bogota": Weekdays at 1455-1900 on 4955 kc/s and 2200-0430 on 6200, 11680 kc/s. Sundays at 1600-2015 and 2300-0415 on all three frequencies.

**Brazil.** Mick O'Sullivan, of West Hartlepool, sends along a list of Brazilian stations logged during the past month: ZYK2 Recife (15145 kc/s) was Q5 S7 as early as 1004; ZYB9 Sao Paulo (15155 kc/s) had weak signals at 1620, but PRL7 Rio de Janeiro (9720 kc/s) was Q5 S9 at 1935. PRB22 "Radio Record," Sao Paulo (9505 kc/s) is listed Q5 S7 around 0045, and finally ZYK21 "Radio Tamandare" at Recife (not Sao Paulo, OM!) on 3265 kc/s, Q4 S7 at 0100 with high noise level.

Further to our recent notes on the numerous new Brazilians on the lower frequencies, "Radio Poti," at Natal (Rio Grande do Norte), is ZYI21 on 4935 kc/s, the MW outlet remaining as ZYB5; the call of "Radio Borborema" (3325 kc/s) is now known to be ZYJ21, relaying ZY07 on 1350 kc/s MW. The location of this one is Campina Grande.

**Uruguay.** CXA13 "Radio Carve," Montevideo, 6155 kc/s (10 kW): Q4 S9 (plus hetero QRM) with sponsored announcements and call at 2300, followed by a news bulletin. Schedule is 1100-0300. (O.C.)

**Peru.** "Radio del Sol," at Lima, 15105 kc/s, has the call-sign OAX4X; sign-off is 0600.

**Venezuela.** YVKF "Ondas Populares," at Caracas, 4880 kc/s, was heard with an English request programme of popular tunes and sponsored announcements (all in English) including Pan-American Airlines, etc. News in English followed at 2248-2300. (Scribe.)

**Conclusion.**

The Editor and "Onda Corta" thank all readers who sent along items for this feature, and we regret that space does not permit the inclusion of them all. The Honour Roll of Countries Verified (BC Stations only, and starting at 30) is presented this month—is your present score here? Your Broadcast News are always welcome, and should be sent to "Onda Corta," c/o "Short Wave News and Radio Amateur," to arrive before the 24th April.

Our "QSL's Received" feature is held over till next time, and by then we'll have a double-length list of these to get out teeth into.

73 and the best of Dx until next month,

"Onda Corta."

**HONOUR ROLL**

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**S.W. PROGRAMME PARADE**

compiled by

**ROY PATRICK.**

*Most countries of the world broadcast programmes in English and below is a selection of stations which are regularly received in the British Isles. No matter what your taste may be, Short Wave offers unlimited entertainment value.*

*All times GMT.*

**AFRICA.**

**BELGIAN CONGO.** OTC Leopoldville. 9745 kc/s. Daily programme at 19.00 which consists of news, "Amongst Friends" talk, and musical features. Dx programme every Wednesday, and Request Night every Monday.

**EGYPT.** Cairo. 9715 kc/s. 19.00 daily, News; also at 21.00.

**FRENCH EQUATORIAL AFRICA.** Brazzaville. 11970-9440 kc/s. News at 16.00, 18.15, 20.50, 22.45. English Mailbag, Thursday, at 18.25, 22.55.

**S. AFRICA.** Johannesburg. 11940 kc/s. 16.00-20.05, Tuesday, Thursday, Saturday.

**NEAR EAST.**

**IRAN.** Radio Tehran. 15100 kc/s. 20.00, News and Music.

**IRAQ.** Baghdad. 11724 kc/s. 19.15, "A Date With Baghdad."

**ISRAEL.** Voice of Israel. 9010 kc/s. 19.30, News. 21.30-22.15, News Reel, Music, Talks or Features.

**SYRIA.** Damascus. 11915 kc/s. 21.30, News, Press Review, Commentary.

**TRANSJORDAN, JERUSALEM.** 7110 kc/s. 11.00-11.30, 14.30-15.30.

**TURKEY.** Radio Ankara. 12.30-13.15, 17820 kc/s, 16.93 m. 21.00-21.45, 9465-7285 kc/s. 23.15-00.00, for North America, 9515 kc/s. Mailbag programme, 21.30-23.45 every Sunday. From the last Saturday of April to October the above programmes will be heard one hour earlier.

