The SHORT WAVE Magazine

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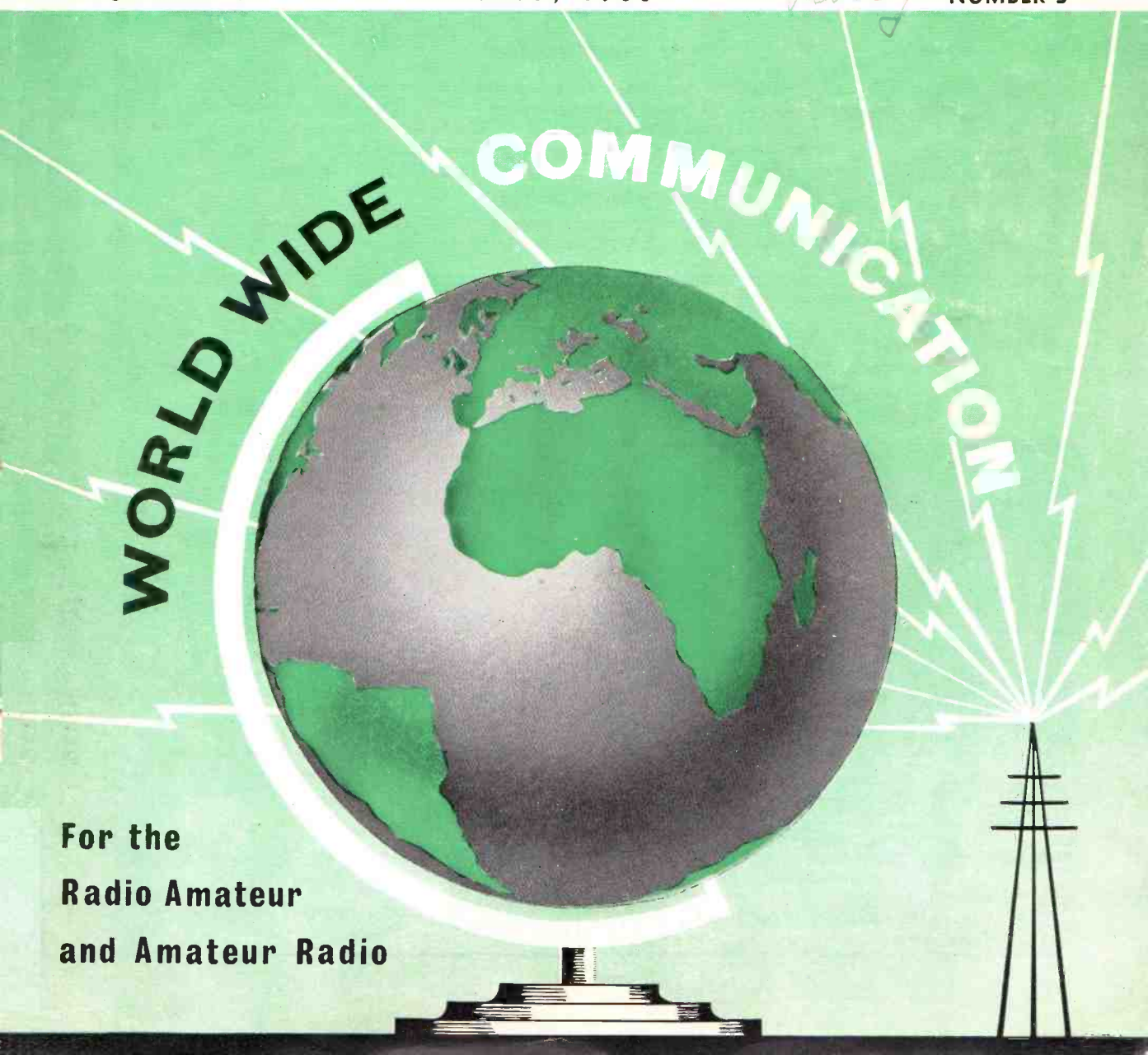

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The SHORT-WAVE Magazine

EDITORIAL

Rough *The world of Amateur Radio has been thrown into something of a turmoil by the recent not-unexpected developments in connection with our 14000-14350 kc band. Briefly, the 50 kc area at the HF end of this band has always been clear of American phone stations, it being tacitly accepted that 14300-14350 kc was reserved for the rest of the amateur phone world. Now, by a decision of the American licensing authority (the FCC) inspired by the American national organisation (the ARRL), U.S. amateurs on QRO phone have been let into this 50 kc, without reference to the established international amateur machinery (the IARU), which is supposed to consider and decide upon such matters within our bands.*

While the ARRL was probably acting with the best of intentions — to keep Russian commercials out of the 14250-14350 kc area (implied by the USSR reservation at Geneva — see p.541 February, 1960, SHORT WAVE MAGAZINE*) by giving their own amateurs more room — the fact that they took this action without consulting anybody first has inspired some sour comment throughout the rest of the amateur world.*

This most regrettable development is very important for quite another reason : It proves that the IARU is not the strong well-organised international body it has been held out to be— and, indeed, ought to be. It also shows that we are now at the point where international re-planning of the amateur bands has become urgently necessary, in the interests of all concerned—this means defining segments for CW, AM phone, SSB and RTTY on all the HF communication bands. While this will have to be done with due regard to the fact that the Americans are dominant in terms of active numbers, that does not mean that they are entitled to dominate the rest of the Amateur Radio World in every other respect. And, here let it be said that there is nothing to be gained by quarrelsome argument about this recent American action, either over the air or in print in the world's Amateur Radio press.

If the IARU stands for anything, now is the opportunity to show it. We may hope that, in the course of the IARU Region I conference at Folkestone in June, some concrete proposals will emerge. But they need to be thought about and circulated now. If properly considered proposals acceptable to all European groups are put forward, they could not be ignored by the Americans.

Pending international agreement covering all bands, the immediate need is to rationalise the 14 mc band, and in this context we commend the proposals already made that this should divide somewhat as follows: 14000-14100 kc, all-world CW; 14100-14125 kc, SSB outside U.S.; 14125-14200 kc, all-world AM phone and U.S. CW; 14200-14350 kc, U.S. AM phone and SSB. Of course, this arrangement is by no means ideal, and can only be regarded as having been forced on us by the American decision to open 14300-14350 kc to their high power phone stations.

Austin Forsyth G6FO.

Pi-Section Inter-Stage Coupling

PRACTICAL TREATMENT AND VALUES FOR ALL BANDS

J. MacINTOSH, A.M.Brit.I.R.E., F.C.C.S. (GM3IAA)

This article is a useful and interesting discussion on the application of pi-section networks in transmitter stages before the PA, where such tank arrangements are commonly employed. The author shows that not only is higher inter-stage efficiency obtainable but—perhaps even more important—the harmonic attenuation is much more effective. And anything that can be done to eliminate or minimise harmonics will go a long way towards eliminating or minimising TVI.—Editor.

MUCH has been written concerning pi-section output circuits but little about pi-section interstage coupling. Considerable time had been spent making the interstage couplings of the writer's 150 watt transmitter as efficient as possible, using capacity coupled circuits with parallel feed to the valve anodes. Although adequate drive was obtained, even on 28 mc, it was evident that an efficient inter-stage coil for 14 mc was limited in inductance owing to the standing capacitance across the circuit. This capacity can be considerable and the elements which go to make up the total are: (*a*) The minimum capacitance of the tuning condenser; (*b*) The output capacitance of the valve preceding the coil; and (*c*) The input capacitance of the valve following the coil.

The total capacity can amount to 30 $\mu\mu$F, or more, and this takes no account of any stray capacities. A tuning condenser with a high minimum will increase the total. Furthermore, capacitive coupling tends to accentuate the passage through the network of unwanted VHF harmonics.

There appeared to be a good case, therefore, for changing to pi-section coupling. Extensive experiments were then conducted and the ultimate circuit is given in Fig. 2.

Pi Impedance-Matching Network

Before discussing Fig. 2, it may be of interest to consider the theory of the pi-impedance matching network—*see* Fig. 1. Resistance R1 represents the anode load of V1 and V2, Fig. 2, while R2 is the grid impedance of V2 and V3. R1 will usually be of the order of several thousands of ohms, and, when the network is used to match the anode circuit of a power amplifier to a transmission line, R2 will have a fairly low value. From the standpoint of comparison, the values of C1 and L will be about the same as the values in the more conventional capacity-coupled anode circuit, so the value of C1 may be calculated for a given value of Q. Values of reactance for C1, L and C2 are obtainable from pi-network design charts or they may be calculated from formulæ.

In the present case, however, no reliable figures are available for the value of R2. All that is known is that "under Class-C conditions and drawing grid current, the grid impedances of both V2 and V3 in Fig 2 will be low." This applies particularly to amplifiers. In the case of frequency multipliers, the grid impedance is considerably higher, owing to the high bias voltage.

The values arrived at in the case of C2, Fig. 1—as represented by C7 or C15 in Fig. 2, plus the relevant capacity values given in the last columns in Tables 1 and 2—were determined, therefore, by experiment.

It should be pointed out that the pi-impedance circuit is capable of passing frequencies *lower* than that to which it is tuned and this could be more pronounced when tuned to the higher frequency bands. This need be no problem, however, provided reasonably high Q tuned circuits are used in the anode of the PA and in the aerial tuning unit.

Pi-Section Coupling, Advantages

The text books state that "the circuit is actually a capacitive coupling arrangement with the grid of the amplifier tapped down on the circuit by means of a capacitive divider." The system is effective in reducing VHF harmonics because the fixed condenser placed across the control grid and earth of the following valve provides a direct shunt for harmonics. There is a more or less optimum value for this fixed condenser within limits which are not critical. In the higher frequency ranges it must not be made too large in value, because obviously it

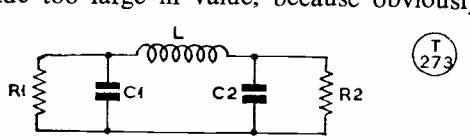


Fig. 1. Network in the well-known pi configuration for matching any two values of purely resistive impedances R1 and R2.

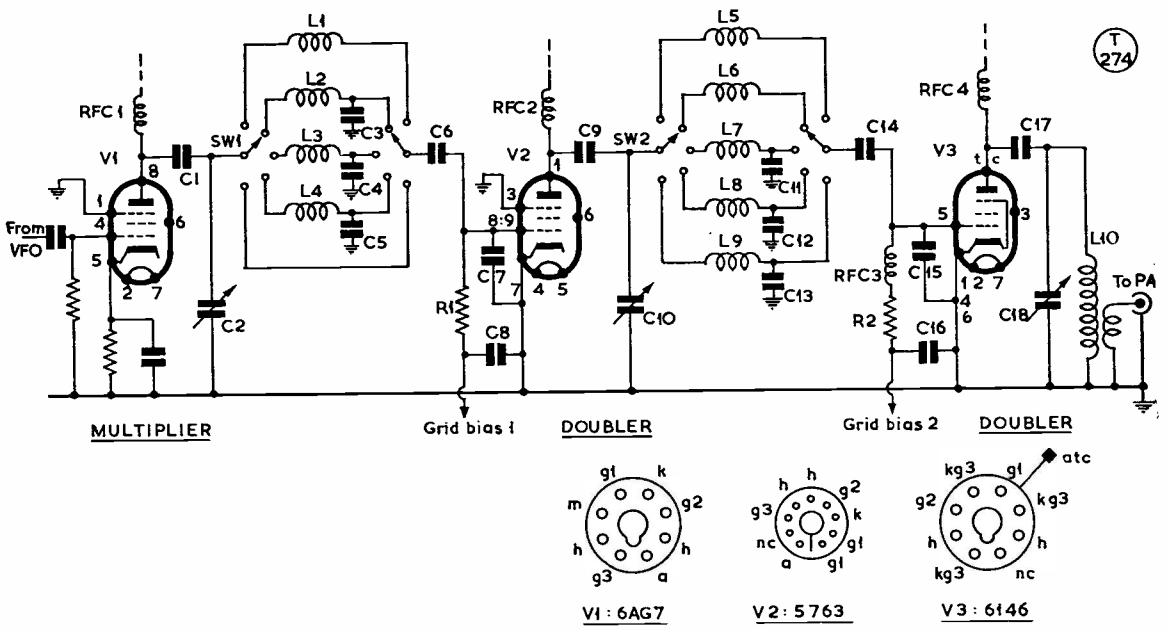


Fig. 2. The circuit arrangement as used by GM3IAA. V1 is a buffer or frequency multiplier, and V2/V3 are doublers. In the fifth position of the switch Sw1, V2 operates as a buffer with C2 at minimum; this would permit operation on 3.5 mc, as ample drive is available. The anode of V3 is conventional, drive to the PA grids being by coax cable and link coupling. In this circuit, screen connections and all wiring not relevant to the method of inter-stage coupling have been omitted.

would then shunt a valuable proportion of the harmonic required for driving. Conversely, if made too small in value it will be less effective in shunting the unwanted harmonics.

Any variation in the size of these grid capacitors C7 and C15 will affect the setting of the tuning condensers C2 and C10, and this variation also applies to the fixed capacity at the control grid end of the different coils L2, L3, L4, L7, L8 and L9 in the circuit of Fig. 2.

For any increase in capacitance of C7 or C15, the tuning condensers C2 and C10 will have to be reduced in value for any given frequency.

Inductance Coils—Tables 1 and 2

Table 1 gives the construction of coils L1, L2, L3 and L4, coupling V1 to V2, while *Table 2* covers coils L5 to L9, coupling V2 to V3.

V1 acts as a buffer, doubler, tripler or quadrupler, as required, while V2 and V3 are used as doublers. The VFO is permanently tunable in the region of 1·75 mc. The system is elastic and V2 could, for example, be used as an amplifier as the grid condenser C7 has a loading effect which helps to stabilise the valve. Indeed, V2 was used as an amplifier when transmitting on 3·5 mc, the grid and anode circuits being tuned to 1·75 mc. So much drive was available, however, that a fifth position was created on switch SW1, providing for the use of V2 purely as a buffer. This arrangement was eminently satisfactory.

That a considerable increase in inductance had been achieved may be gauged from the constructional details of the old and new coils L5 and L6—*see* Table 3.

Table of Values

Fig. 2. Pi-section Interstage Coupling

C1, C9, C17	= .003 μF	R2	= 15,000 ohms
C2	= 250 μμF var.	L1 to L9	= *See Tables* 1 *and* 2
C3, C4, C5, C11, C12, C13	= *See Tables* 1 *and* 2	L10	= Plug in coil for each band with link coupling to PA grids
C6, C14	= .01 μF	RFC1	= 19 mH
C7	= 100 μμF	RFC2, RFC3, RFC4	= 2.6 mH approx.
C8, C16	= .005 μF	V1	= 6AG7
C10	= 200 μμF var.	V2	= QVO3—12 (5763)
C15	= 75 μμF	V3	= QVO6—20 (6146)
C18	= 150 μμF var.		
R1	= 17,000 ohms		

Construction and Layout

The ·01 μF condensers C6 and C14 in series with the grids of V2 and V3 are not strictly necessary and may be omitted if desired. C7 and C15 should be of good quality mica type and wired directly across control grid and cathode of the valve, using the shortest possible

TABLE 1

COIL and FREQUENCY	TUNING ON C2 250 $\mu\mu$F 100° DIAL	No. of TURNS CLOSE WOUND	Enamelled Wire SWG	FORMER PAXOLIN	CAPACITORS WIRED AT GRID END OF COILS
L1 / 7 mc	30°	27	No. 18	1″ outside diameter	none
L2 / 5.25 mc	40°	30	No. 20	ditto	C3 = 50 $\mu\mu$F
L3 / 3.5 mc	55°	37	No. 24	ditto	C4 = 75 $\mu\mu$F
L4 / 1.75 mc	95°	59	No. 24	ditto	C5 = 660 $\mu\mu$F
POSITION 5 ON SW1 1.75 mc	zero	—	—	—	—

Constructional details for the four pi-section coils covering 7, 5.25, 3.5 and 1.8 mc, together with values of capacity.

leads. The values are not very critical: C15 could be increased to 100 $\mu\mu$F at the cost of a slight drop in RF output on 28 mc. The fixed capacitors C3, C4, C5, wired at the grid end of coils, L2, L3, L4, L7, L8 and L9 should also be of good quality mica. When in circuit, these condensers are in parallel with C7 and C15, as the case may be. They should be wired into circuit with the minimum of lead length.

The values ultimately chosen are satisfactory and should suit most valves in use in amateur-band transmitters.

The drive is controlled by one or either of two potentiometers which vary the voltage supplied to the screen grids of V2 and V3. As the VFO output is also controlled, it was not found necessary to fit a control to the screen grid of V1. All screen voltages are stabilized. Control of the drive is absolutely essential and this applies particularly to the lower frequency bands. There is no point in over-driving; output merely falls off and unwanted harmonics are increased.

Values for coils L2 and L6 may appear unusual to some readers; the third harmonic of the VFO is on 5·25 mc and this is doubled to 10·5 mc by V2 and to 21 mc by V3.

Shielding

All the coils are placed under the chassis and grouped around their respective switches SW1 and SW2. They are mounted in perpendicular fashion and fixed to the chassis by screwed brass rod. The underside of the chassis is completely shielded by a metal cover secured by self tapping screws. Precautions have been taken against stray coupling between one set of coils and the other and against the radiation of unwanted harmonics which might cause TVI.

Parts Used

Items C2, C10 and C18 are Jackson Bros. type "C-12." These condensers have a reasonably low minimum capacity even in the higher values.

SW1 and SW2. These ceramic switches

TABLE 2

COIL and FREQUENCY	TUNING ON C10 200 $\mu\mu$F 100° DIAL	No. of TURNS CLOSE WOUND	Enamelled WIRE SWG	FORMER	CAPACITORS WIRED AT GRID END OF COILS
L5 / 14 mc	17°	14	No. 16	1″ outside diameter Paxolin	none
L6 / 10.5 mc	20°	19	No. 18	ditto	none
L7 / 7 mc	35°	23	No. 20	ditto	C11 = 45 $\mu\mu$F
L8 / 3.5 mc	65°	31	No. 26	ditto	C12 = 177 $\mu\mu$F
L9 / 1.75 mc	85°	50	No. 28	1¼″ Ceramic	C13 = 400 $\mu\mu$F

Constructional details for the five pi-section coils covering 3.5, 7, 10.5 (for doubling to 21 mc) and 14 mc, with values for the condensers.

TABLE 3

POSITION	OLD COIL	NEW COIL Pi-SECTION
L5 14 mc	10½ Turns No. 14 SWG 1″ Former	14 Turns No. 16 SWG 1″ Former
L6 10.5 mc	13½ Turns No. 16 SWG 1″ Former	19 Turns No. 18 SWG 1″ Former

All turns close wound

Showing the difference, in terms of turn numbers, between two of the usual inductances and two of the pi-section coils, on two different bands. The difference is not so pronounced on the lower frequencies where it matters less.

(made by Wright and Weaire) are obtainable from Webbs Radio, London. They are Wearite Type 112, each switch being 1-pole 12-way, with two wafers. One wafer is needed for the input to the coils, the other wafer for the grid end connections. Only alternate contacts were used to enable the coils to be spaced apart. The switches are not ganged.