**FAR EAST.**

**AFGHANISTAN.** Kabul. 9975 kc/s. 16.20-16.50.

**CEYLON.** Commercial Service of Radio Ceylon. 11975 kc/s. 13.30-16.45, Thursday, 17.15. All programmes in English.

**CHINA.** Radio Peking. 09.00-09.25 : 15.170 kc/s, 11690 kc/s, 25.66 m., 15060 kc/s, 11.690 kc/s. 13.30-14.00, 22.00-22.30 : 10.260-11690-15060 kc/s.

**INDIA.** All India Radio. 13.30, News and Musical Programmes, 17740-15380 kc/s. 15.30, News, 11760-9590-5970 kc/s. 19.00-20.15, for the British Isles, 7190-7170 kc/s.

**PAKISTAN.** Radio Pakistan. 15.15-15.30, News, 11675-4805 kc/s.

**TAIWAN.** Voice of Free China. BED 4 on 11.800 kc/s. 19.20 daily.

**INDONESIA.** Radio Indonesia. 14.30-15.30, 15.150 kc/s. 19.00-20.00, 11795-15150 kc s. News, Talks and Popular Music.

**NORTH AMERICA.**

**Canada.** Radio Canada. 17.00-17.30 over 17820-15320 kc/s; 18.45-19.00, 15320-11720 kc/s; 22.30-23.05, Monday to Friday. Saturday, Sunday, 23.00, 11720 kc/s. Saturday only, 13.15, Sports News and Ice Hockey or Basket Ball Matches for Canadian Troops in Europe, 17820 kc/s.

**AFRS.** New York. Daily programmes from 18.00-22.45. *Winter schedule*, 9550-11890-15230 kc/s. *Summer schedule*, 17760-15210 kc/s.

**RADIO BOSTON.** 20.00-21.00, 11740 kc s.

**SOUTH AMERICA.**

**ARGENTINA.** Buenos Aires. 19.00-20.45 daily, 15290 kc/s.

**BRAZIL.** Radio Jornal do Commercio. Brazil calling daily on 9565 kc/s at 00.05-00.30, except Sunday. Sunday, 20.30-21.00.

**RIO DE JANEIRO.** Radio Nacional. 9720 kc/s. 02.30 (except Tuesday), Musical Programme for North America.

**BOLIVIA.** La Cruz del Sur. 9505 kc/s. Has English programmes daily at 02.00.

**ECUADOR.** HCJB "Voice of the Andes." 21.00-22.30 and 02.00, 15115-12455 kc/s. Monday is silent day.

**EUROPE.**

**ALBANIA.** Tirana. 7850 kc/s. 21.15 daily.

**EIRE.** Radio Eireann. 17.840 kc/s. 18.30-18.50, News. 11760 kc/s, 22.10-22.30 (Experimental Transmissions).

**FINLAND.** Helsinki. 17800-15190 kc/s, News-Press Review.

**HOLLAND.** Radio Nederland. Happy Station programme every Sunday, 10.30-12.00, 21.480-17.775-15220-6035 kc/s. 16.00-17.30, 11730-9590-6025 kc/s.

**RUMANIA.** 9252 kc/s. 19.00, News.

**MONACO.** Monte Carlo. 9785-6035 kc/s. Friday, 22.30-23.00.

**SPAIN.** Radio Nacional de Espana. 9368 kc/s. Daily at 20.15. Sundays at 23.00. "Voice of Spain" programme.

**SWEDEN.** Radio Sweden. 11.00-11.15, News, 15.155 kc/s. 12.00-12.15, News, 11880 kc/s. 20.00-20.30, 6095 kc/s. Dx programme every Friday at 15.15, 11705 kc/s. Repeat 22.30 and 07.15, 6065 kc/s.

**VATICAN STATE.** 15.00, News. 9646-11740-15120 kc/s. 18.15, 11740-9646-5968 kc/s.

**YUGOSLAVIA.** 17.45, News. 6100 kc/s. 20.00, 9505 kc/s.

## CLUB NOTES

*We shall be pleased to receive from Club Secretaries, notes for inclusion in this feature. Submit by 6th please.*

**Acton, Brentford and Chiswick Radio Club.** Hon. Sec., R. G. Hindes, 151 Rusthall Av., Bedford Park, London, W.4.

At a well-attended meeting on February 12th, G5LQ gave an interesting demonstration of a 2-metre converter with an S640.

Other recent demonstrations and talks have been given by the Secretary, Mr. R. G. Hindes (home-constructed valve voltmeter), and G3GEH (home-constructed VFO).

On March 18th, an "any questions" feature was inaugurated.

It has been decided to instal a transmitter for use by the Club. This will be constructed from components supplied by members. During the coming summer, a visit to the National Physical Laboratory is being arranged.