Formers. With the one exception of L9, which was already on hand, all the coils were wound on one inch outside diameter paxolin tubing, obtained from Denco (Clacton). The wire should be wound on as tightly as possible and given a coating of " Denfix " polystyrene solution, also obtainable from Denco's.

Results Achieved

No attempt was made to use a single tapped coil in either interstage coupling. Although this would perhaps have been feasible between V1 and V2 (where the highest frequency is 7 mc) it would have been inefficient between V2 and V3 especially when V3 was doubling from 14 mc to 28 mc.

The PA is a push-pull circuit using 35T's and grid drive is more than ample, even on 28 mc. Grid current can be run up to a maximum of 80 mA with negative grid bias as high as 170 volts.

V3, the QVO6-20 (6146) is an excellent doubler. Running at 430 volts on the anode, 200 volts, stabilized, on the screen, with a standing negative bias of 50 volts and a maximum anode current of 100 mA, grid current runs up to: 5 mA on 3·5 mc and 28 mc ; 6 mA on 7 mc ; and 7 mA on 14 mc and 21 mc. The grid leak is 15,000 ohms. At 3 mA grid drive, negative bias is 95 volts ; at 5 mA the negative bias is 125 volts. These figures are somewhat in excess of those necessary for efficient and adequate drive up to the full legal limit of 150 watts input. In fact, 4 mA is more than ample on 28 mc and excessive on the lower frequencies.

Since writing this article another transmitter has been built, embodying pi-section interstage coupling. It employs an 807 PA—or two in parallel if desired—and covers all bands from Top Band to 28 mc. Results have been most satisfactory, including tests with a television receiver about six feet away from the transmitter. At the time, the PA anode coil and aerial tuning unit were not screened in any way. Link coupling was used between the PA and ATU.

SCHOLARSHIPS FOR R.A.E.

We are asked to announce that through 404 Signal Squadron AER (Press Communications) twelve scholarships are being offered for men who wish to become licensed radio amateurs. Pre-requisites are that they should be fit to join the Squadron, aged between 18 and 40, and prepared to sign on for three years. 404 Signal Squadron is an Army reserve organisation and, as such, all training is spare-time, with annual camps, during which members draw full pay and allowances at Regular Army rates according to rank. The proposed R.A.E. training will be intensive and thorough, and will include Morse instruction. It is the idea and intention that the twelve men selected should take and pass the R.A.E. in May, 1961. At the same time, they will belong to a worth-while Service organisation in which amateurs and Amateur Radio already play a large part. Apply for full particulars to: Major J. A. Bladon, G3FDU, Madresfield, Jack Lane, Davenham, Northwich, Ches.

CORRECTION NOTE

In the circuit on p.73 of our April issue—" CW Transmitter for Top Band "—the value for C14 should have been given as 500 $\mu\mu$F, and not as stated.

REPORT ON RADIO-FREQUENCY RADIATION

The Postmaster General has announced that he has received the report of the inter-departmental Committee that has been considering possible hazards to health from intense radio-frequency radiation. The Committee recommends certain safety precautions to be taken at radio transmitting stations and other establishments where such radiation is generated. (These recommendations are to be published in due course by H.M.S.O.)

The matter first came to public notice in 1958, when the Secretary of State for Air and the P.M.G. were asked in the House of Commons about possible hazards from radio stations using the forward-scatter technique. Their replies emphasized that there was no danger to the public from any existing stations of this type. The radiation in question is similar to that sometimes used for industrial and medical heating. It must not be confused with ionizing radiation such as is given off by radio-active substances.

TRANSISTORISED DC CONVERTER

30 WATTS AT 300v. FROM 12 VOLTS—PRACTICAL DESIGN FOR THE CONSTRUCTOR

D. Boddey (G3KUM)

Much is now being heard about the use of low-voltage power transistors in switching, or LF oscillating, circuits from which HT can be derived at high efficiency, input to output. A particular problem for the amateur who wants to build his own DC converter of this type is the construction of the necessary "hi-cycle" transformer. In his article, our contributor deals with this in detail and shows that with a knowledge of what is required and the calculations involved, it is quite a simple matter to produce an efficient and highly satisfactory HT power unit of the type required for mobile operation.—Editor.

HAVING run a small car, and worked mobile gear for quite long periods the writer has felt the need for a source of HT which "hammered" the car battery as little as possible. This is only a seven-plate assembly of moderate capacity and the 8 amp. drain of the rotary converter made it imperative to limit the time spent on "transmit" as much as possible.

Checking on various systems, it became obvious that transistor DC converters were 'way out in front from the point of view of efficiency. They can readily be made to deliver powers of the order of 100 watts; maintenance is *nil* and they can be built as much more compact units than their rotary counterparts.

It was decided to build one. After sorting through various published circuits, that shown in Fig. 1, was decided upon. The secondary winding, or rectifier side, is not shown as this does not play any part in the oscillator circuit, and will be treated separately.

Oscillator Circuit and Operation

Look at the diagram. The resistor Rs applies a small bias to the base of TR1, causing it to conduct. The current through the primary produces a flux which in turn induces a current through the winding FB1, supplying more drive to the base. The current builds up until the core is saturated; at this point there is no further increase in flux and the base current falls. The transistor starts to switch off; the flux due to the current through TR1 decreases, inducing an opposite flow of current in FB1, hastening the process. At the same time, current induced in FB2, starts TR2 conducting. The current through TR2 increases until the core again saturates when TR2 switches off and TR1 starts conducting again, initiating a fresh cycle. This, then, is the oscillator, in effect a make-break or switching device in the primary of the transformer.

The first point to be decided is what power is needed from the converter. This must be a final decision as it dictates the rating of the transistor to be used. Transistor converters only operate at their highest efficiency in the fully loaded condition. Now to the selection of suitable transistors. Assume a required output of 30 watts, *i.e.* 300 volts at 100 mA, and a conservative efficiency of 85%. (In practice an efficiency of 85% to 90% should be achieved.) This means that the primary input will be about 36 watts. Thus, on a vehicle with a 12-volt system the battery drain will be 3 amps. Another factor in the choice is that the maximum collector voltage rating, *i.e.* Vc Max., must be approximately 20% *greater* than twice the supply voltage. The reason for this is that the inductive load when in the "off" condition will produce a voltage across the transistor that will be twice the supply voltage *plus* a sharp spike on the leading edge (*see* Fig. 2). This can punch through the collector base junction, causing avalanche breakdown if the Vc max. rating is not high enough. Newmarket Transistors V30/30P fit the bill nicely. Maximum collector voltage is 30, Ic max. is 3 amps., and Pc max. equals 10 watts.

The transistor type having been selected, the next step is to get a pair with reasonably matched values of *beta** plus or minus 10%. This can be checked by connecting a battery, potentiometer and milliammeter between base and emitter, and a 12-volt supply with a one-amp meter in the collector (*see* Fig. 3). If the base current is then adjusted to 10 mA the *beta* value can be read off directly from the one-amp meter. At one-amp $\beta=100$, at $\frac{1}{2}$-amp $\beta=50$, and so on. Considerable spread of this characteristic may be found. In a quantity tested by the writer, the *beta* value varied between 40 up to about 90. The two selected gave a reading of 55. It must be borne in mind, however, that this value only holds good for that condition. If the bias is increased to give a collector current around the maximum permissible, the value of *beta* will be found to decrease considerably. This must be remembered when an approximation for the number of turns on the feedback windings is made.

Transformer Construction

This is the most critical part of the circuit. One of the advantages of this supply is its higher operating frequency, dispensing with bulky smoothing circuits. The material from which most audio and power transformers are manufactured is of relatively low permeability and the core area is large. This means that a high number of ampere turns is required to saturate the core and it can be shown that a large core area and greater number of turns decreases the frequency.

A 2 cm. square cross sectional area is quite

**beta* (β)—Expressing gain in the grounded-emitter configuration, always in numbers greater than 1. The *beta* gain is the change in collector current divided by the change in base current produced by a signal. In a junction transistor $\beta=a\div 1-a$, where *a (alpha)* is the manufacturer's gain figure, as usually quoted, being the ratio of collector current change to emitter current change for a fixed collector voltage.—*Editor.*

adequate for a 30-watt converter. Recommended laminations and characteristics are given in the Table 1. Assuming a stack of laminations of ·004 in. Radiometal is available with a core cross-sectional area of 1·9 cm. square: The operating frequency is at an optimum around 400 to 500 c.p.s. To calculate the primary turns $f = \frac{Vs \times 10^8}{4N \times A \times Bsat}$ cycles per sec. *Vs* is 12 volts; *f* is 400 c.p.s.; *A* is 1·9 cm square; B*sat* is 16000 gauss.

Therefore

$$N = \frac{Vs \times 10^8}{4f \times A \times Bsat} = \frac{12 \times 10^8}{4 \times 400 \times 1{\cdot}9 \times 16000}$$

equals approx. $\frac{12 \times 10^3}{486}$, or near enough 25 turns.

A former to fit the laminations can be made from any of the usual materials, such as cardboard or thin paxolin. Now, this 25 turns is the number for *half* the primary. The complete winding is wound *bifilar*. This is very important to ensure tight coupling and balance; 22 SWG wire is quite adequate.

Next comes the feedback winding. The writer has yet to find a truly accurate method of calculating the number of turns for the FB winding. The best method is to make the closest possible approximation and from there on it is cut-and-try. As mentioned earlier, the measured value of *beta* has to be derated,

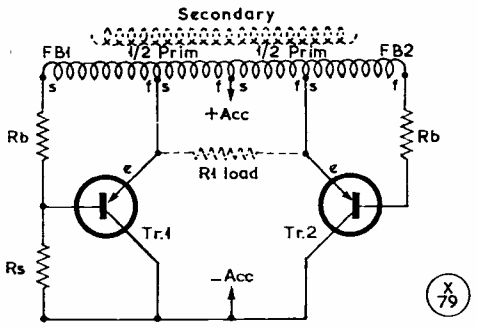


Fig. 1. The switching circuit used by G3KUM, giving a 400-cycle frequency for the primary side of the unit. TR1 and TR2 are power transistors, and when running up the temporary load R1 must be connected — see text. Rb is 2-5 ohms, using Eureka wire for the winding, and Rs is found experimentally, as explained in the article.

and with Newmarket V30/30P transistors, a factor of 0·4 has worked out quite well in practice.

Therefore, taking the measured value of 55, this gives 55 × 0·4, or 22.

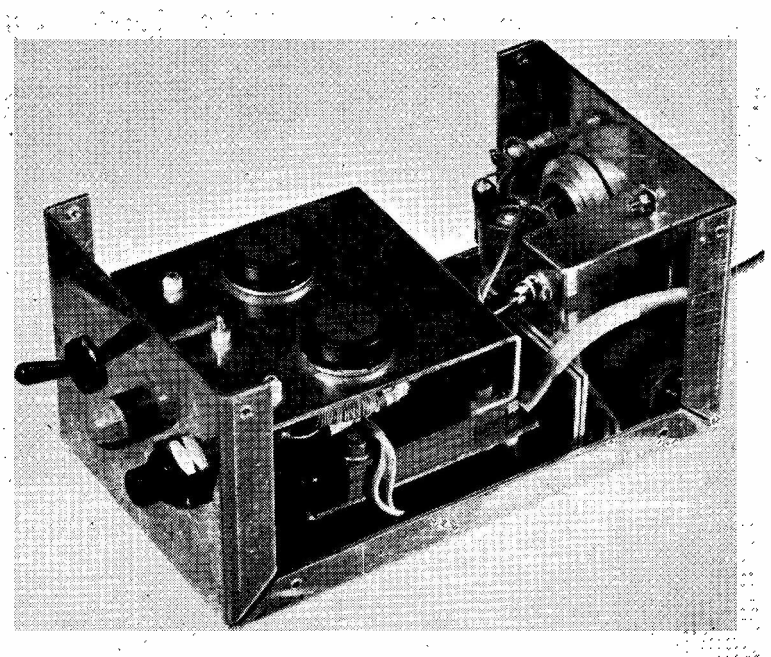
$$Ib = \frac{Ic}{Beta} \qquad Vb = \frac{Ic \times Rb}{Beta} \qquad Nfb = \frac{Vs}{Vb}$$

which equals

$$\frac{Vs \times Beta}{Ic \times Rb}$$

where Rb is the average value of base resistance from manufacturer's data. Nfb equals turns ratio of primary to feedback winding. Therefore $\frac{12 \times 22}{3 \times 20}$ equals 4·4, taken as five turns.

Use 24 to 26g. wire. Having thus approximated the number of turns on the feedback windings, they are now wound over the primary. Again, they are wound *bifilar*, the same way as the primary. If enamelled DSC or DCC wire is used, no interleaving is needed, but with plain enamelled a thin layer of "empire tape" between primary and feedback winding might be advisable. At this stage, however, forget about the secondary and assemble the core. The ·004" laminations are paint insulated one side and plain metal the other. A non-standard method of assembly is advised to reduce the gapping, in order to give easier saturation. This is done as follows:—Place the first pair



Upper chassis view of the transistor power unit designed and built by G3KUM, showing mounting of the power transistors and the general component layout. The final size is only 3 ins. by 3 ins. by 4½ ins. overall.

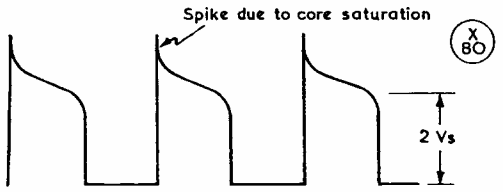


Fig. 2. The emitter waveform with a switching time of about 30 μS — see text for discussion.

of laminations in the bobbin, metal side up as you look at it. The next pair are placed metal side down (the first two pairs are therefore metal-to-metal). The last placed pair is now paint side up, and the third pair is therefore placed paint side down. Thus the stack is built up metal-to-metal and paint-to-paint. The windings will now be ready to be connected as shown in Fig. 1, start-to-finish, start-to-finish.

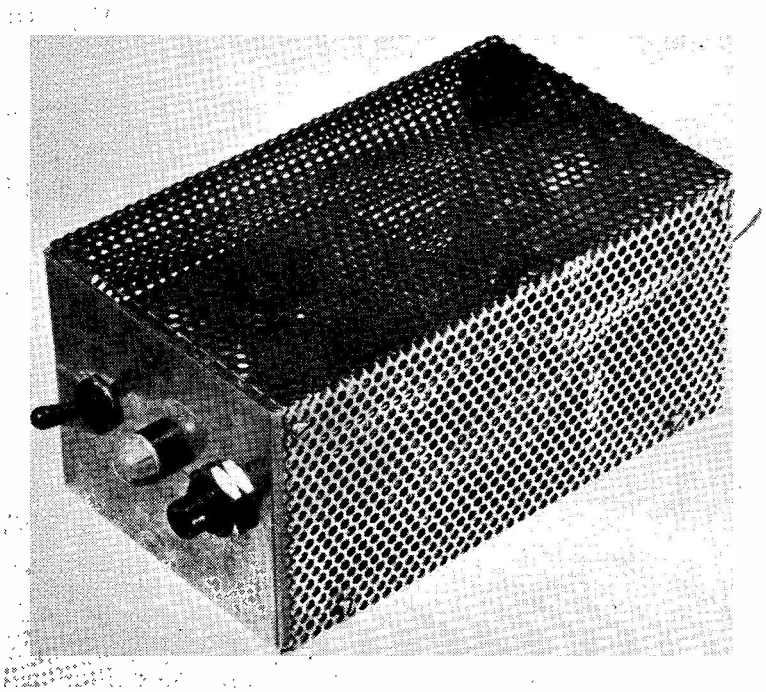
Finding the Value of Rs (Fig. 1)

The next step is to make a breadboard (or experimental) hook-up of the whole oscillator circuit. For this purpose, mount the two transistors on a large piece of aluminium; an old chassis will do. The idea is to protect the transistors by heat sinking, since the efficiency might not be too high right away. A thin smear of silicon grease between the transistors and the heat sink is helpful in reducing the thermal resistance. Connect the supply voltage—positive to the primary tap and negative to the heat sink. *Do not switch on yet.* A suitable load must now be connected from emitter to emitter (R1 in circuit diagram Fig. 1). The value of this load in ohms is twice the supply voltage squared, 24^2, divided by the power output, 30 watts. In the case being considered, this comes to 19·2 ohms. This load can be made from an old electric fire element or similar wire. (The penalty for running the converter off load is the price of two new transistors! The transients produced as the core saturates can be very high off-load, and punch-through breakdown will almost certainly occur.) Now to test: With the emitter to emitter load connected, switch on. It is doubtful whether oscillation will commence. Rs must now be selected. Starting with a value of 6-8,000 ohms, come down until a value is found at which oscillation starts automatically. The supply current reading should be somewhere around 3 amps. If a 'scope is available, have a look at the emitter waveform; it should be as illustrated in Fig. 2. If the tops have a very pronounced slope, the core is not saturating. The remedy is either to reduce the core area or increase the primary turns. Both will affect the operating frequency.

TABLE 1

CORE MATERIAL	B sat.
H C R Alloy	16000 gauss.
Mumetal (1)	8000 gauss.
Radiometal (2)	16000 gauss.

(1) Includes Super Mumetal and Permalloy "C"
(2) Includes special Radiometal, Permalloy "B" and Laminic



Neat finish and construction of the DC converter described in the article, using power transistors in the primary switching circuit, to give outputs up to 30 watts at 300 volts, at high efficiency.

Failure to oscillate is an indication of insufficient feedback, so try increasing the number of FB turns, after checking that no error has been made in wiring the transformer windings. The more usual case is the reverse—too much feedback. This is easy to spot or even smell, as the base resistors will start to cook! Reduce the FB turns until the base resistors are running cool. All power dissipated in these resistors is power lost, reducing the efficiency.

When everything appears to be as it should, make a measurement of the supply voltage and current; the efficiency can then be calculated. In the model the writer built this worked out at approximately 86%, which is

quite a reasonable figure. It will be found to vary according to the type of core and transistor characteristics. Efficiency of the order of 90% or more can be obtained by the use of toroidal strip-wound cores, but without machine winding they are hardly practical for the amateur.

Secondary

Having got the oscillator working at reasonable efficiency into its load resistor, the secondary can be wound. Use as generous a wire gauge as winding space will allow, as the overall efficiency will be de-graded if there is excessive copper loss in this winding. The ratio is given by output voltage, divided by supply voltage, *i.e.* for a 300-volt secondary with a 12-volt supply, 25 to 1. Therefore, the number of turns will be 25 × number of primary turns which equals 625 in this case. If a centre-tap winding is required for full-wave rectification, this will mean 625 turns either side of the centre tap. The writer favours the bridge rectifier circuit using silicon diodes. However, these are rather expensive, and a Westalite contact cooled rectifier is a much cheaper proposition and also reasonably small.

The final engineered version of the converter can be made very compact *(see* photographs) — about 3 ins. x 3 ins. x 4½ ins. A perforated sheet cover is advisable to ensure good ventilation. The heat sink in the final model need not be very large—about 9 square inches should be adequate, as the transistors are not dissipating much power. The writer would like to express his gratitude to G3DPH for his invaluable assistance with this manuscript.

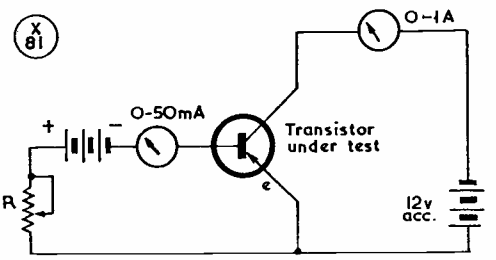


Fig. 3. It is desirable that well-matched transistors be used for TR1, TR2. This is a circuit for checking the beta-gain of transistors — see text. The resistance is 1,000 ohms wire-wound.

Making Wide-Band Couplers

DESIGN AND CONSTRUCTION OF EFFICIENT MINIATURE UNITS

The miniature wide-band couplers described in this article are due to an original design by G3JAM, and are intended to work with 6AQ5's in a conventional buffer-doubler circuit. For this, it is pre-supposed that there is a small (5 $\mu\mu$F variable) trimmer across grid and cathode of each 6AQ5 stage, which also has a 680-ohm cathode resistor for protective bias and 33,000-ohm grid resistor. The finished appearance of one coupler is as shown in the drawing at Fig. 1, each unit being enclosed in a suitable miniature can. Performance curves of the couplers are given in Fig. 3, and from this it can be seen that adequate output is obtained over each band; the curves for 1·8 and 3·5 mc (not shown) are a good deal flatter than for the other bands. The HT on each 6AQ5 is intended to be 220v./20 mA plate and 135v./2·7 mA screen, with variable screen voltage for drive control. With HT up to 300v., more drive can be obtained.

The couplers are designed to resonate with the stray capacities in the circuit, as this not only gives the highest dynamic resistance together with a lowish Q (to avoid excessive double humping) but excellent power matching is achieved. However, for Top Band and 3·5 mc some capacity is added to provide a more rapid decay at either end of the band.

The Aladdin formers used have a polished

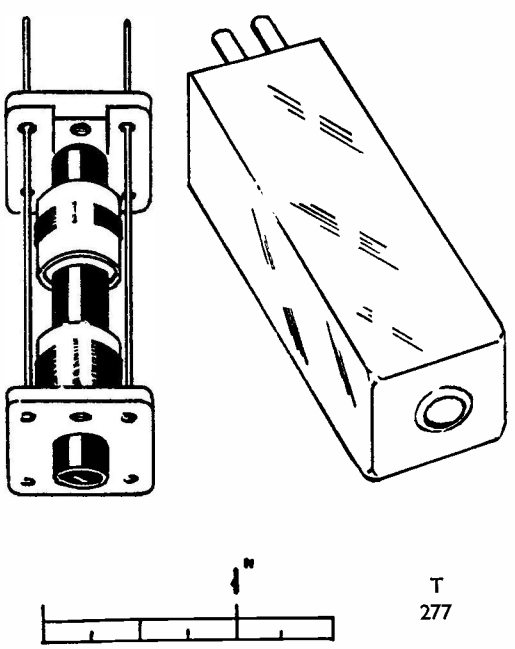


Fig. 1. Finished appearance of a typical coupler unit, with enclosing can.

surface, a snag which is overcome by binding the former just where the winding is required with a specially prepared layer of $\frac{1}{2}$-in. wide self-adhesive paper tape. A $1\frac{1}{4}$-in. length of the tape has added to it a $\frac{3}{8}$-in. piece by pressing the adhesive sides together for an overlap of 3/16 in. This will leave exposed 3/16 in. of adhesive facing the opposite way from the rest. The 3/16 end will adhere to the former without difficulty and the remainder can be wrapped round to constitute a secure adhesive base on which to begin the winding.

Fig. 2 shows that the anode end goes on first and windings are close-wound, turns touching. Where two and three layers are needed (*see* Coil Table) these should be wound back over the previous layer with an interleaving of tape prepared as described.

When the primary is finished, it is covered and the link put on, in the centre of the tape on all bands except 28 mc, where it is located edge on at the HT end. As the coverage on 28 mc is materially "assisted" by stray capacity coupling, it is recommended that this link be adjusted after the transmitter is built. All the others, however, can be taken as read.

The secondary winding continues without break from the link, the joining wire coming straight along the former unsupported, as drawn in Fig. 2. Double silk covered wire was chosen for the two HF coils because it sticks to the tape better.

When the windings are complete and the ends bared and tinned, the top spacer is pushed on, lining up the expansion slit with the notch in the former. Four pieces of 20 or 18 SWG tinned copper or brass wire connected to the appropriate windings completes the operation.

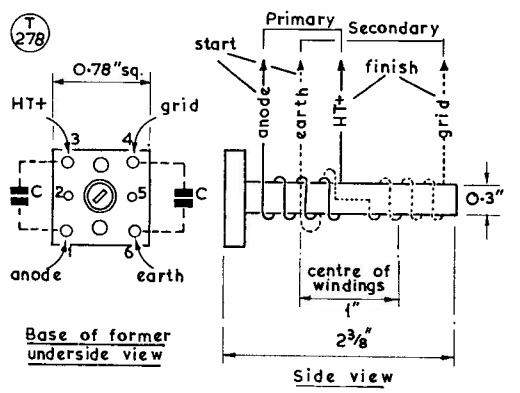


Fig. 2. Dimensions of former and winding details for the wide band couplers described in the article.

(Don't forget to put the square insulating piece in the top of the can before inserting the coupler or the power pack might take off !) A satisfactory lubricant for the slugs is Vaseline.

Adjustment

When tuning, the top slug is normally adjusted for the LF end of the band and the bottom slug for the HF. However, as these are bandpass circuits, critical adjustment is not required and with reasonable care anyone can, without test gear beyond a calibrated VFO, obtain the very satisfactory results shown by the curves below.

Provided the couplers and the valves are mounted side by side and the switch takes up a length not more than about nine inches from the first to the last wafer and is mounted over them (looking at the underside) no marked

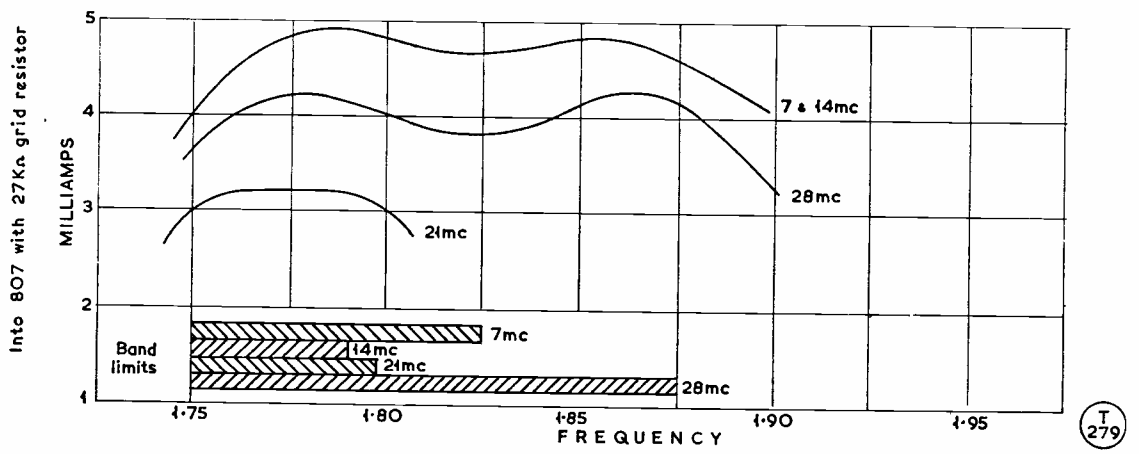


Fig. 3. Performance curves of the wide-band couplers described and illustrated in the article. These couplers are easy to make and full details are given in the text.

differences from the suggested turns values should occur. The Top Band buffer will be close to switch wafer No. 1 and the 28 mc final doubler near switch wafer No. 6. Also, to keep the 28 mc wiring at a minimum, the PA socket will need to be close to this last switch wafer.

If, however, it should happen that one of the couplers tunes slightly LF even with the iron-dust slug right out, this can be replaced by an 0-BA brass one which will save altering the coupler. The real remedy would be to try and reduce wiring length a little.

Many sets of these couplers have been made up, with satisfactory results over long periods. Various other types of valves have also been used—such as 6AM6, 6BW6, EF50 and similar —though in some such cases it has been necessary to alter turns values somewhat in order to accommodate valve changes or alterations in layout. This will usually be necessary because these couplers are designed to be resonated by the circuit capacity.

COUPLER WINDING DATA

BAND mc	Pri. TURNS	Inter-Link TURNS	Sec. TURNS	Wire GAUGE
1.8	65/60/55	16	60/55/50	40
3.5	33/32/31	9	30/29/28	32
7	25/25	4	25/21	32
14	24	2	24	32
21	18	1	18	28
28	14	2	12	28

Notes: Formers are Aladdin 5/16-in. by 2-3/8 in. long with double iron-dust slugs. For 1.8, 3.5 and 7 mc primaries and secondaries, figures indicate number of turns in each layer. Separation between centres of windings is one inch. Windings are close-wound, in same direction for each section — see Fig. 2. Wire used is enam. covered, except for 21/28 mc, where DSC is used.

Improved Modulation for the DX-40U

SIMPLE CIRCUIT MODIFICATION

G. W. ILBURY (G3MMW)

The Heathkit DX-40U, while being an excellent transmitter for CW work, suffers somewhat by reason of lack of modulation when on telephony ; this is due to the system used. It is hoped that the notes following will be of interest to other DX-40U owners, many of whom have heard the results from G3MMW and have asked for information.

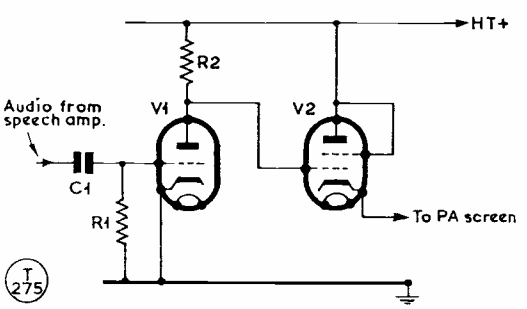


Fig. 1. Essential circuitry for the series-gate modulation system as specified for the DX-40U — see text. G3MMW has obtained better results on phone by modifying his DX-40U for screen control, as Fig. 2.

Those who are familiar with the DX-40U modulator arrangement will realise that it is of the type known as series-gate—see SHORT WAVE MAGAZINE, November, 1959. The basic circuit is shown in Fig. 1. In this system, as the audio input to V1 is increased, the bias due to C1,R1 rises, causing the mean anode potential of V1 to increase towards HT+; this rise is in turn passed, by the cathode-follower action of V2, to the screen of the PA, giving the required controlled-carrier effect, in that the audio modulating voltage is mixed in with the DC control voltage on the screen of the PA.

An inherent difficulty with this method of modulation is that, with the high audio inputs required for full control, V1 will tend to be biassed too far back, and in consequence the anode of V1 will keep almost at HT+. It follows that there can be very little voltage swing left for the audio signal, and in practice this gives rise to the flat, clipped speech effect* characteristic of many DX-40U's heard on the air.

To overcome this and yet alter the existing DX-40U circuitry as little as possible, it was decided to modify to normal screen modulation, and for this the Fig. 2 arrangement was

* The effect is very much dependent on PA loading. It is quite possible to set this up in such a way that full modulation is obtained with good speech quality. The trick is to adjust for something less than full CW output, so as to make better use of the available audio voltage swing on the PA screen.—*Editor.*

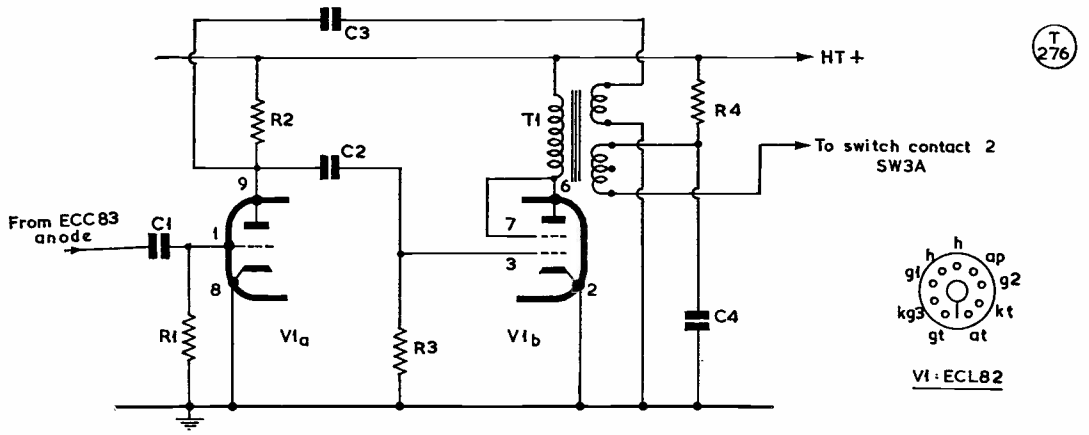


Fig. 2. Circuit modification suggested by G3MMW for improving phone working on the Heathkit DX-40U transmitter — and see Fig. 1. As explained in the text, no very drastic alterations are involved and G3MMW obtains better modulation characteristics using this arrangement than with the circuit specified for the transmitter.

adopted. The transformer used for T1 is a miniature 50-cycle mains type as provided in self-powered units such as external TV converters and the like ; its rating is 250v. input, 250-0-250v. output, with one 6·3 volt winding. This type of transformer was chosen because its size and characteristics are convenient and suitable, and there is the added very useful advantage of being able to use the heater winding to obtain feedback—*see* Fig. 2. T1 was fitted on to the DX-40U chassis without having to move any other component, and connected with the 250v. input (primary side) in the anode, the output side leads going to HT+ through R4 and to the screen of the 6146 PA *via* contact 2 on the function switch —*see* Fig. 2. The centre tap is not used and remainder of the circuitry is quite straightforward ; the values of C1 and C2 can be altered from those given to suit individual preferences as regards audio band-pass.

Feedback

The feedback circuit using the transformer 6·3v. winding through C3 in Fig. 2 should be incorporated if a 50-cycle miniature mains transformer is used, as without this correction speech will tend to be " toppy." If audio oscillation should occur when the feedback loop is connected, the leads to the 6·3v. winding need to be reversed.

Having done this modification, the existing feedback arrangement in the standing DX-40U circuit—R21, C37 in the diagram on p.352 of the November, 1959, issue of the MAGAZINE—should be removed, as it is no longer operative. (For those working from the DX-40U manual, C37/R21 are in the line from the cathode of the tetrode side of the ECL82 back to the cathode of the second half of the ECC83 ; C37 is 100 $\mu\mu$F, and R21 470,000 ohms).

Table of Values

Fig. 2. Circuit of the modified DX-40U modulator

C1	= .001 μF (C34 in original cct.)	R3	= 68,000 ohms, ½w.
C2	= .001 μF, 500v.	R4	= 12,000 ohms, 3w.
C3	= .001 μF, 750v.	T1	= Midget mains xformer — *see text*
C4	= 0.1 μF, 750v.		
R1, R2	= 100,000 ohms, ½w.		

(V1A-V1B is an ECL82, V5 in the original circuit on p. 352, November 1959 issue.)

Results

When operating the modified DX-40U on phone as described here, the PA current will read approximately 50 mA (30 watts) kicking up to 55 or 60 mA for full modulation. By whistling loudly into the microphone, it can be pushed up a good deal higher — but this corresponds to gross over-modulation, and so should be avoided. In some cases, depending on the microphone in use (some crystal types give a greater voltage output than others) the overall gain of the system may be so high that over-modulation occurs on room noises only. If this is the case, the gain can be reduced by changing the speech-amplifier valve (the ECC83, V4 in the circuit on p.352 November issue) for a 12AU7 ; these valves are interchangeable as regards base connections.

As a test, the author's DX-40U as modified to the Fig 2 circuit was run for two hours into a dummy load with a sine-wave input adjusted for full modulation ; at the end of the time, the

ECL82 was at normal working temperature and the modulation transformer quite cool.

Most DX-40U owners would agree that one should think twice before modifying commercial equipment built to a standard design—but results over the air from G3MMW have shown that the modification is fully justified and worth-while in terms of greater talk-power.

THE ZM7DA EXPEDITION

TOKELAU—JANUARY 5/12, 1960

THE Tokelau Islands in the Pacific, at about 9° S. by 172° W., are British territory administered from Western Samoa, under New Zealand trust. The chief island is Nukumonu (approximately 300 yards wide by four miles long at high water), and it was from here that ZM7DA was on the air, as most exotic DX, during the period January 5-12 this year.

Operators were W5PQA—leader and organiser of the expedition and, of course, an American national—with VR2DA, in whose name, as a British subject, the ZM7DA call was held. For a short time (one day, to be precise) the call used was ZM6AP/ZM7; this was from 0605 GMT on January 5 till 1845 on the 6th, when the official ZM7DA licence was notified by radiogram from New Zealand.

This expedition took a good deal of organising on the part of W5PQA, and involved him in considerable personal expense. Apart from getting the licence and providing suitable equipment, a 45-ton 6-knot cutter, the m.v. *Maroro*, with crew, had to be chartered for a term of three weeks to get the party from Suva, Fiji to Nukumonu, Tokelau, a sea-trip of about 900 miles, taking the best part of a week.

As regards gear, the main item of equipment was a Collins KWM-2, sent out by air from the factory; other gear included VR2DA's modified TA-12, his SX-28, a 10-watt portable-mobile rig for emergency use, and a 110v. AC generating set with 44 gallons of petrol to run it. Aerials on site consisted of a Minibeam, a three-band trapped dipole, and 7 and 14 mc dipoles; the 40-metre band was used for "local" working with VR2CC, Fiji, who maintained regular monitor watch for the expedition, their communication channel being 7040 kc.

Results and Experiences

Probably due to the rough travelling involved, the gear with not without faults. The KWM-2 had to be doctored and the power supply gave some trouble. Radio conditions were fair-to-good, except for Europe, from which direction most signals had rapid-flutter QSB, making them very hard to read. W5PQA himself handled the SSB phone operating, and VR2DA took on the CW, using both the KWM-2 and his TA-12 (on 28 mc). In all, 65 countries were worked and some 3,000 contacts made in the seven days on Nukumonu, using the 7-14-21-28 mc bands.

The return trip was somewhat hazardous, being made in very bad weather, but the party (which included Mrs. W5PQA and Mrs. VR2AP, who came along for company) got safely back to Suva, Fiji, on January 17, having travelled nearly 1,800 miles at an average speed of 6½ knots! During the trip out, some operating was done signing VR2DA/MM and W5PQA/MM, but this was not possible on the return because of the weather.

All genuine VR2DA/MM, W5PQA/MM, ZM7DA and ZM6AP/ZM7 contacts are being honoured by QSL card *via* W5PQA—but this does *not* include the pirate "ZM6AP/ZM7" who was active on the 21 mc band from January 4; when the expedition proper really got going, he was unable to stand the pace. Finally, it is understood that ZM6AP/ZM7 and ZM7DA contacts are being recognised by the ARRL for their DXCC.