**South Manchester Radio Club.** Hon. Sec. : F. H. Hudson, 21, Ashbourne Road, Stretford.

Meetings are held at Ladybarn House, Mauldeth Road, Manchester, 14, alternate Friday evenings at 7.30 p.m. The Club is fortunate in having commodious premises, namely, a large room for general activities

such as lectures, demonstrations, etc., and a smaller room in which is installed the club station G3FVA and which is also used for Morse classes and technical subjects. A healthy sign of the Club's activity is the recent influx of new members. Recent subjects dealt with were "TV and TVI," and a lecture by G2HW on the 160 metre band.

**Coventry Amateur Radio Society.** Hon. Sec. : K. Lines, G3FOH, 142, Shorncliffe Road, Coventry.

Members, wives and friends foregathered at the Opera House on February 29th for the Society's Annual Dinner. Prizes and trophies were presented by Mrs. Theakston, and the after-dinner entertainment was in the capable hands of Tommy Packham and Ted Meacham.

Winners of this year's contests are as follows :—

Transmitting Trophy..	H. J. Chater, G2LU.
Listener's Trophy ..	N. Montgomery.
Best Lecturette ..	R. Bastin.
Constructional..	Alan Clements.

Arrangements are being finalised for the MARS/CARS Contest and the full Summer Programme is being prepared. No doubt, the wives of the Committee Members will share the Society's joy when this task has been completed! Club nights continue at the YMCA, Queen's Road, at 7.30 p.m., and the forthcoming programme is as follows: **14th April**—No meeting. **28th April**—“Communication Receivers.”

**Spenn Valley Radio and Television Society.** Hon. Sec.: N. Pride, 100, Raikes Lane, Birstall, Nr. Leeds.

Meetings for April are as follows: **April 9th**—Junk Sale. **April 23rd**—Open Meeting to discuss NFD. Meetings are held at 7.30 p.m. Temperance Rooms, Cleckheaton.

Last year the Junk Sale was a great success with keen competition to get various useful items of gear on sale. Many items of no use to the owner found a purpose in the buyer's rig.

Any members of the RSGB, whether members of this Club or not, are invited to the discussion on NFD as the Club proposes entering a station.

**Hartlepool Amateur Radio Club.** Hon. Sec.: L. M. Arrowsmith, 51, Alverstone Avenue, West Hartlepool, Co. Durham.

The prime interest at the moment is the NFD, and the Club intends to put two stations on the air. Most nights are, therefore, occupied with building gear for the two stations. By the time this appears in print, the licence for the Club should have been received. Successful “swindles” are being run and tea and biscuits enable the OM's to stand the racket each week! The Club Library contains quite a few of the “standard amateur bibles” now and together with copies of various periodicals, quite a large amount of radio literature is to hand. The Club Magazine, it is hoped, will be in publication again soon.

**Yeovil Amateur Radio Club, G3CMH.** Hon. Sec.: D. L. McLean, 9, Cedar Grove, Yeovil, Somerset.

Meetings are held every Wednesday at 7.30 p.m. in the Club Room at the British Legion Headquarters, Grove House, Preston Road, Yeovil. Morse classes, talks and discussions are given regularly. The Club Station, G3CMH, is operated during meetings. The Tx runs 25 watts on 3.5, 7 and 14 Mc/s, and 8 watts on 1.7 Mc/s, phone and CW reception reports are always welcomed and QSL'd 100%. Members include G3BEC (QRP), 3CFV, 3DMJ, 3EUZ, 3GOS, MD2B and ZE3JQ as well as a number of well-known SWL's.

At present under construction by G3CFV is a 150 watt PA for the Club Station. The

Club is affiliated to the RSGB. Anyone interested in radio is welcome to meetings and it is hoped that visitors staying in the district will come along to see us.

**Slade Radio Society.** Hon. Sec.: C. N. Smart, 110, Woolmore Road, Birmingham, 23.

Meetings are held on alternate Fridays—next meeting April 11th—at the Parochial Hall, Broomfield Road, Slade Road, Erdington, commencing at 7.45 p.m. Visitors are very welcome at any meeting. Recent activities have included lectures on “Coil Q,” “The Generation of Electrical Power” and “Selected Topics from Nuclear Physics.” Future subjects are “Electric Traction” on **April 25th**, and “The use of VHF in Mobile Radio Schemes” on **May 9th**.

The Society specialises in radio direction finding and preparations are in hand for this year's contests, in which special consideration has been given to the beginners in this activity. The provisional date for the first test is May 11th. It is hoped that the Society will again be able to participate in the RSGB D/F Contests this year.

Further details of the Society may be obtained from the Hon. Sec.