(We acknowledge the notes by VR2DA in the March, 1960, issue of the Australian *Amateur Radio* as the basis of this article. —*Editor.*)

MORSE CLASS FOR G.P.O. TEST

For those within travelling distance of Croydon, a Morse class of ten lessons is starting at the Croydon Technical College, each Friday evening, 7.0-9.0 p.m., from May 13. The fee for the whole session is 12s. 6d. Any further information from: E. M. Childs, 10 Eaton Road, Sutton, Surrey.

UNLICENSED TRANSMISSION

While on the one hand the G.P.O. pursues pirates relentlessly, and rightly—and also licensed amateurs who break the rules—on the other, surplus dealers advertise, in the public print, walkie-talkie transceivers, "with a guaranteed range of 5-10 miles, and a delight to operate for young and old alike, batteries 20s. extra"—to quote a recent display advertisement in a national newspaper. The customer naturally thinks he is on safe ground in buying one of these things (there is no mention about any licence being required) and then proceeds to break every rule in the book without being in the least aware of it. The whole situation is quite absurd, and until the Post Office can bring a case that will be reported in every newspaper in the country, it looks as if it will go on.

C. W. OVERLAND, G2ATV

It is with deep regret that we have to announce the sudden death, on March 23, of Charles William Overland, G2ATV, of London, N.W.10. He was Editor of our contemporary, *Radio Constructor,* with which he had been connected since its inception, and his untimely passing is a great loss to his colleagues of Data Publications, Ltd. To them and to his family we offer sincere condolences.

PENETRATING COMMENT

When Mr. Aneurin Bevan, recuperating after his recent illness, was asked what he thought of TV entertainment, his answer was: "The medium is far greater than the capacity to satisfy it." How right he is! He might also have said that the sort of TV we see on our screens for most of the time is the prostitution of a great technical achievement.

Q-Multiplier for the TCS Receiver

ADD-ON UNIT FOR INTERNAL MOUNTING

A. J. HARWOOD

The idea of improving receiver selectivity by sharpening up the IF can be pursued in several ways. One of these is the device known as the "Q-Multiplier," some form of which is incorporated in many modern receiver designs. Though this article deals with improving the IF selectivity of a particular type of surplus receiver, the principle and circuit suggested can be applied to any receiver, either as an internal modification or as an external unit.—Editor.

MANY readers will possess the surplus (ex-U.S. Navy) TCS transmitter/receiver assembly and though the transmitter has been discussed in SHORT WAVE MAGAZINE (*see* October, 1958, and April, 1959, issues), little appears to have been published on modifications to the receiving side.

The writer has been using a TCS receiver, which has a tuning range of 1·5-12·0 mc, thus covering the 160-80-40 metre amateur bands as well as the 75-49-41-31-25 metre broadcast bands, and has found it necessary to make only one major modification—namely, the addition of a Q-Multiplier—to achieve results worthy of far more expensive gear.

As regards the Q-Multiplier, it can be simply described as involving a latter-day resurrection of that essential feature of the old straight receiver, *viz.* smooth and controllable reaction. Manuals such as the *Radio Handbook* deal fully with the Q-Multiplier and its functioning; all the reader unfamiliar with it need keep in mind is that it is a low-frequency single valve oscillator circuit which is operated near, but not at, the point of oscillation; in this condition, it is used in parallel with the receiver first IF stage, the result being to give a large improvement in the selectivity of that stage. In use, a Q-Multiplier can be said to add to a receiver many of the advantages of a variable crystal filter, without the disadvantages of ringing and the difficulty of alignment.

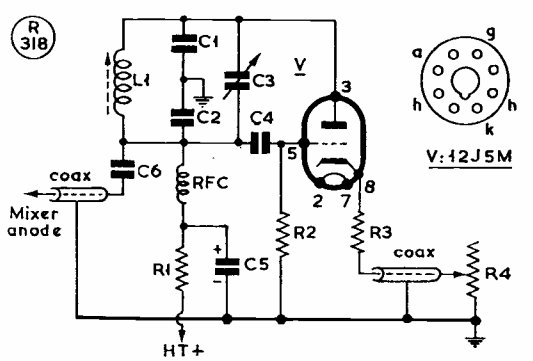
Practical Circuit

The circuit of the unit as used in the writer's TCS receiver is shown in the diagram. L1 is a coil of high-Q, preferably of pot-core construction (though this is not vitally necessary) and is tuned by C1, C2, C3 to the main receiver IF, in this case 455 kc. The circuit itself is a Colpitts, with V1, a 12J5 (for the TCS) which is kept off oscillation by the application of negative feed-back across R3, R4. By adjustment of R4, the circuit can be brought to the point where it is just not oscillating and under these conditions the effective Q of L1 is considerably increased. By connecting L1 to the first IF transformer a high degree of controllable selectivity is imparted to the receiver, this being varied as required by adjustment of R4. The point in the receiver IF pass-band at which maximum selectivity occurs can easily be adjusted by altering the resonant frequency of the Q-Multiplier, controlled by C3.

Fitting and Application

In the writer's TCS, the following modifications were carried out: By removing front and back panels access is obtained to the receiver oscillator switch section. On the front panel all that is needed is to change the position of the AF gain control, into the centre of the rectangle formed by the BFO, Range, RF and AF gain controls. R4 is then mounted in the hole left at the old AF gain position. Then take the plate off the oscillator selector switch and remove all the moving parts from it; fit a bush in the centre hole, thus allowing the plate to be used as a bearing for a ¼-in. spindle, and replace the switch plate and the front panel.

Take out the oscillator switch wafer and return the wires to the appropriate terminations for the "M.O." position (this wafer may be discarded and the ceramic crystal holders removed). Mount C3 on a strip of paxolin



Circuit of the Q-Multiplier discussed in the article. Values are: L1, for 450 kc, 160 μH with C1, .001 μF; C2, .003 μF; C3, 25 μμF tuning; C4, 500 μμF; C5, 8 μF elect.; C6, .001 μF; R1, 10,000 ohms, ½w.; R2, 2 megohms, ¼w.; R3, 2,700 ohms, ¼w.; R4, 2,000 ohms, 2w. variable. L1, with C1-C3, should tune across the receiver IF; a medium-waveband coil could be used for L1, trimmed as necessary; normally, some turns would have to be taken off.

supported on the pillars previously holding the switch wafer (these pillars may need shortening, to suit the condenser used) and bring out the spindle, using an insulated coupler, to the front panel through the bearing plate already mentioned. Cut a piece of 16g. aluminium to fit the space left by the crystal holders and mount the other items for the Q-Multiplier unit on this plate. It is a good plan to wire out, as a sub-assembly, as much as possible of the unit before fixing the plate to the chassis. After completing the wiring and connecting HT/LT supplies, take a short length of coax from the unit to the first IF at the mixer anode—*see* circuit diagram. Finally, connect R4 through coax, keeping this connection as short as possible to avoid decoupling by the cable capacity.

Testing and Results

After checking for functioning, switch on the receiver and tune in a signal. Set C3 to its mid-position and advance R4 until the unit is about to oscillate; now adjust the core of L1 until a setting is found where the signal is greatly increased and any adjacent-channel interference reduced. Adjustment of C3 should then allow any signal present in the IF passband to be peaked up.

As the operator becomes accustomed to using the Q-Multiplier its benefits and advantages will become more apparent, and comfortable SSB reception will be found to be possible. In the gently-oscillating condition, the Q-Multiplier will also function as a variable BFO for CW signals.

TRANS-ATLANTIC CABLE FAILURE

On April 16 the Post Office announced that the G.P.O. Trans-Atlantic telephone cable had failed, due to a fracture 200 miles from the Newfoundland coast, and that it might take some time to re-join the ends. This is the first such failure since the cable was put into service nearly four years ago, and was almost certainly due to some extraneous cause. The cable itself and all its valve-operated submerged repeaters can be expected to give reliable service over a period of at least 20 years.

NATIONAL RADIO SHOW

This year's National Radio and Television Exhibition is to be held at Earl's Court, London, from August 24 to September 3. Responsibility for the Exhibition rests with the British Radio Equipment Manufacturers' Association.

AT FEVER — A NEW DIAGNOSIS

Chronic Infective Amateur Electronic Cervicomyalgia is a disease which, although little known among the general public, is quite prevalent among a certain group of the population, being predominantly a male disease, the incidence among the general population being quite small. Those members of the female population infected are known as YL's.

The disease is definitely infective, and is almost always chronic and incurable. It tends to have a variable course, sometimes following a steady downhill path, showing on occasion acute exacerbations, *e.g.* manic linear construction. The course is commonly cyclothymic (or manic depressive), *i.e.* having periods of depressive inactivity, followed by periods of frenzied activity, usually into the small hours. (Note: *A sedative is helpful here.)*

The symptomatology varies, and includes such manifestations as:

(a) Dxostosis,
(b) Rag Mastication,
(c) Antennamegaly *(i.e.* overgrowth of certain types of external excrescence),
(d) Surplus part metabolism (a particularly distressing symptom),
(e) Kit metabolism (a later manifestation),
(f) and even Stereofecundosis.

One complication is characterised by a sudden phase of acute distension of the cranium, *e.g.* on the acquisition of a ticket, or the successful completion of a DX-100U. This is liable to be followed by equally sudden cerebral deflation, which occurs, for instance, after an explosion in the modulation transformer, or the departure of a 10-metre beam into the next field during a gale.

To sum up: There is no effective treatment for this disease, apart from divorce or *rigor mortis.* It is one to be borne, with as much fortitude as possible, sustained by the sympathy and loving care of the nearest and dearest.

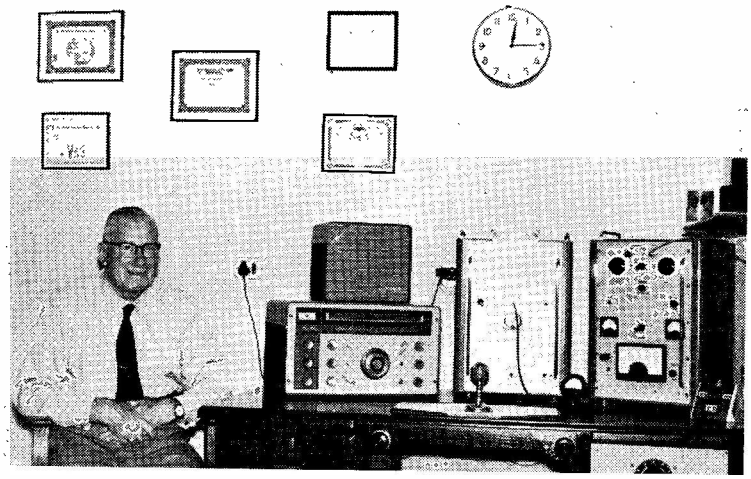
(Thesis submitted by Dr. L. C. Bousfield, G3LKB Billingshurst, Sussex. *Medical journals please copy.*)

RECOMMENDED FOR AMATEUR SERVICE

A recent issue of Standard Telephones & Cables *Component News* makes the following specific recommendations as regards Brimar valve types for various amateur requirements: *Cascode RF Amplifiers,* 6BQ7A, ECC84; *Grounded Grid Amplifier Triode,* 6AF4A; *Triode-Pentode Frequency Changer,* ECF82; *RF Power Amplifiers,* 6870, 6CH6, 5763, 6146, 5B/254M, 6BW6; *AF Power Amplifiers,* 5B/255M, 6BW6, EL84, 6146; *Low-Noise AF Pentode,* 8D8; *Rectifier,* 5R4GY; and *Voltage Regulators,* OA2, OB2.

DX COMMENTARY

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



ZE2JA

WE have another pretty full month to report, with conditions about as expected (except for the Big Sun-Spot, which wrecked everything for a few days). The longer hours of daylight have altered things somewhat, and those whose operating hours are restricted by times of work encounter a new set of stations on the bands.

One can now be on at 0700 GMT without getting up before 8 a.m., which helps in a number of cases! And probably this is the pleasantest time of day for the easy-going DX-chaser. QRM is not too bad, and sometimes 21 mc is open then, although 14 mc is the better bet.

Short skip is slightly less, it seems; but there are times when everything within a 900/1000-mile radius seems to come in at S9 plus. For the chaser of rare ones, it has been a pretty dull month, but the majority of DX'ers (those with scores below 200) have found plenty of new stuff to add to their collections.

Those who don't even count up (and there are plenty of them, too!) have been having some nice solid QSO's with VK, ZL, West Coast W's, JA, KH6, ZS and such. Not what the highbrows might call DX, but still good enough and very satisfying for those who don't treat their hobby with such deadly seriousness that it becomes real hard work.

The Top Band season went out with quite an interesting display, too. Next year that band should be really good; and so should Eighty.

CALLS HEARD, WORKED and QSL'd

Contests

This subject is not quite dead yet and, if it ever does die, it certainly won't lie down. VE2WW (Montreal) says more or less what W6AM said last month—that a contest is a chance to meet lots of old friends, however briefly. He restricts his contest activity to DX CW, and looks on it as a good yardstick for the efficiency of the station — especially the ARRL Contest! Most of the rest of the time he works SSB and tries to keep mentally balanced that way.

G6YL (Carlisle) is a real OT who thoroughly dislikes contests. She would like to see them restricted to QRP, field days or VHF. The present week-end affrays she regards as "a bad-mannered racket and an affront to the old Ham-Spirit." They also lead amateurs to act contrary to the terms of their licences (yes—what about that "signing off at not more than 12 w.p.m." ?) Finally, G6YL laments that so many stations never tune their receivers off their own frequency; and would like to see the whole amateur world give QRP a serious try-out.

G3MXJ suggests that the best time to do week-end working on 7 and 14 mc is when there *is* a contest on . . . G3LPS, together with many others, remarks that the bands were "completely wrecked" by the WSEM Contest (April 9—10).

OK1JX (Prague), in a very long and interesting letter, puts forward the point of view that Contest work is about the only way of improving operating technique. In OK-land, he says, six years back the average rate was 18 w.p.m. and 20 QSO's an hour; now it is 24 w.p.m. and 30 an hour. They also encourage improvement of gear—*e.g.* installation of full break-in, graduation from straight key to el-bug—and so on—as well as a general improvement in tactics. And, as a parting shot, he

asks: "Who make the less noise and abuse of the air, when queuing for a rare one—a dyed-in-the-wool contestman or a non-contest type?" But he admits our original point, which was that contests are too frequent and too long, and thinks that we should be able to eliminate some of the small national affairs which are organised just to boost their members' DX scores.

He also comments, at some length and with great force, on G3JZK's recent analysis of the "Mittel-EU" outlook—but that's another story and too long for this section. He says, among other things, that the OK's suffer from hordes of G's who *will* keep answering *their* CQ DX calls, and implies that they regard G-land almost as we look upon Mittel-Europa! *Well . . .* ! But it is fair comment, and OK1JX makes a number of very good points. And, for our part, we might now say that of all the European groups, the OK's generally are among the very best operators.

DX Gossip

The latest on Malpelo Island, *via* HK3LX/G3JFL: The DX-pedition should have left between April 18 and April 25 . . . but these things get postponed so often that we still quote this. If you haven't already heard or worked him, there may still be hope! *(Late flash*—It's off again.)

AP5BIB may have a peculiar sound about it, but W5PQA (who laid on the ZM7DA show) has been given permission to operate from East Pakistan, and that will be the call . . . G2JB tells us that VS1GC (ex-G3LMO) and VS9MB sked daily on 21225 kc at 1400 GMT. They are both crystal-controlled and will welcome calls from G's . . . Also from G2JB—JZØHA worked 21200 kc, 1350 GMT; QSL *via* W2CTN.

Russian calls: The UT5 mentioned last month is in the UB5 district, but that is not all—UV and UW prefixes may now be heard from all districts that normally sign UA. Whether these have a novice status or are simply due to running out of call-signs, we don't yet know. (Judging by the activity during the Russian contest, April 9-10, it might well be the latter.)

We gather that the ARRL don't propose to grant new-country status to the FF4, FF7 and FF8 stations in West Africa. Two countries, as before—FF8 and FQ8.

K6CQV/KS6 showed up recently and caused a traffic jam—but he will be there for 18 months, so take it easy . . . Activity from Sikkim is promised once more, this time by VU2KV/AC3 on 14 mc CW.

VQ8BBB, St. Brandon Islands, is still active but very touchy. Reports say that a pile-up sends him off the air—and there always is one!

Activity from Cocos Island again—VK9HC is reported to be on around 14100 kc . . . Yet another new country claimant is Cabinda, to which CR6CA proposes to travel shortly; all three HF bands, AM, SSB and CW. (Cabinda is a strip of Portuguese territory just north of the mouth of the Congo.)

And we had never heard of the Blasket Islands (off the south-west coast of Eire) until EI6X wrote to say that a group of EI's are heading that way. They will operate from May 21 (midnight) till May 22 (1600), on all bands, but mainly on 14 mc. No new country, this, but a good one for WPX-hunters, since the call will be EIØAA, which is sure to attract a lot of attention. With a beam on a 550-ft. hill, they should get out pretty well, too. Mostly SSB, but AM and CW will also be used.

W6AM is busy sending full data on the African Republics to the ARRL . . . envelopes showing their different stamps, and a "first

FIVE BAND DX TABLE
(POST WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
G3FXB	829	76	133	226	224	170	266
G2DC	816	87	118	239	205	167	267
G5BZ	795	66	121	270	206	132	278
G3DO	694	25	51	250	188	180	277
GW3AHN	670	16	55	204	245	150	266
G3BHW	649	15	45	209	213	167	249
GI3IVJ	642	41	70	179	189	163	232
G3ABG	604	56	90	191	139	128	215
W6AM	568	40	68	298	96	67	278
G2YS	541	73	93	171	120	84	190
G3LET	518	40	116	189	120	53	208
UR2BU	505	24	56	154	148	123	194
G3IGW	476	50	77	115	119	115	171
G6VC	469	40	60	159	121	89	191
GM2DBX (Phone)	433	34	31	162	105	101	178
W6AM (Phone)	429	23	62	284	49	31	284
G3JZK	421	17	62	95	143	104	192
GI3NPP	416	24	45	95	137	115	176
G3JAF	410	33	24	112	183	58	210
UR2BU (Phone)	403	12	33	112	130	116	167
G3DQO	395	20	52	181	101	41	190
MP4BBW (Phone)	394	1	5	183	125	80	197
G8VG	340	37	79	132	53	39	152
G8DI	340	35	66	101	75	63	133
G3LHJ	339	15	39	105	119	61	156
G2BLA	333	36	62	78	79	78	129
G3DNR	309	11	30	90	93	85	133
G3NOF (Phone)	302	8	15	33	128	118	160
G3MCN (Phone)	291	4	8	62	142	75	178
VO2NA	290	19	39	118	73	41	127
G3BHJ	288	8	29	43	136	73	160
G2DHV	274	22	30	133	64	25	153
G3WP	265	17	34	80	24	110	141
G2CWL	261	21	29	68	112	31	146
G3JVU	252	27	44	93	43	45	112
W3HQO	240	3	8	79	114	32	164
G3JSN	240	31	47	51	61	50	98
G3MMP	209	6	27	45	65	66	95
G3NFV	201	12	23	26	53	87	117
G3LAS	197	11	27	55	70	34	106
G3GHE (Phone)	193	13	28	33	43	76	113
G4JA	184	34	37	62	36	15	106
G3LZF	176	11	19	53	45	48	114
G3IDG	157	15	16	41	43	42	72

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

cancellation" dated March 5, the "birthday" of one of the new republics. (ARRL are reported to be unmoved, as yet!).

SWL Peter Day (Sheffield) reports VR3X, 3W, 3V and 3Z all active on 14 mc CW, VR3W also very busy on phone. Another good one he heard was W3ZA/EP (14310 kc CW). General DX news includes the following: KJ6BV works KH6 and KM6 on 14 mc phone, 1845 GMT Sundays . . . ZL3VB (Chatham) on 14040, 0600-0900 . . . VS5GS, 21120 kc AM, 1400 . . . KC6AQ, 14 mc SSB, 1430 . . . AC5PN, 14020, 1900 . . . JT1AB, 14080, 1215 . . . UAØKYA, Tannu Tuva, Zone 23, "very active" on 21 mc CW, 0800. Peter Day now sends a duplicated "DX bulletin" with his SWL cards, and doubtless gets a very high percentage of QSL's in return thereby, as he can always be relied upon to find the exotic stuff.

SWL M. H. Parker (London, E.6) says that I5TUF is run by an American oil-drilling team (QSL to Box 16, Mogadiscio, Somalia). They have two operators and work on 21 mc around 1700 . . . VS1AF was heard to mention that a non-U.S. team will be operating from Nepal soon, "to give U.K. stations a chance."

SWL P. A. H. Evans (Shrewsbury) heard PJ9AC working a VE3 (14 mc). New call for WPX, if not for anything else! He also logged FB8AC on 21 mc AM, not getting replies . . . G3DQO (Manchester) and others mention W2AYN/EP, apparently OK and giving QTH as Teheran.

G2DC (Ringwood) tells us that Auckland Is. (south-west of New Zealand) has been awarded "country status." Something may be cooking there, but there's said to be only 3·5 mc phone activity at the moment.

The Willis Island team is now said to include no amateur operators . . . DL9PS promises operation from San Marino some time in August . . . ST2AR awaits an SSB rig . . . If you get ZD9ITD it will be all right, as GW3ITD/MM has applied for this call . . . For those wanting Vermont on any band, look for K1IVT/1 (or K1EFI/1 or K1LST/1) during May 14-15, as they will be there working CW and phone on all bands 3·5-28 mc.

Top Band DX

W1BB's latest bulletin of news makes it pretty clear that One-Sixty has pepped up again this year, and that we are probably in for a series of good Trans-Atlantic winters. February 14 was the best night for more than three years; DL1FF and G6HB, G3PU, and a few more G's got across, but it was not a scheduled test morning and activity was not high.

February 21 saw KS4AZ stirring things up for the W's, to say nothing of VP1JH, VP5FP and HC4IE. VP1JH was our old Top-Band friend WØNWX on a DX-pedition! And the lists of W's heard by G's that morning were phenomenal.

February 28 was good again, with G3PU and DL1FF getting across. VE1ZZ was one of the stations worked. Then came the *CQ* 160-metre CW Contest, March 11-13, during which G3PU did it again; ZL4RB heard K6ZH in the contest up to 569 and made a tape recording of him. This time, WØNWX came up as VP2VA and gave some of them a new country. Signals were good over here, but the QRM on the other side made it almost impossible for G's to work them.

Other news items: G3PU's score on Top Band is now 18 states, 32 countries and WAC—*very* FB! SWL D. Powell, of Gibraltar, sent "superb" reports to W1BB on all the tests . . . W6ZH was working ZK1BS on 14 mc (February 6), shifted to 160 metres and was copied solid on 1995 kc phone!

W1IGU was experimenting with kites and managed a 500-ft. vertical at an angle of 88°. Later, he got up to 1185 ft. at 85°. He was so busy with the kites that he hardly had time to transmit, but says that signals inside 500 miles all got weaker, with the DX stuff coming up terrifically. W1BB promises to continue his bulletins next season, but will only send them to those who participate regularly in Top-Band DX activities, and who send in reports and news items. There is no mailing list—Stew doesn't propose to start one—and already the paper-work is about as much as he can keep up with. He certainly does serve as the "control station" *magnifique* and Top-banders can't be grateful enough to him for all the hard work he puts in. (And as well as all this, he has the most consistent and most frequently-heard signal of the lot.)

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	98	98
G3JEQ	97	97
G6VC	96	96
G3FNV	94	95
G3JHH	94	94
G3HDQ	89	90
G2CZU	81	83
G3JJZ	77	80
G3APA	74	86
G6QN	73	80
G3MCY	71	73
G2CZU (Phone)	67	68
G3FS (Phone)	64	70
G3NFV	62	67
G3MYI	60	82
G8VG	58	67
G3NBT (Phone)	58	60
G3MXJ	55	67
G3LNR	54	57
G3NPB (Phone)	50	55
GM2HIK	48	55
G3NNF	45	49
GW3NAM	44	53
G3NPP	44	51
G3JFF	36	45
G3LZF	32	43
G3NNO	27	56
G3NVO	22	36
G3NTU	21	36
G3NJQ	18	32

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

Top Band Local Topics

And so, to return to our little ten-watters—right out of the global DX race on this band unless they have beautiful sites for aerial-farms!—we record more or less the usual goings on. G3NQF (Enfield), a relative newcomer, has already worked 19 OK's, 11 DL's, and two HB9's, also getting SWL reports from ON and SM, the latter being 589.

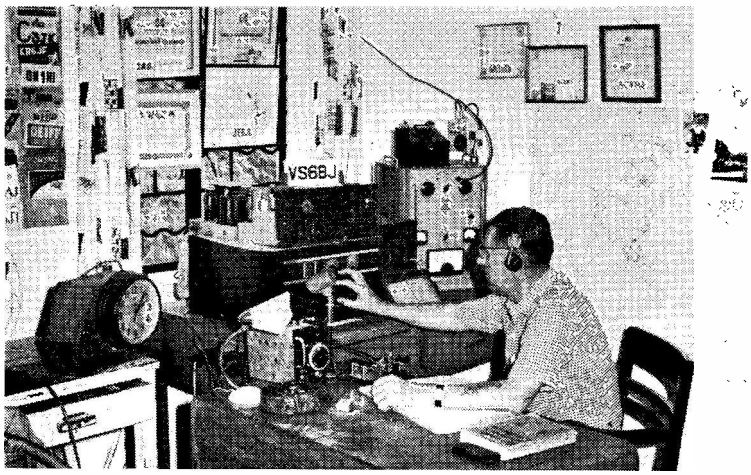
G3NBT (Sidcup) would like to hear Hereford or Cumberland on phone. He's just worked his 60, but not all confirmed yet; March 19-20, he says, was a wonderful night.

G2VV (Sunbury) worked EI3AE for a new one on the band . . . G3NVO (Middlesbrough) was even luckier, raising EI3AE on CW and EI5AC on phone; he also received a card from G3MHB/P (Argyll) . . . G3MXJ (Gravesend) now has a half-wave aerial up, and is "quivering on the brink" of WABC; he, too, collected G3MHB/P, and also G3HEK (Salop), leaving him with Hunts. as the only unworked English county.

G3NNO (Leeds) worked the Argyll station and heard EI3AE; he also mentions a QSO with G3CSZ/TTX (see "QRPP") . . . G3MNL (Carlisle) will be operating most nights from 2200 to 2330; his first QSO on the band was with G5CP/A, after which he found the input was only 3 watts.

GM3KLW (East Lothian) reports that he is now representing that county on the Top Band air, and is already in search of his WABC. There should be plenty of customers for him . . . G2NJ (Peterborough) wants to say thanks to Doug. Powell, the Gibraltar SWL, for splendid co-operation and detailed reports. (From ZB2 likewise come reports on reception of G3GPW, 3NNJ, 3LEV, 3KDV, 3LGK, 3LWM, 3NPI, 4IV, GW3KSQ and GW3NAM.) G2NJ also received an SWL report from Sweden.

G3JJZ (London, S.E.6) has got back on the band since his demob, and his score stands high—77/80. The three missing QSL's are for Banff, Monmouth and Stirling, all worked six years ago! Recent contacts — GM6RI, 2HIK and 3KHH, GC, GI, GW, four OK's, DJ2KS and EI3AE.



VS6BJ is one of the Hong-Kong group, located at Kowloon, and has an interesting station. The receiver is an AR88 and the transmitter a Labgear LG.300. For SSB working, he has a home-constructed half-lattice exciter with an 829B as PA.

Forty Metres

Since there are no comments on Eighty this month, we plunge straight down to the QRM band, where quite a bit of DX has been going on. GI3NPP (Dungannon) worked KP4YT, SVØWI, CT3BF, OY1AA, ZB2N, PY's and ZL, among others. G3MXJ raised CT3AV, UM8KAB, UA9 and PY's. G3ABG (Cannock) lists UAØABG (Yakutsk), ZA1KC (?), ZB2A and VE3BWY—our old friend Ham Whyte, G6WY. G3ABG also says he heard PJ2ME in the early evenings and had ignored him, but now he's wondering if he was genuine after all.

G3NWF (Petts Wood) distinguishes himself by sending a WPX entry compiled from nothing but Forty CW—122 points; he runs 25 watts to an 807 and a dipole, and some of his better QSO's on the band have been with CT3BF, OY1AA, TF5TP, UA9 and Ø, UL7, VE1 and 3, KP4YT, ZB1NR, PY and loads of W's; nice ones heard but not yet worked included CM, HH, HK, VP3, OA, CX, LU, SV1, 4X4, ZC4 and ZL.

G3JSN (Watford) worked KP4AMR and UN1AN, and called UM8KAB many times without result; he makes a passionate plea concerning phone operation on the band, which appears under another heading further on.

G2DC says "lots of good DX to be dug out." He worked all W and VE districts, CT3, CR6, ZD1, 2 and 6, ZS1-6, VK and ZL.

From G3NOQ (Tynemouth) "a note from a beginner which may help to cheer lesser brethren . . ." and what he says is that running 25w. CW to a 6L6 with a 67 ft. wire, he has worked nearly 30 countries including all W districts except the 7th, also OX and VE. He says "I'm by no means DX-mad and never get up before 0630!" This is the sort of report which does show what can be done and assuredly should encourage more recently-licensed readers (brethren).

G3LET (Westcliff-on-Sea) has found 40m. conditions poor recently, except for PY, workable most evenings after 2100. His best-of-the-month, also on CW, were CT3BF, CX1AA, CO7AA, HK7MM, JA1-4, VQ2-4, VP3ER (2359), VP2KD (2330), VK3AZY, YV5ACP, VP9BO and VQ6AB (who would like to work the U.K. on 3·5 mc). To us, a list like this makes 40 metres look good!

Twenty Metres

G3LPS (Blackburn) seems to have deserted Forty these days, and has become a Twenty-only specialist. He pushed his dipole up

a little higher, and finds results worth it; between the hours of 1600 and 1900 GMT he has worked UL7, VQ2AB, KR6DO, KH6BXU, FB8CE, VQ3HV, ZS's and plenty of UAØ's and suchlike; at other times, ZK1AK, VK's, ZD2JKO (2030) and ZL's. G3LPS has some trenchant remarks to make about klottery but adds that it's an extra nice feeling when that DX station comes back to *you*, even if you can hardly hear him for the lids still making long calls.

G2VV worked TI2PZ for a new one; G3JSN raised PZ1AP, VP9AK, F9UC/FC, CT2BO and FG7XG—all CW; he heard 9N1CJ on SSB, coming in like a European.

G5BZ keeps his weekly skeds with W2HAQ and VK5BZ, and worked a doubtful one signing ZA2BAK; otherwise the only contacts of note were JA's, VKØPM and VE8ME. GM2DBX (Methil) makes a welcome reappearance; not much on this band, but he did raise VP5AR and ZP5CP.

G3ABG collected PJ2ME and VO2NA; G3EKW (Nottingham) added FF8DF, JA, LU, OX3UD, PY, UAØKZA, VE6, VK and W's; GW3AHN (Cardiff) worked VQ6GM on CW.

MP4BBW (Awali) once more spent the whole month on 14 mc SSB; new ones were UG2AA, SL5AB, KG4AZ, JZØHA, ZK2AB and OE1RZ. "Routine DX" included YS, HI, HR, AP, XZ, FB8, 9N and many other nice ones; the famous Ted Henry SSB rig (see p.86, last month) is bound for FB8CJ, then FR7ZD and possibly to VQ8, FB8CD and a Tromelin expedition. How that Argonaut gets around.

G3DO (Sutton Coldfield) also used SSB only, pushing up his WPX total for Twenty to 174. The month's additions included YV1CS, ZS7P, OY7ML, KC4USH, YN1TAT, K6CQV/KS6, VU2RM, VS1JO and a lot of new Europeans.

New for G3MXJ, on CW, were VQ6GM, VU2XG, SVØWAC, OX, CO7AA, ST2AR, OQ5PS, KH6 and LU. He found conditions "rather unpredictable." G3NOF (Yeovil) got his phone to EA8DD, PY1DC and VK3AEE, but missed out on FG7XP, LA3SG/P, VP7NS and 3A2CN, G2YS (Filey) mentions VK2VG "sticking out like a European," and also worked FG7XC and 7XF, ET2US and DU7SV.

G2DC noted a UA6 calling YA1AM/MIR (whatever that might be!) He worked UJ, UA9 and Ø, lots of VK's and ZL's, and found the band very good in the mornings until the big fade-out.

G4JA (Baschurch) raised KR6DO, KR6GY, 3A2DB, VP9AK and a K7 in Arizona.

Fifteen Metres

G2VV collected YA1BW and OX3RH for new ones, also VK6SM and a couple of /MM's—all on his 68-ft. indoor aerial. G3JSN raised FF8AP and EA9AQ, but he can only operate at weekend afternoons, and heard much DX at times when he couldn't call it (TVI !).

G3NWT (Sandiacre, Notts.) reporting a nice crop of DX on Fifteen, mentions a QSO with VK6KW at noon "at the height of the Russian QRM which providentially parted, like the Red Sea, for the duration of it." This made him feel good for the rest of the day.

GM2DBX raised FF4AB, VP2ML and lots of W's; G3ABG, on the key, booked in UG6AW, ST2AR, ZD2JKO, VQ3CF and VU2MD; G3MMP boosted his total with HZ1AB, LZ, OD5LX, VO, ZB2, ZS, UF6 and OHØNC; G6VC caught up with LA3SG/P on CW, and got a direct QSL from YA1BW for an earlier contact on the band.

GW3AHN had his usual fiesta on this band, his phone connecting with FF7AB, FK8AT, KA, KG6, KH6, KW6DA/KM6, KR6, LA2TD/P, TA3GI, VK9RO, VP2ML, VQ4, VQ6GM, VR2BC, VS1 and VS9. In addition, he worked CW with JA, KG6, KH6, KR6, UAØ and UL7, VK9GK, YA1BW, ZS7R, 9M2EB and 7G1A. (And, *yes*—he still uses 25 watts!). He tells us that 9N1FV and 1TB are both active on 21 mc AM, running low power to dipoles —difficult to receive in Europe. Also that DL3RO is licensed in Persia and signs DL3RO/EP.

G3NFV (Ashtead) worked phone with VP2ML, UA9OM, TF3KA and 9M2EB; CW with AP2CR, UA9 and UI8; GI3NPP's CW penetrated to CT3AV, VQ6AB, ZS7R, 7G1A, UJ8, UI8 and UAØ.

G3NOF sends a long phone list including HV1CN (SSB), KA's, KR6's, MP4TAH, TG9TS, TI2CMF, SVØWT (Crete), VK9AN, VP2DA, 2GW, 2ML and 4LG, VS1, 6 and 9, XW8AL, YV, ZD6, 9M2DX and 2GA, and all the usual stuff.

G3DNR (Broadstairs) stuck mostly to 15 metres on which he worked VU2BK and 9M2EB (both phone) for new ones. Others, on CW, were YA1BW, ZD2GUP, UG6 and UO5.

G2DC collected a new one in ZS7R; he also worked all W States (including KH6 and KL7) during the month! To say nothing of all VE districts, AP2CR, EL4A, OQØRL, VU2MD, 2XG, 2JA and

WPX MARATHON

Starting January 1, 1960

CW Only		Phone Only	
G6VC	249	MP4BBW (*SSB*)	187
G8DI	213	G3DO (*SSB*)	174
G3JVL	197	G3GHE	143
VU2XG	170	G3LAS	126
G3LZF	153	UR2BU	80
G8VG	132	G3NFV	80
G3NWF	122	GM2DBX	71
G4JA	116	GM3NQB	70
G3LAS	114	G3BHJ	64
G3JVU	109	G8VG	63
G3JSN	99	G3LHJ	59
G3MXJ	97	G3MCN	53
G3DQO	95	G2FQW	49
VO2NA	90	VO2NA	48
UR2BU	79	G3JSN	47
G3MGL	76	G6VC	35
G2BLA	65	G3DNR	32
G3LHJ	63	G4JA	23
GM3LYI	58	G2FQR	15
G3WP	52	G3MGL	8
G3DNR	49		
G3GMK	40		
G3NTU	33		
G2BP	29		
G3JFF	24		

(No new entries accepted, and stations not reporting movement for three consecutive months will be deleted.)

2RN, JA's, VS1, VQ3, VP8EH, ZD2's and 7G1A.

G4JA, on CW, accounted for VQ4EV, VU2RN, JA and a K7 in Wyoming; he uses a 136-ft. wire for all bands, but like a letter Z, never more than 20-ft. high, and clearing roofs and telephone wires by only a couple of feet!

G3GHE (Reading) got his phone to DL3RO/EP, EA9, FF7AB, FF8AP, FK8AT, JA, MP4, OQ5, PZ1AC, VP6, VQ6, VS9, VU, ZD2 and 9G1DK, plus the usual VK's and ZL's.

Ten Metres

A pretty poor band, this one, nowadays! And of course the big sunspot had a devastating effect on it. Nevertheless, during the period some worthwhile DX has been recorded. G2VV's indoor aerial got him into JA and ZD2; GM2DBX worked phone with ZS7L, RD6KAR and FG7XS; G3ABG raised ST2AR; and G6VC dug out FG7XF and EL4A from an apparently dead band.

G3JSN found few U.S.A. openings, and thinks the Pacific has just about had it with the present state of sunspot activity. The only contribution from GW3AHN was OA4M on phone; G3NFV did somewhat better with VP2AR, VP7NY, VU2PS, ZD2RJO and ZS9G on phone.

GI3NPP raised I5TUF, OQØPD, VP2DY and VQ6GM; and G3NOF (also on phone) collected a good bunch which included CR6 and 7, CX4CS, FB8CG, GW3ITD/MM, HP1HC, OQ5CG and 5FV, OR4TX, VE2AIG/SU, VQ2, 3 and 4, VQ8AV, XW8AL, YV5EB, ZE's and ZS's, ZS7L, ZS8I, 9G1CT and 9M2EZ. Various W's including four mobiles, were also worked.

G3GHE, on phone, mentions CR6CA, EL1D, UL7JA, VQ6GM, VK's and JA's. G2DC says the band is very erratic, and when it does open "our friends" are there to mess up everything with their squawking. He chased FG7XF without any luck; but worked all W and VE districts, JA, VU, VK, ZD1 and ZL.