**Kingston and District Amateur Radio Society.** Hon. Sec.: R. S. Babbs, B.Sc., G3GVU, 28, Grove Lane, Kingston. Tel., KIN 2801.

Meetings of this Society are held fortnightly on Wednesdays. Lectures and film strips covering receivers, transmitters, aeriols, components and measuring instruments are given throughout the year.

On alternate Fridays, radio theory classes are held and those members wishing to obtain a transmitting licence are taught Morse code.

All meetings are held at Penrhyn House, 5, Penrhyn Road, Kingston, and commence at 7.45 p.m. Refreshments are obtainable during the interval.

**Brighton and District Radio Club.** Hon. Sec.: R. T. Parsons, 14, Carlyle Avenue, Brighton.

Meetings are held every Tuesday evening at The Eagle Inn, Gloucester Road. Club room is open from 7.30 p.m. to 10.30 p.m. each Tuesday and organised programmes, of which there are three in every four Tuesdays, commence at 8 p.m. Subscription 5/- per annum. The membership at the moment is just over 90. Future programmes are as follows: Tuesday, **April 8th**, Talk and Demonstration on Lecher Wires by Mr. F. R. Canning, A.M.I.E.E., G6YJ. Tuesday, **April 15th**, RSGB Debate on Council Minutes. Tuesday, **April 22nd**, Talk on Class “D” Wavemeter, Mr. Pitfield, G3EDG.

Further details may be had from the Hon. Sec.

# STRICTLY FOR THE BEGINNER

FROM time to time we receive reminders in the form of letters from our readers, that we must not forget the needs of the real beginner in our hobby of Amateur Radio. It is some time since we ran a series specially for the newcomer, so we start this month a new series which we trust will impart information to those who need it and at the same time interest the more experienced reader. Each month we shall reproduce typical letters we have received during the previous month and print an answer to the queries they contain. We are starting off with this one on aerials :—

Dear Sir,

*I think that before writing any more it is only right to tell you that beyond "knob-twiddling" my knowledge of radio is absolutely nil. I have quite a good 8v superhet with which I have had 50 countries (BC) verified within the past year and I am awaiting veries of another 12. I have the "SWN" and the "Radio Constructor" each month, and although the latter is far too technical for me I hope for some little helpful tips.*

*Here is the reason for my letter. I recently erected the SWL Special dead to specification on 35' masts and I am very happy with the results. Quite recently I was given a 14' length of  $\frac{3}{8}$ " copper tubing, and having read something about this type of aerial I thought I'd have a try so slung it up in my loft with a 20 swg lead-in via a small aerial tuner. The results have been exceptionally good over 10 to 50 metres except that the tuning of the receiver does not appear to be so "smooth." But I feel sure that with expert advice regarding length, direction, etc., this aerial would be really good, especially to folk in flats, etc. Would it be possible for a short article to be written on this type of aerial. I feel sure it would be of great help to non-technical "blokes" like myself.*

Yours truly,  
H.C.

The fact that modern types of receivers will give some sort of reception, no matter how inefficient the aerial system, leads to quite a bit of confusion in the minds of beginners as to the function of the aerial and the exact mode in which it works. By means of its own inherent electrical characteristics, it should vibrate (electrically) in sympathy with the particular radio waves one wishes to pick up and by means of a "lead-in" system it should convey these vibrations to the receiver with as little loss as possible and at the same time without picking up a lot of extraneous electrical vibrations from nearby electrical machinery, etc., which is subsequently reproduced as unwanted noise in the receiver.

The SWL Special Aerial consists of a length of wire cut to such a length that it will vibrate at a frequency of the waves most required and two "lead-ins"—or feeders—so arranged that with suitable tuning arrangements the wire can be made to resonate on a number of frequencies around the main characteristic of the wire itself. In this way it can be "tuned" to one of several particular frequencies. In this way it becomes a very efficient "collector of radio waves" if we may use this term.

The 14' length of copper tube can also be made to resonate if it is attached to a tuning system. The frequency at which it does this will depend on the length of the wire connected to it—the lead-in—and the capacity of the tuning condenser. As it is shorter in length than the SWL Special, it will work reasonably well on the "shorter" waves—10 to 30 metres, but not so well on the longer ones.

Another point to note is that there is nothing inherently good in the 14' length of  $\frac{3}{8}$ " copper tube. Exactly the same results would have been obtained if the lead-in had been made 14' longer. Our newcomer may have imagined that his 14' copper tube resembled the whip aerials of vehicles, but these are made like this to be self-supporting—not because they are particularly efficient. On the other hand he may have confused it with the rotary beams used for amateur transmission. Here again, they are made of tubing for constructional convenience.