G3NWT (Sandiacre, Notts.) had a contact with ZD2JKO who said that he had "a 10-metre opening after the explosion of the French A-bomb" and had added four new countries to bring his score to 108C. (It is not unlikely that this French explosion could have had some temporary local effect by the creation of a slow-moving, low level reflecting layer—but broadly speaking, letting off the most powerful bomb yet conceived can hardly have more than a slight, passing and quite local influence on the ionosphere compared with the enormous effect of the sun's activity, on it constantly. It is rather like striking a match under an arc-lamp, so far as the ionosphere is concerned.—*Editor.*)

G3LSC is at Poole, Dorset, and started with the Top Band Talking Box — see "Short Wave Magazine," October 1956 — and a CR-100 receiver. Though he still has the Talking Box, the main transmitter is now a K.W. Vanguard, with a Cubical Quad for the 21 mc band. For 160 metres, he has a 250ft. wire, so arranged that the middle 30ft. section is in the vertical — another approach to the problem of getting the current antinode, where the radiation occurs, into the right place.

The Overseas Mail

James Pershouse (9M2DQ) reports little DX these days, and he is mostly on 7 and 3·5 mc "doing local stuff." The times are wrong out there for working the U.K., since he has to go to bed around 1500 GMT in order to be up early next morning, and the band opens about 1630. He tells us that several VK's serving with the R.A.A.F. in Malaya now hold 9M2 calls—sometimes old ones re-issued, others are new ones—confusing for the QSL Bureau.

Mac Wilford (VP6WD) says that the "VP6BY" recently reported on SSB was VE6BY operating VP6WD's station. Under the reciprocal agreement, Canadian amateurs can get VP calls easily, and so VP6WD handed over his station complete and Art ran it, signing VP6BY. He got a big kick out of being rare DX on SSB (the only VP6 as yet) and worked a lot of stuff. We gather that VP6WD does *not* approve of the new American phone band!

Ronnie Munro (VS6EL) writes to say that he is ex-VQ4HW and is a new call in Hong Kong. Recently reported QSO's with a VS6EL have been with a pirate. The real one is not yet on the air, but will not be long; for a change, he has a magnificent location, almost on top of Victoria Peak, 1,300 feet up and practically unobstructed. If he gets his aerial on the top of the six-floor block of flats where he lives, all should be well!

From *The Malayan Radio Amateur* we quote the following: VS1GN, ex-G3JFC, VS4BD, VS5BS and ZC5JN (all the same

chap!) is now 5A2CW . . . VS1KM is ex-G3KZJ and 4S7JM . . . 9M2GR is on SSB from Penang, 14 mc . . . 9M2EW is back on the air, 7 and 21 mc . . . 9N1AA, the King of Nepal, no less, expects to be active soon . . . A whole bunch of "active" 4S7's is reported, but where do they hide themselves?

News from the SWL's

Peter Day (Sheffield) heard ZC4JB calling "CQ G" at 2230 on 3798 kc phone; on Forty he logged phone from HK4EX, TI2OE, CO8AC and six YV's; and CW from HC4IE, HK7MM and KG4AD; and the most interesting one on Twenty was W3ZA/EP (14310 kc CW).

B. Carter (West Harrow) heard HI7CJY and HI8GA (FM) on Ten; 9M2DW "booming through" on Fifteen phone; and one or two rarer ones like FD8AMS and a VS4 who caused such havoc that he couldn't copy the call! He quotes G3NHD, 3NWH, 3MFO, 3HBR and G2TM/M as "notable top-banders" in his district.

F. Bramham (Barrow-in-Furness) used to envy the DX lists sent in, but his father bought an HRO and he is now in business with the others! On Twenty SSB he mentions AP5BIB, KR6GF and 6LL, XZ2SY, LA3SG/P, OY7ML, KW6DB and PZ1AX; on Fifteen phone 9M2DW and HV1CN; and on Ten phone VP2ML, VS6BJ, VP2AR, VP3MC, ZD6DT, FF7AB and VE8AB.

J. Wooden (Kingston) heard a so-called "GPO Monitor station" come on Ten metres and tell a local G that he had broken four of the regulations. The "monitor," however, was just a pirate! On Ten phone, J.W. heard XE1CW and 3AF, CT3AV, FB8CI and VS6BJ for interesting ones.

QRPP!

"QRP" is a relative term, and may be W's using 75 watts come under that heading . . . but here's G3CSZ/TTx (Birkenhead) talking about his days of "QRPPP," which are left behind him. He is now in the high-power class with 2·5 watts on Top Band to an OC24 transistor running at an overall efficiency of 35 per cent. On this he has worked OK1WR, EI3AE, GI's, GD, GM and quite a load of distant G's. The TTx is a crystal-oscillator operated in the grounded-base mode, and reports from all the stations mentioned were between S5 and S7—nice going!

Don't Spread

G3JSN asks us to make a forceful plea for greater care in netting, especially in 7 and 3·5 mc phone QSO's. He suggests that 50 per cent of the mutual QRM among phone stations is unnecessary, being due to a net spreading over anything up to 15 kc. Monitor your own transmission and re-net if you are drifting (which you shouldn't be, anyway). "Nets" do not possess any material advantage unless they *do* confine themselves to one frequency—watch it, you spiders!

DX-pedition

The recent Cambridge expedition to the Isle of Man put GB3LAS on the air, with a Labgear LG.300, a G3MGB Top-Band Tx, a Mosley three-band vertical and a 250-ft. long wire. They picked the worst week for years (what with A-bombs and S-spots) but still managed a few pile-ups, working 815 stations in 60 countries and 20 Zones. The ops. were G3JZK, G3MDR, G3MIK and G3LAS; they all had a good time and are toying with the idea of a GC trip in the summer. Good news for Top-Banders—GB3LAS had so many requests for contacts with Hunts. and Cambridge that they are going to put these counties on the air during a few week-ends of the Cambridge summer term. G6UW will be on Top Band in June, and G3LAS will be active when possible from Ely.

Interesting /MM Expeditions

If you find WA2EDV/MM, it will be the yacht *Rolling Stone*, of which WA2EDV (Don Stone, Essex Falls, N.J.) is owner-operator, on passage back home to the States from Bremen; he was due to leave there on May 5. WA2EDV/MM has already been operating from dock-side on 21·415 mc, but on the trip homeward will be running a KWM-1 on 14/21 mc SSB, and on 28 mc when the 10-metre band opens. *(QTHR.)*

Sailing in the opposite direction will be W2ZXM/MM (Kurt Carlsen, of the *Flying Enterprise)* in his 55-ft. yacht *Wind Rose,* which he is bringing to the U.K. to race at Cowes. W2ZXM/MM will be leaving on June 12, and will also be running a KWM-1 on the 14-21-28 mc bands.

Good luck to them both, and we are obliged to G3LB (Ripon) for the information.

Miscellany

GW3CF (Prestatyn) is the victim of a pirate's attentions; he is getting QSL's for 14 and 21 mc QSO's with GW3CF and G3CF, although he is not active. He will deliver the QSL's personally on receipt of the new owner's address . . .

Another to suffer from pirate trouble is G3LAF (Ruislip A.T.C. Sqdn.), receiving cards for 10-15-20 metres, which bands G3LAF does not operate on at present.

SWL S. H. Stephenson (Morden) found a nice Funny One on April 1st at 1645. On 14 mc this joker, signing "6L6GT," was working sundry stations, giving his QTH as "Lunik" and name as "Red." (QSL *via* Box 88, but he didn't mention Moscow.)

G3LZF (Todmorden) would like to see prediction charts for the various bands. Of course, we used to do these many years back, but the general opinion was that conditions change so fast that they don't really mean much. All you can get from them is what you might be working *if* you are there at the right times and *if* conditions are what they should be. If there's sufficient demand for them, we will have another go—the data are always available—but no one else seems to have brought the subject up over the years.

I1AB is now of Milan, and has the distinction of operating SSB on entirely home-built gear.

G2BJY (Walsall) drops a line to tells us that he has been active consistently since March 1946 on all bands, including the old 5-metre band when we had it. He has worked 191 countries (165 confirmed) and only needs the odd card for several sheepskins. He has a home-built receiver (quite a rarity these days), but is not keen

on VHF owing to "a brainful of TV servicing, FM and so on."

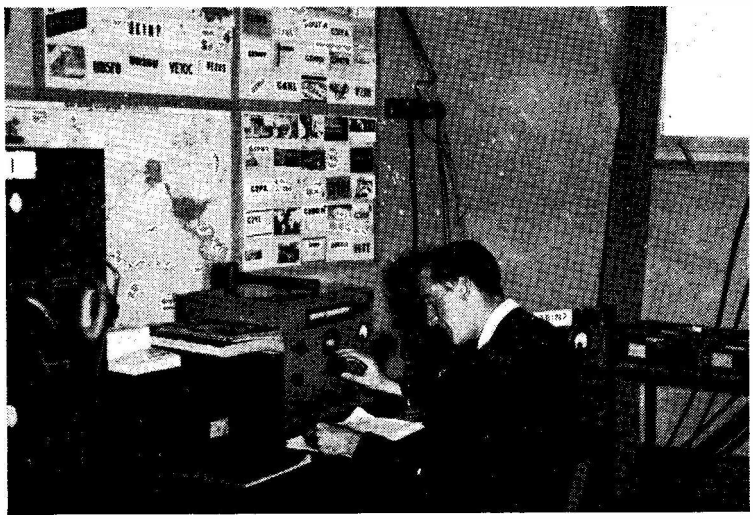
RTTY Activity

G3CQE (Norwich) has worked PAØFB for a new country in this most advanced mode, although G2UK made the first G/PA QSO of the kind. PAØFB is raising the DX, including two TG9's and several W's. G3CQE himself tells us that some of the latest newcomers to RTTY include ZK1BS, HL9KT, KM6BI, OA5G and K6CQV/KS6—real DX! VS6AZ is also said to be on, but in difficulties; VQ6GM hopes to make it shortly; EI6W is fully equipped and nearly ready, and GW2FUD has a printer and is trying to get going.

ZL3HJ, with whom G3CQE had a T/P contact some time back, has now worked W6CG, who does the DX column for the *RTTY Magazine*. No info from foreign parts on RTTY this time, but thanks to G3CQE for the foregoing.

So that's it for one more month, and again we have to thank our numerous helpers, especially the West Gulf DX Club *Bulletin*, W1BB, *The Western Radio Amateur*, and all our DX-gathering sleuths including, we are glad to see, many of the SWL's.

Keep up the good work and let us have the next contributions by the deadline, which will be **first post on Friday, May 13.** For the month following, it will be *June 10* — overseas correspondents, please note. Address everything to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. For another month, then, we say 73, Good Hunting, and — BCNU. And don't miss the deadline!



ZB1NR, Malta, has a neat layout and is very active. There has recently been an official embargo on the issue of new ZB1 licences, due to certain administrative difficulties connected with the legal position of the ZB1's; this does not, however, affect those who are already licensed.

THE MOBILE SCENE

The first of the season's mobile events was the gathering at Cannock, Staffs., on March 27, at which the main attraction was the Heathkit show and demonstration, organised by G3ABG, who informs us that the total attendance was over 400. This was probably a good many more than expected, as it was early in the year for a Rally event.

On April 10, the Amateur Radio Mobile Society held their Rally at Overstone, Northampton, at which the attendance was not as great as it might have been had the weather been a little kinder—it was bitterly cold, with a high wind. Nevertheless, some 45 cars fitted /M clocked in at various times, and the Top Band talk-in station, G3NMS, was kept quite busy; a few mobiles were also worked on two metres. During the morning, plenty of /M activity was to be heard in the Bucks/Herts area from cars on their way to the Rally. The events included a frequency-measuring contest—some of the triers were as much as 50 kc out on Top Band!—and a draw for prizes of purely feminine interest. It was too cold and blustery for real enthusiasm, however—but that was not the fault of the organisers, who had come up from beyond London to make the on-site arrangements.

Future events on the calendar are now as follows:

May 8: Cheltenham Mobile Rally, Montpelier Gardens, Cheltenham (in the middle of the town). Talk-in stations will be G3GPW/A on 1920 kc and G3IER/A on 145·39 mc. An equipment display is being arranged, and there will be ample parking space on site.

May 8: Thanet Radio Society Mobile Rally at Hugin Site (of local archæological interest) on the A.256 between Sandwich and Margate.

May 15: A.E.R.E. Harwell Amateur Radio Club Mobile Rally at Harwell, on the A.34 Oxford-Abingdon-Newbury road. The meeting opens at 2.30 p.m., with G3NNF/A doing the talk-in on 1930 kc, and G3NNG on 144·10 mc; the ladies will be taken off on a coach trip round about Oxford, and there will be buffet tea at 5 p.m., winding up with a raffle. Ample parking space will be available, and the inclusive cost is only 4s. Intending visitors are asked to notify in advance, to facilitate the catering arrangements. Tickets, with remittance 4s. and s.a.e., from D. T. Boffin, G3HS, A.E.R.E. Amateur Radio Society, 6 Highworth Road, Faringdon, Berks.

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The Mobile Scene—contd.

May 22: Northern Mobile Rally, Harewood House, between Leeds and Harrogate, on A.61. This event is being organised by the Spen Valley Amateur Radio Society, and the Rally secretary is J. Charlesworth, G3IJC, 23 Craven Lane, Gomersal, nr. Leeds, to whom application should be made for further information.

June 5: Harlow & District Radio Society Mobile Rally, Village Hall, Magdalene Laver, nr. Harlow, Essex. Talk-in on Top Band will be by G3ERN and on two metres by G3JMA. In addition to events of interest for mobileers, attractions are being arranged for the XYL's and harmonics. Refreshments will be available.

June 26: West of England Mobile Rally at Longleat House, nr. Warminster, Wilts. Grounds open 10 a.m. to 6 p.m., admission to Rally 1s. per head. Unlimited parking accommodation in reserved Rally car park, in one of the most delightful settings on the Longleat Estate. Ample catering facilities in the Longleat House Restaurant; no prior booking necessary. Attractions to include Morris Dancing Displays at 3.0 and 5.30 p.m.; free prize draw; competitions for children; tickets at reduced prices for admission to Longleat House itself (residence of the Marquis of Bath). Prizes and certificates will be awarded for: *(a)* The mobile travelling the greatest distance *to-and-from* home on the *day* of the Rally; *(b)* The longest distance mobile-to-control contact on Top Band; *(c)* The best distance worked mobile-to-control on two metres; *(d)* The mobile recording the highest field strength at the control station from a designated point in the Rally grounds; and *(e)* The best mobile-equipped car in a *Concours d'Elegance*. These prizes will be presented by Lord Bath at 4.30 p.m. Control and talk-in stations will be G3CHW/A on 1900 kc and G3FKO/A on 145·3 mc, opening at 10.0 a.m.

July 10: South Shields and District Amateur Radio Club Mobile Rally—details later.

July 17: Southern Counties Mobile Rally, Beaulieu Abbey, nr. Southampton, at the Vintage Car Museum established by Lord Montagu of Beaulieu. This event is being organised by several southern Clubs in co-operation, and detailed arrangements will be announced in due course.

Readers who are operating /M are reminded that we shall be glad to have details for the Mobile Register, instituted originally by SHORT WAVE MAGAZINE, and published at intervals during the season. The information required is call-sign, QTH, bands worked /M, and make and registration number of vehicle. We already hold a few new entries, which will be included at the next appearance of Register additions.

GOOD LUCK IN THE R.A.E.

To those involved in this month's Radio Amateurs' Examination, our good wishes for a successful outcome in their attempt to convince the Examiner and get the slip marked "P."

SWL

SMALL AERIALS — AMATEUR JARGON — POWER SUPPLIES — MAN-MADE STATIC — WPX AND HPX — READERS' COMMENTS

THIS instalment of *SWL* might well be called "Loose Ends," since it is an attempt to tidy up a few of the matters left over from previous issues. Readers are always co-operative in telling us what they want to see in this feature, but it is not always possible to give it to them at once. Furthermore, the publication of a "Wanted" idea from one particular listener will often bring a small crop of suggestions from others, all of which can only be dealt with at a later date. So now let us attack some of the subjects in the pending tray.

Small Aerials

Top of the list comes that universal problem—how do I get a large aerial into a small space? Granted that a large aerial is not always necessary or even desirable, there are many purposes (LF-band listening, for instance) for which it helps towards successful work.

But never forget that a small aerial in the clear is better than a large one that runs up stairways, round corners, parallel to gutters and electric wiring, and so on.

The roof-space aerial, in particular, can be a real trouble-spot. Many is the disillusioned SWL who has slung a dipole of sorts in the loft, only to find that his noise-level has become worse than it was before.

The reason for this is, of course, that the average roof-space contains a water-tank, piping, and a variable quantity of electric wiring, often pretty aged. Rusty and badly-bonded lengths of conduit are *not* a help towards quiet reception!

The answer? Make the best of things and run your aerial right up to the peak of the roof, as shown in Fig. 1(a). This will, at any rate, prevent it from being *parallel* to most of the other metallic stuff in the roof-space.

If you want it to be an aerial for one particular wave-band, make a proper dipole of it, co-ax fed at the centre, which will be the top. Eight feet per leg for 28 mc; twelve feet per leg for 21 mc; sixteen feet per leg for 14 mc will give you excellent results—but only on the one band.

For two bands you can arrange two dipoles in parallel, the feeder going to the centres of both of them. Imagine the one shown in the drawing to be a 14 mc aerial; then you can install a 21 mc version running "through the page," so to speak, with one leg pointing towards you and the other away. This will not detract noticeably from the efficiency of the one for the other band, and they can be operated in parallel.

You can try all sorts of sizes and shapes of aerial in the roof space, but it is usually undesirable to bring the actual aerial wire down through the house, unless your room is the one directly under the trap-door. In other cases a screened feeder is necessary,

to avoid noise pick-up.

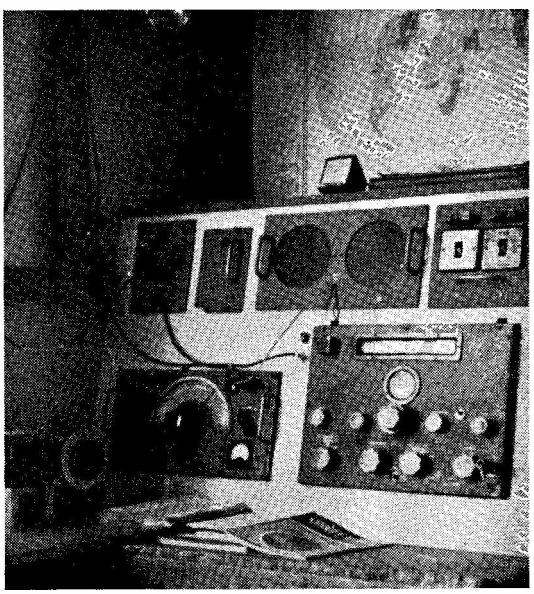
Fig. 1(b) shows a simple answer to an outdoor-aerial problem—how to get a 66-ft. aerial into a 33-ft. garden (or, *pro rata,* a 132-ft. aerial into 70-ft. or so of space). You want to get the *centre* of the aerial well up in the clear, and what more obvious way of doing it than to let the ends droop? The disadvantage of this scheme is that a vertical wire will always pick up more locally-generated (man-made) noise than a horizontal one. But if your aerial is a half-wave for the band you are most interested in (*e.g.* 66-ft. for 7 mc) it is the centre part of it that does the most work towards collecting signals, and the ends, even if vertical, will not matter so much.

If you consider it as a transmitting aerial, it is the portion carrying the heaviest current that does the most radiation of power; this portion, in a half-wave aerial, comes at the centre. So, conversely, the centre part of a receiving aerial carries the greatest amount of the minute current induced in the wire by the incoming signal and the same rule applies.

Don't forget that if you are interested more in the HF bands, there is little point in putting up a long wire unless you want to take advantage of its directional properties. For all round reception something about dipole-size will be better.

Amateur Jargon

SWL's who find themselves puzzled by abbreviations and the jargon of Amateur Radio fall into two categories, according to whether they listen mostly to phone or CW. In any case this is a problem which soon resolves itself—it is only the novice who is puzzled by the strange language. A few months or even weeks of listening will soon make clear what is meant by the various expressions—even if some of them don't make sense even then !



The neat console receiving layout designed by E. Willox of Aberdeen. It shows what can be done with familiar gear.

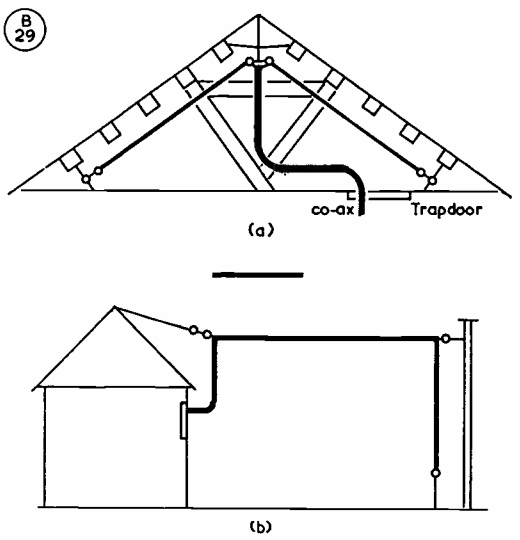


Fig. 1 (a). Layout for an indoor aerial, which can give very good results if installed as suggested in the text. The roof-space is always a suitable location for HF aerials if no outside arrangement is convenient or possible.

On phone, most of the cryptic sayings derive from the CW man's form of shorthand—the "Q" code. This is a ridiculous state of affairs, since these abbreviations were never meant for phone use, and in most cases save no time. The professional CW operator uses "QRK?" for "Are you receiving my signals well?", and so the amateur use has come down to QRK for Signal-Strength. "QRM?" means "Are my signals interfered with?", and so QRM means Interference. We haven't space to publish the whole code, which may be found in all sorts of places, including the *Call Book* and many of the smaller books and pamphlets on Amateur Radio.

Best-known groups are QRL—I am busy; QRN—Static; QRO—High Power; QRP—Low Power; QRS—Send Slower; QRT—Stop Transmitting; QRU—Nothing for you; QSB—Fading; QSY—Change Frequency.

All of these will be heard on the phone bands, but often, it's sad to relate, with the further burden of the phonetic alphabet superimposed on them.

Thus "Static" becomes "QRN," which becomes "Queen Roger Norway" or some such horror, much more complicated and time-wasting than the original word! And (later arrival) "QRX 1" (Stand-by for one minute) has taken charge as the universal equivalent of "Half a mo" or something similar.

The number "73," in one of the original telegraph codes meant "Best regards," and as such it has become almost the symbol of Amateur Radio. Never a QSO (contact) or QSL (acknowledgment) without its "73." But how nice it would be if everyone would remember that the awful "Best 73's" means, literally, "Best best regards's." Just plain 73 is correct.

On CW, the novice is sometimes bewildered because some stations seldom seem to send a complete word. But here, again, common sense soon resolves

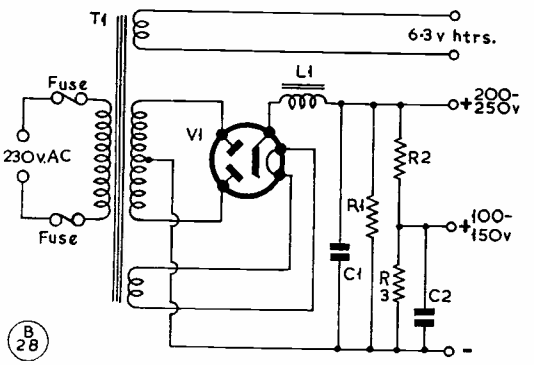


Fig. 2. Circuit of a simple general-purpose power pack, suitable for most receiver applications and for general work round the station. It can be built in a metal box, or on an open metal chassis with adequate protection, and in either case must be properly earthed.

Table of Values

Fig. 2. Circuit of Simple Power Supply

T1 = Receiver type mains transformer, giving 250-0-250 v., 5 v. for rectifier, and 6.3 v. for heaters.
V1 = 5Y4G or similar, with 5 v. heater and rated for 300 v. or above.
L1 = 20/32-Henry smoothing choke, maximum current rating about 100 mA.
C1 = Electrolytic, 32 μF., 450 v. working (or higher).
C2 = Electrolytic, 8 μF., 250 v. working (or higher).
R1 = 50,000 ohms, 2-watt.
R2 = *see text* for notes.
R3 = 25,000 ohms, 2-watt.

(*Note:* Construction should be on a metal chassis, which must be *independently earthed.*)

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the problem. Simple time-saving contractions like "Tks" for *thanks*, "fm" for *from*, "fr" for *for*, "ur" for *your*—these take little deciphering. Then there is another large group in which a word is boiled down to a few of its letters plus the letter X. Weather becomes Wx; Distance becomes DX; Conditions, Cdx; Transformer, xformer, and so on. These, too, are pretty easy to spot.

A few more awkward ones have become part of the standard amateur vocabulary, and are based on either phonetic contractions or the use of initials—sometimes both. Thus the fairly easy "cul"—see you later—graduated into "cuagn"—see you again. Even trickier is "bcnu"—be seein' you, phonetically.

Keep on listening—and keep guessing! You'll never learn them all, because some clever character will be ahead of you, inventing new ones. And one final interesting point: *All* these abbreviations are based on the English language, which is the reason why, in Amateur Radio, a Russian, a Hindu and a Bolivian can make themselves understood to one another *and* to an English SWL listening in!

Power Supplies

We have been asked to give details of a *simple* power supply for receivers, and, judging by some of the efforts observed at various times, there is plenty of room for improvement in some of the "simple" power packs in use. To be simple a unit need not be crude!

Fig 2 shows the basic essentials—a transformer, a full-wave rectifier, a swinging choke, a large smoothing condenser, a bleeder and a potential divider for the lower voltages.

An ideal unit would use an additional smoothing choke, but we have kept to basic essentials. For further additions and refinements, refer to the April issue of SHORT WAVE MAGAZINE, p.76. The article mentioned gives you some interesting information about power packs, but this brief note is concerned with simplicity and the fundamentals.

The resistors R2 and R3 must be chosen with the special requirements in view. The value of R2, to give a voltage of 100 or 120 volts at the output terminal, obviously depends upon the load, which controls the voltage drop across the resistor. To drop 100 volts at a current of 10 mA, R2 will have to be 10,000 ohms. R3 helps to hold things steady, and C2 provides additional smoothing.

For a stabilised low-voltage supply a neon regulator can be substituted for the R2/C2 combination, but this is a refinement that should be dealt with in more detail—this note is intended to present the simplest possible power supply in a form which is not dangerous to the user! Note that a bleeder, R1, is always in circuit; the R2/R3 potential divider fulfils this requirement, but resistors *have* been known to go open-circuit, and one can't be too careful. (And for the completely uninitiated—a bleeder is simply a means of ensuring that the large smoothing condenser does not stay charged after the unit has been switched off. Many are the cases of operators collecting a nasty jolt from a disconnected and apparently dead power unit!)

Man-Made Static

The whole subject of man-made and locally-generated interference is one on which we promised a few further words; but it is one of those things largely outside the listener's control.

Two things can be done by the operator at the receiving end—use an aerial which is "in the clear," the down-lead through the house being screened (and we have already commented on that); and use an efficient noise-limiter in the receiver. All commercial communication receivers, and not a few of the surplus types, already have a noise limiter as a standard fitment. For the more advanced type of technique we can best refer you to the article on p.514 of the February, 1960, issue, which gives a very comprehensive survey of the subject.

Simple noise limiters are effective at reducing the amplitude of sharp peaks, such as occur in the QRM from unsuppressed car ignition circuits; but their use on such horrors as nearby vacuum cleaners and similar generators of continuous "hash" is pretty limited.

Man-made static extends further than this; you may have all kinds of sources of noise in your own house which you can cure. Dirty switches can give vent to the most terrifying roars at times—replace them with a modern quick-break type. Loose connections on water-pipes (even the telephone earthing circuit has been known to come in this category!); curtain-rail aerials for local-station receivers in the shack;

lengths of conduit in the loft touching each other without being bonded; all these things can spoil the picture for you as far as quiet reception is concerned. All can be tracked down and put right with a little patience.

Vacuum-cleaners, refrigerators, washing machines and the like *should* all be efficiently suppressed as supplied; but brushes *do* wear out sometimes. And the same applies to electric razors. Watch all these things, use a decent aerial and fit a noise limiter—you can't do much more !

WPX and HPX

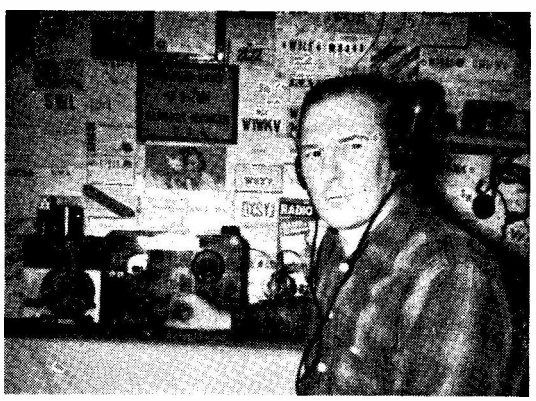
A few years ago our American contemporary, "*CQ*," started a scheme known as WPX (Worked All Prefixes). It was intended to cut through all the confusion as to what was, and what was not, a "new country," by considering the prefix heard and nothing else.

For WPX purposes the prefix consists of the letter (or letters) *and* initial figure of the call-sign; or, in the case of the newer prefixes, the figure, letter and figure with which the call starts.

Irrespective of *where* the station is situated, the prefix counts as the unit. Thus G3 is different from G2 or G5; DJ2 is separate from DL2; W2, K2, WA2 and WV2 are all different (though all four stations may be in the same city), yet VK9's are all the same, whether in Papua, New Guinea, Norfolk Island or Cocos Island.

Thus there is a certain amount of give-and-take involved in the scheme. Where stations are operating in a foreign country and using a *suffix*, this counts as if it were a prefix. Thus VE6AAE/SU counts as an SU, not a VE6. On the other hand all /MM's count separately, providing that their prefixes differ . . . so W2ZXM/MM and SM8CQT/MM both count separately from an ordinary W2 and SM8.

On an "HPX" basis, readers are invited to count up their prefixes heard, starting from Jan. 1st, 1960, and to submit their scores for inclusion in a table which will be published in this feature. One list for CW only; one for Phone only; no "mixture" catered for. How many prefixes have *you* heard this year ?



SWL P. J. Kavaleski of Hancock, Mich. uses home-built gear as well as commercial receiving apparatus and is a regular correspondent to this feature.

SWL • • • • • •

continued

Readers' Comments

The material for a further list of listeners' gear is slowly amassing, but there are too few additions to justify its publication this month. Next instalment, perhaps—and if you want to be included, send your name and address, receiver type or types, extra equipment and details of aerial.

G3IHG (Byfleet) writes to this section with details of a very interesting treble-conversion superhet that he has built, using the excellent IF coils from the ex-R.A.F. R.1116. The VFO uses one of the permeability-tuned coils in the HF oscillator, and tunes between 40 and 80 metres; three crystals are switchable—10·5 mc, giving a range of 14·0—14·7 mc; 3×8·15 mc, giving a range of 27·95—28·65 mc; and 3×8·35 mc, with ranges of 28·55 to 29·25 mc and 21·55 to 20·85 mc (tuning "backwards").

First IF, in conjunction with these three crystals, is from 3·5 mc upwards; this beats with an oscillator tuning 5·2 to 5·9 mc to give a second IF of 1·7 mc; and the third oscillator is on 1·6 mc, giving a third IF of 100 kc.

The description and block diagram were received just too late for us to be able to reproduce the latter in this instalment. Meanwhile you have some ideas to consider, and we will give the valve line-up and block diagram next time.

J. M. Nisbet (South Croydon) likes the idea of combining the R.109 and R.208; and, in answer to those who complain about the dearth of home-built receivers suggests that one reason could be that the surplus variety work out much cheaper.

G. Curtis (South Harrow) rightly points out that the method described for receiving CW (p.35, *March* issue) may be correct for some receivers but not for others. It is essential for those with a very high RF gain (*e.g.* AR88); for some with IF as well as RF variable, all three gain controls seem to have an optimum position, which may usefully be marked off with white dots.

G3LWS gives the correct procedure for setting up an AR88, which, as he says, is also applicable to other receivers. Basically it amounts to using full audio gain for CW, setting the RF control to give the desired loudness of signal. Other points to watch—with the aerial disconnected, set the aerial trimmer to give maximum background noise, and the BFO control to give the lowest audible pitch of that noise—the BFO is then tuned to the IF, and may afterwards be used to give the desired pitch on CW signals.

The aerial trimmer is re-peaked when the aerial is connected; searching is, in general, carried out with the Selectivity switch in position 2, but genuine listening with it in position 5. The above procedure applies to CW reception; for phone, to obtain maximum benefit from the AVC, the RF gain control is turned to maximum and the audio control set to give a comfortable signal.

P. J. Kavaleski of Hancock, Michigan, whom we

mentioned in a previous instalment, tells us that as a result of his request for contacts with British SWL's he received 30 air mail letters and four tape-recordings! He wants to let all concerned know that he will be answering them personally, and to thank every one of them. Incidentally, letters are still arriving, although the paragraph in which he was mentioned appeared in the January issue.

Dave Quigley, another one who was mentioned in a previous issue, writes to say that he has now been posted to Germany, and at present enjoys the use of two AR88's and an 80-metre dipole. Despite this he is working on the design of an amateur-band triple-conversion job, complete with noise limiter, S-meter *and* the Teleprinter Converter described in March issue of SHORT WAVE MAGAZINE. When he returns to his home (Cowes, I.o.W.) he hopes to be equipped for reception of AM, SSB and CW from two to 160 metres, also amateur teleprinter reception and amateur TV. Incidentally he would like to hear from any other SWL interested in amateur TV reception. QTH is Tpr. Quigley, S.M.C. Branch, Hq. B.A.O.R., B.F.P.O. 40.

Peter Martin (Durham City) remarking on the subject of contests—ventilated recently in "DX Commentary"—says that however those who are against them may argue, contests do give the SWL a chance "to do a week's listening in a day." If he were a transmitter, he would keep off contests, but as an SWL he finds that they produce the exotic stuff!

It has often been said that you can become an active SWL (and an amateur transmitter) at any age, and here is *J. R. Briggs (Cromer, Norfolk)* to prove it. A business man who has seen his 40th birthday, he is now an SWL of, as he says, "only about two years' experience, with no knowledge whatever of the technicalities of radio." He is, therefore, essentially a *listener* and, with an R.107 and CR-100, all bands are covered. J.R.B. puts in many hours listening and

Correspondence from short wave listeners is welcomed for this feature, the next appearance of which is in the July issue. The closing date is May 30 and all mail should be addressed: "SWL," c/o The Editor, Short Wave Magazine, 55 Victoria Street, London, S.W.1.

claims that he doesn't miss much! His only complaint is that amateurs do not identify themselves clearly enough, nor give their QTH sufficiently often—this always being a point of particular interest to listeners.

Finally, on this theme of DX, we are asked to give publicity to a new Swedish SWL organisation, which is to produce its own bulletin, called *The DX'er.* Eleven issues will come out each year, and the U.K. subscription is 10s. Apply for details and a specimen copy (two IRC's) to: SWL Sven Elfving, SM3/3104, Solgardsgat 15, Ornskoldsvik. Sweden. There is no language difficulty, as it is all in English.

Deadline

For the next instalment of "SWL," which will be in the July issue, please send in your letters, reports and comments to reach us not later than Monday, May 30. If you have not yet appeared in the List of SWL's together with Receivers and Aerial Types, send your entry on a post-card or a single sheet, *separate from your letter,* and we will include you in the next list.

And one last reminder—we are always glad to have SWL station photographs for this feature. But they must be good ones: Clear, sharp and bright, with the station fully described on a separate sheet, including details of DX heard. It is no use sending in prints that are in any way "blurred impressions," or at all dark, fuzzy or out of focus. We have plenty of these and they are just not usable!

SWL • • • • • •

continued

SPRINGFIELD BOYS' CLUB — G3NHS

We are asked to make it known that membership of this Club, which now has its own amateur station G3NHS on the air, is open to all young people who care to call at 10a Big Hill, Mt. Pleasant Lane, Clapton, E.5, on the Monday, Wednesday or Friday evenings of any week. The Club premises can also be hired for outside radio society meetings on application to the secretary or manager.

AMATEUR TELEVISION CONVENTION

The fifth Amateur Television Convention, organised by the British Amateur Television Club, will be held on September 10 in the Conway Hall, London, W.C.1. From a recent issue of the B.A.T.C's. *CQ-TV* we get it that in ten years Club membership has increased from less than 20 to around the 600 mark. *CQ-TV* is produced by J. E. Tanner, G3NDT/T, 20 Hughenden Road, Clifton, Bristol, 8, and the honorary secretary of the Club is D. S. Reid, 149 Ongar Road, Brentwood, Essex.

AUTONOMICS DIVISION, NPL

The National Physical Laboratory announces that the name of its Control Mechanisms and Electronics Division is to be changed to the "Autonomics Division." The word "autonomics," meaning "self-governing," is particularly apt as a description of the new types of device that the Division aims to develop. The Division has already done much in the field of automatic control and in pioneering digital computers, but now that industry has adopted these techniques, research has moved forward into new fields. The autonomic devices of the future will be self-governing machines which discover *for themselves* how to recognise, how to translate and how to control.

H. C. KENWORTHY, O.B.E., G6HX

We very much regret to have to record the death, on April 12, after a long and trying illness, of Harold Charles Kenworthy, O.B.E., of Banstead, Surrey, who was licensed as G6HX nearly 30 years ago. He had been in failing health for some time, but retained his interest in Amateur Radio until his last illness. We offer our condolences to his wife and family in their bereavement.

Modulator Driver Unit

CONSTRUCTION AND GENERAL PRINCIPLES

Part II

G. T. SASSOON (G3JZK)

The first part of this article, giving the circuitry with all values, appeared in our April issue. Here, the author concludes with an interesting discussion on relative power levels in the modern AM phone transmitter.—Editor.