One further point to note is that an aerial in a loft is far more liable to give a heavier background of noise in the receiver than one erected out in the open on high poles well removed from buildings and sources of unwanted electrical interference.

Domestic and financial considerations must always be taken into consideration when erecting an aerial system and compromise is always necessary, but generally speaking an outdoor aerial is worth the extra expense when serious SW listening is anticipated and means should be incorporated to "tune" it to the most desired frequencies.

Dear Sir,

*Could you please enlighten me on the following: (1) How do I match an 80 ohm twin feeder into an S640—input impedance 400 ohms? (2) How can I match a dipole aerial into a receiver which has only one aerial input terminal? (3) Can I obtain 250v HT and 6.3v LT from an S640 to supply power to a pre-selector? If so, how? (4) Can you give me details of a good aerial tuning unit?*

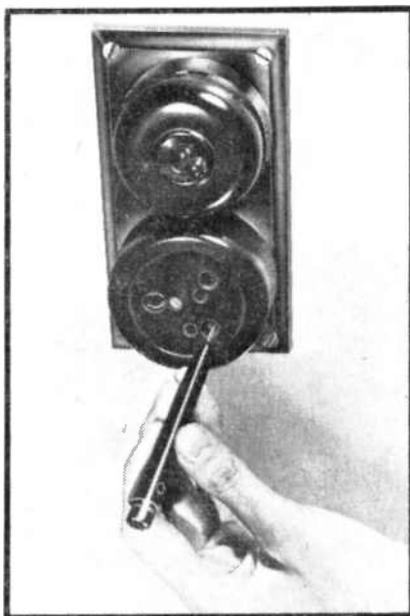
Queries 1, 2 and 4 will be dealt with in our next issue in an article by J. N. Walker, G5JU, entitled "Matching the Aerial to the Receiver." The answer to 3 is that this

additional supply can be taken from the existing power pack in the 640. It will mean taking the receiver out of its cabinet and connecting leads from, say, the filament pins on a conveniently situated valve-holder for the filament supply and similar length leads from the output of the power supply. If our reader is not certain which these are, he had best obtain the help of a local colleague.

ANSWER TO LAST MONTH'S  
CROSSWORD



NEON VOLTAGE INDICATORS.



Philips Neon Voltage Indicator.  
Cat. No. Q5000.

QPR CONTESTS

Two open Contests are announced: the QRP "200" CONTEST and the QRP "100" CONTEST. The first is for QRP operation—input not to exceed 2 watts—on 1.8, 3.5 and 7.0 Mc/s bands only, a certificate being awarded to all contestants providing proof of having worked a total of 200 or more countries composed of a minimum of 50 countries per band. The second contest relates to countries worked on 3.5, 7, 14 and 28 Mc/s, certificates being issued for working 100 countries with not less than 20 on any one band. Full details may be obtained from the Hon. Sec.: J. Whitehead, The Retreat, Ryden's Avenue, Walton-on-Thames, Surrey.

Philips Electrical Limited have re-introduced two Neon Voltage Indicators, for use in testing low and medium mains installations.

The popular pencil type, Cat. No. Q5000, is priced at 5/- each, list, and can be used on AC or DC mains voltages between 110 and 500. It is housed in a black insulating pencil-shaped case, with a pocket clip.

The Voltage and Polarity Indicator, Cat. No. Q5005, is a much larger type suitable for 80/750 V AC and 100/750 V DC, and for indicating polarity on DC. It has two black "Philite" moulded insulated test prods, fitted with collars to prevent accidental hand contact with the metal probes, joined by a 39in length of tough rubber-covered cable. One prod houses a Type 4017 Indicator Lamp, which can be replaced. List price is 30/-. Supplies of both types are available immediately.

THE END! (with apologies to an advertisement in a contemporary): . . . 150 w Tx, professionally built in 6 ft rack, . . . covering 10, 20, 40 and 80-metre bands . . . exchange for *shot gun* [italics ours—Ed.]

## SMALL ADVERTISEMENTS

Readers' small advertisements will be accepted at 2d. per word, minimum charge 2/-. Trade advertisements will be accepted at 6d. per word, minimum charge 6/-. If a Box number is required, an additional charge of 1/- will be made. Terms: Cash with order. All copy must be in hand by the 12th of the month for insertion in the following month's issue.

## PRIVATE

**EXCHANGE.** Over 60 latest new unused valves, large number components, no sub-standard or surplus, details supplied, for coupled rangefinder camera, Ensign Commando, Peregrine III, or similar. Box B184.

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