THE grid of a Class-AB2 or Class-B valve presents a non-linear impedance, across which it is difficult to develop a drive voltage without distortion. To achieve linearity, the driver stage incorporates negative feedback, *via* R30,C16. The output is sampled by VR4 from one of the output terminals to earth—which terminal must be determined by experiment—and fed back to the phase splitter grid. Now, negative feedback is all very well provided that it remains negative; however, at certain frequencies, above and below the normal AF range, phase shifts in the stages within the loop will cause it to become positive. Therefore, as the negative feedback control is advanced, the gain will decrease if it is taken from the correct side of the output—then, at a certain point, the amplifier will break into oscillation. This oscillation is usually at an ultrasonic frequency, between 10 and 100 kc. It can be detected by placing a multimeter, on a range of a few hundred volts AC, together with a dummy load resistor of the correct value, across the transformer output terminals. The object is then to eliminate this oscillation, by placing condensers and resistors across various points in the circuit, *e.g.* C17, R31 also C23, R44 and C24, R46, with C25 across T1. The values of those used at G3JZK are shown in the diagram, but they should *not* be regarded as sacred, for their values were determined by experiment, and they are dependent almost entirely on the characteristics of the transformer. Their values *can* be calculated, but the procedure is complex and requires detailed information regarding transformer performance. It is best to use cut-and-try—after a little experience, an instinctive flair for this type of work can be developed. In general, any alteration which causes an increase in the feedback potentiometer (VR4) setting for oscillation, or an increase in oscillation frequency, is advantageous. The frequency of oscillation can conveniently be found by modulating the transmitter with the output, running it into a dummy load, and measuring the separation in kilocycles of the sidebands from the carrier, using the receiver. Oscillation can also be detected as a rise in cathode current of the modulator output stage.

The object is to raise as far as possible the amount of feedback which can be used without oscillation. When cutting the feedback causes a 20 dB rise in gain, the situation is satisfactory, though more is desirable. Low frequency oscillations will set in at a later stage, and can be tackled by playing with the values of the interstage coupling condensers within the loop. In general, it is desirable to have the time-constants as widely differing as possible, since the criterion for stability is that the slope of the frequency response curve round the loop should at no point exceed 10 dB/octave, where the loop gain exceeds unity. Therefore, a smooth fall off in response at HF and at LF is necessary. In practice, the HF end is usually more troublesome. It is best to push the feedback up as far as possible before oscillation sets in, raising it as much as practicable by inserting resistors and condensers, then back it off a bit to prevent instability on speech peaks. and carry on. The effects of the stabilising components inserted on the AF response should be borne in mind—for example, a 1 μF condenser across the output will undoubtedly kill the oscillation, but will also effectively remove most of the audio !

It would be even better if the negative feedback could be taken from *rectified carrier,* thus including practically the whole transmitter in the loop, but this is not as advantageous as it may seem. Stabilising a loop containing so much circuitry is a job for audio experts; nevertheless, results can be obtained, but with much difficulty and at the expense of frequency response. Generally, the driver contributes most of the distortion in an un-fed-back modulator, by reason of its non-linear load, hence feedback across it alone is sufficient in practice. The modulator output stage, if operated well within its capabilities, will produce as little as 3% harmonic distortion, and a correctly operated PA not much more; an un-fed-back tetrode driver, however, can cause distortion of 30-40%. Nevertheless, it is worth experimenting with feedback from one of the modulator output stage anodes (or from the modulated HT supply to the PA) if it is found easy to stabilise

the driver feedback loop. To apply negative feedback across the modulator output stage alone is usually impracticable—as little as 10% feedback might necessitate doubling of the drive voltage requirement, or quadrupling the drive power.

Construction

Layout is not particularly critical, except in the low-level stages, where the usual precautions with regard to screened wiring and short leads must be observed. The unit should be in a chassis with baseplate, if not in a cabinet, and the valves fitted with screening cans to minimise RF feedback. Even if the RF feedback is insufficient to cause howling, it can still cause a deterioration in quality. This can be observed as a change in tone or volume when switching from dummy load to full radiating conditions. All incoming and outgoing leads must be by-passed at the point of entry, as in TVI practice, as a further precaution. This should not be necessary for the audio inputs, which must be *via* screened cables. The higher level stages are no less susceptible to RF feedback, since their associated leads are generally longer, so grid stoppers are included as a matter of course.

The question then arises as to the output impedance of the driver—this is, of course, governed entirely by the type of transformer used. The anode-to-anode load impedance required by the 6BW6's is 8000 ohms; this, multiplied by the turns ratio of the transformer squared, gives the impedance across the output terminals. The grid-to-grid input impedance of Class-B or Class-AB2 valves is not normally quoted in tables. However, an estimate can easily be formed from the figures usually given for "peak grid-to-grid drive volts," and "drive power" required. The peak grid-to-grid voltage is divided by $2\sqrt{2}$, or 2·8, which gives the RMS grid-to-grid voltage. This is then combined with the drive power required in the formula:

$$\text{W (watts drive)} = \frac{\text{V}^2 \text{ (volts RMS g-g)}}{\text{R (g-g input impedance)}}$$

to find the value of the input impedance.

To measure the turns ratio of an unknown transformer, it is merely necessary to put an AC voltage across one winding—mains, or 6·3v., depending on the DC resistance of the winding—and measure the voltage across the other. The number of turns in each winding is proportional to the voltage across it, so the ratio can be found. However, with the negative feedback circuit functioning, very considerable mismatches are tolerable, even more so if the driver has some power in hand. Some typical input impedances are in the Table above.

INPUT IMPEDANCES—PUSH-PULL AF OUTPUT

Type	Class (HT)	Peak g-g Drive	Drive Power	Approx. g-g Drive Impedance
6146	AB2 (750v.)	101v.	.07w.	18,000 ohms
807	AB2 (750v.)	92v.	0.2w.	5,000 ohms
807	B (triode conn.) 750v.	555v.	5.3w.	7,000 ohms
HK24G	B (2,000v.)	290v.	1.1w.	10,000 ohms
TZ40	B (1,500v.)	285v.	6.0w.	1,700 ohms
35T	B (2,000v.)	255v.	4.0w.	2,000 ohms
808	B (1,500v.)	220v.	4.8w.	1,300 ohms
811	B (1,500v.)	150v.	3.0w.	900 ohms
100TH	B (3,000v.)	640v.	6.0w.	8,600 ohms
805	B (1,500v.)	280v.	7.0w.	1,400 ohms
250TH	B (3,000v.)	460v.	24.0w.	1,100 ohms
KT88	B (triode conn.) 750v.	360v.	3.6w.	4,500 ohms

NOTE: The audio output power in watts given by pairs of the above valves in push-pull can be obtained from the standard references, such as the "Radio Amateur's Handbook" and the "Radio Handbook."

Relative Power Levels

The choice of valves for the output circuit of the modulator is determined largely by expediency—however, there are one or two points worth bearing in mind. First of all, it is commonly assumed that 75 watts of audio is sufficient to modulate a 150-watt carrier input. This is true only if a loss-free modulation transformer is used, the PA is a triode, and it is to be modulated with pure sine waves only. Allowances must be made for these factors: If the PA is a tetrode, the screen supply must be modulated as well, so that the actual input (as far as the modulator is concerned) might be nearer 180 watts DC. Allow 10% losses for the modulation transformer, and we require at least 100 watts of audio from the modulator, instead of the theoretical 75w.

Furthermore, speech is not a pure sine wave. It is impossible to define a normal voice waveform, but if it is clipped, it becomes nearly a square wave.

Now, when a transmitter running *n* watts input is 100% modulated by a square wave, it

runs $4n$ watts half the time (twice the HT voltage, twice the current) and zero watts for the other half. Thus the average input is $2n$ watts, or twice the carrier power. This extra power, equal to the DC input, must be supplied by the modulator; therefore, the modulator must provide as much power as the input to the modulated stage(s), so that in the extreme case, we would require nearly 200 watts of audio, allowing for transformer losses and screen power, to modulate a 150-watt carrier! In practice, of course, square-wave modulation is not possible since it requires infinite bandwidth—but after it has had the rough edges taken off by the low-pass filter, clipped speech still tends to be a pretty well square wave, 75 watts of which would not be sufficient to modulate a 150w. carrier.

It is pointless to construct a modulator driver of the type described here unless its performance is matched by the rest of the gear. The modulator final must have a "stiff" power supply capable of giving the full rated voltage at full load, no matter if it does rise a bit between times; the maximum output of the modulator is governed by the HT voltage at maximum power supply drain. If tetrodes (such as 807's) are to be used triode-connected, *earth* the *control* grids. Those 22K resistors between grid and screen contribute only distorted audio on the control grids, and do not affect the gain or linearity appreciably!

The PA must be operated under the conditions specified for AM work, particularly with regard to grid drive. Insufficient drive causes positive peak clipping, and puts sharp corners on the truncated speech waves—these then constitute splatter. The modulation transformer should be adequately rated, and correctly matched. An underrated modulation transformer will be incapable of handling audio peaks, and the core will saturate, causing clipping, and again, splatter. Signals have been observed which, although barely 50% modulated, spread all over the band, due to this unintentional clipping in an overloaded transformer. If you know what you are doing, this clipping can be used to advantage, with a high-level low-pass filter between the modulator and the PA. If the necessary coils can be obtained, such a filter is a desirable safeguard in any transmitter; TV focus coils are a useful source of suitable inductances. On speech peaks, parasitic oscillations and other forms of instability can occur momentarily both in PA and modulator, although all appears well under quiescent conditions. They can cause the most virulent type of splatter, easily distinguishable from the "clean-sounding splatter" of an over-modulated, but stable, transmitter.

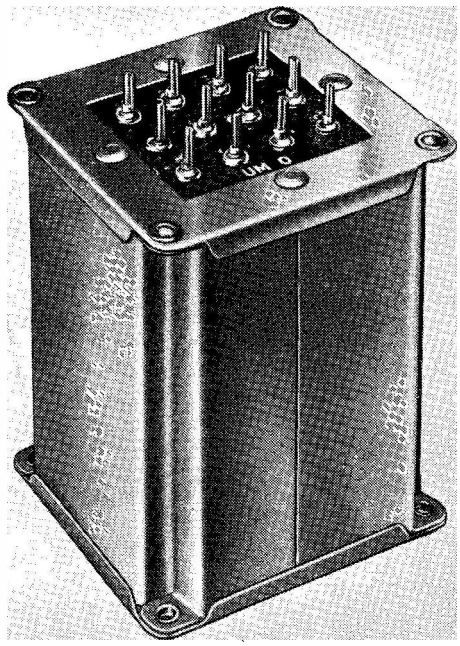
It is common practice to design the RF section of modern transmitters on a basis of under-running—let an 813 idle along at 150 watts. It would be as well to apply the same principle to modulators, even if only to get away from the ubiquitous 807, and to enjoy more numerous, more satisfactory, and more trouble-free phone QSO's.

CANADIAN AMATEUR REGULATIONS

There is full reciprocity between Canada and the U.K. in the matter of amateur licensing, *i.e.* to hold a current G call-sign is sufficient evidence for the issue of a VE licence. This does not, however, apply to what is known in Canada as the advanced amateur licence, which is for 750 watts CW and phone on all bands. For this, a simple oral examination and a Morse test at 15's has to be taken. G3MRR is now VE2BDR in Montreal and sent us this information.

OLD PERIODICALS WANTED

We are asked to say that the Electronics Club, Trivandrum, South India, would welcome donations of unwanted or back-number copies of all radio periodicals. The hon. secretary is C. Pereira, and the address given is sufficient.



A new Woden modulation transformer is now available, the UMØ, designed for low power fixed-station and mobile use. With a matching impedance range exactly similar to the famous UM series, the UMØ is rated for 20-25 watts, and is thus ideal for its purpose.

VHF BANDS

A. J. DEVON

THE magnetic storm on March 31 was one of the strongest and most lasting yet recorded, and was itself in phase with one of the biggest sun-spots ever seen. So far as the HF bands were concerned, the fade-out was complete —signals simply disappeared, as if the ionosphere had never existed. It was an astonishing, not to say a startling, experience for those looking for anything to work on 15 or 20 metres.

So far as two metres was concerned, however, the results of this colossal disturbance were gratifying in the extreme—we had one of the best Auroral manifestations ever known, in terms of duration, reflection efficiency and DX coverage. The only disappointment was that March 31/April 1 (when it happened) being weekdays, the general level of activity was low—and so many U.K. VHF operators lost the opportunity of working OK and SP, to say nothing of SM and LA.

It should be mentioned here that the French A-bomb test happened to coincide with these natural phenomena, and it has been suggested that the explosion in the Sahara had "something to do with it." This seems most unlikely. In the first place, the French bomb was relatively low-powered; secondly, it was let off from near ground level; and thirdly, if a layer capable of reflection at VHF had formed in the neighbourhood of the test area, it would have been necessary to head beams to the south instead of northerly, as is normal for Aurora working. It is true that the H-bomb explosions in the Pacific did affect radio communication in that area very considerably—as reported in the October 1959 issue of SHORT WAVE MAGAZINE—but for them the conditions were quite different: The bombs themselves were a great deal more powerful than the French one, and they were let off (particularly in one case) at a great height, so that the products of the explosion were diffused through the lower levels of the ionosphere more easily. Though much of this must be conjecture, the inferences fit the known facts and the experimental results so far as radio communication is concerned.

Aurora Results, March 31/April 1

Coming back now to the facts about March 31/April 1, the auroral curtain first became effective during the early evening of March 31, holding until 1915, and then came up again at 2305 and lasted an hour and a half, until 0035 on April 1. Later that day, at 1245, it again became critical (*pace* the atomic boys) and the condition lasted until 1655 on April 1 (all times GMT). This latter manifestation was by far the better of the two and, indeed, by some is considered to be one of the best Aurora openings we have ever had. However that may be, it was during the afternoon of April 1 that OK1AMS, OK1GV, OK2VCG, SP3GZ and SP9QZ appeared—all, of course, working "from the deck." Other Europeans recorded were DJ3FX, DL1SN, DL1PS, DL1RX, DL7FU, LA3AA, OZ5BK, PAØFB, PE1PL, SM6BTT and SM7BAE. The G's known to have been on at various times were G3DIV, G3HBW, G3HYH, G5MR, GM2FHH, GM3BDA, GM3FMD, GM4HR, GW2HIY, and GW2HYH—making no less than 10 countries available, of which PAØFB (who sent in much of this information) worked seven himself. Though the turn-out of stations may not seem very impressive, remember that it was a working Friday afternoon; in fact, the astonishing thing is that so many people were able to be on, and it bears out what was said in this space last month about the band being intelligently monitored in all countries nowadays.

Apart from these Aurora breaks, general conditions for EDX/GDX during the period have been fair-to-poor. Though the glass went high at times, particularly at the Easter week-end, then keeping steady at around or over the 30·2 in. mark for the following week, the weather was too cold for any effective opening to develop. It is not until we get some really warm weather, under sustained anti-cyclonic conditions, that we can expect the troposphere to give DX. In the meantime, there will be some flashes-in-the-pan, when the nearer EU's are workable and northerly G's get through to the south of England.

Transistor Two-Way on Two!

An event of considerable interest took place during the month, when G3LBA/G6OH started working one another over a path-distance of 17 miles with transistor transmitters at *both* ends—almost certainly a VHF "world-first" over anything like the mileage, though it is believed that some next-door or garden-wall distances have been covered in the past.

Anyway, on April 6, G6OH (Sunninghill, Berks.) was heard by G3LBA (Cobham, Sy.) at RST-529 on 145 mc, the G6OH transmitter being OC170-2N499-2N499, with an input of 7½ milliwatts. By April 9, G3LBA also had built himself a VHF TTx, running CO OC170 on 24 mc, into a 2N499 tripling to 72 mc, followed by a 2N499 doubler taking an input of 18 mW; this produced a 579 signal at G6OH. The aerials at both ends are simple Yagis.

Experiments are continuing, and both G3LBA and G6OH are to be congratulated on their results so far. Actually, with the transistors now becoming available, an all-transistor two-metre station would be quite feasible and, given the right conditions, long-haul contacts could be expected, even with power reckoned in milliwatts. But as G6OH says, to achieve such results "will certainly put a

premium on quiet receivers and good aerial systems."

For the experimenter, the practical application of transistors on VHF opens up a tremendous field of interest, and to get to the stage where one had a fully transistorised station on two metres (Tx, Rx and ancillaries) would be a very worth-while achievement.

Counties Worked on 24 Cm!

Still in the realm of the unusual, not to say exotic, we come to another VHF experimenter who is off the beaten track—G3FUL of Luton, who has transportable gear for 1250 mc and, when the opportunity offers, he takes it out /P to high ground about the country; with the collaboration of G3BVU and G3JZK, he has now worked 8 counties on 24 centimetres, with a best-DX of 52 miles.

His transmitter is a 703A SEO into a ½-wave stack with reflector. The receiver is a crystal mixer, for which the oscillator is a 955, the third harmonic of which produces injection at about 1220 mc to give an IF of 30 mc into that familiar item of surplus known as the "Pye IF strip"; this has plenty of built-in gain, as anyone who has used it will know. The 955 oscillator is tunable around 400-420 mc, and as the transmitter is operated MCW (with an 807 audio oscillator), if the signal is there it can be found and held within the IF pass-band. G3FUL has noticed that weather conditions along the path play a big part in getting contact, even when situated line-of-sight. For these interesting tests, the 1250 mc Tx is set up at one end and the Rx at the other, talk-back being on two metres; in effect, this involves two loads of portable gear being taken out, with a good deal of route-planning and site-finding.

SSB on Two Metres

Listening round one evening, your A.J.D. found an SSB transmission which turned out to be from G3NR (Bracknell)—it was strong, of excellent quality, and a good deal easier to resolve than many SSB's heard on the HF bands. Though G3NR was working an AM station, both sides could be followed merely by flicking the BFO in and out on the change-over.

It was therefore of particular interest to have a report from G3NR for this month's "VHF Bands." He is on 144·2 mc and sideband selection is by crystal filter, the carrier suppression achieved being 55 dB down; the unwanted (lower) sideband is about 40 dB down. The p.e.p. is around 50 watts, and since he has been on SSB, G3NR has worked some 20 stations which, he says, "speaks very highly of their receiving ability"—from where A.J.D. sits he would say that it is largely due to the excellence of the transmission, which is true single-sideband, and is therefore perfectly easy to tune on a standard receiver using the BFO technique. G3NR hopes to encounter G3CCH, G3MED and the PA's known to be running SSB transmitters on two metres.

Notes and News

G5DW (Ashcott, Som.) draws attention, and rightly, to what we can only agree was an ambiguity on p.40, March, where (if you read it one way) it was implied that West Country stations should not be moving LF—of course, below 144.5 mc is just where they ought to be to conform to the revised Zone Plan.

While admitting the ambiguity, the intention of the passage as a whole was to emphasise the importance of adhering to the Plan, at the same time drawing attention to the necessity of tuning HF for those who, under the Plan, are in the HF segment of the band. G5DW himself does conform, so his protest at the ambiguity is justified; he also draws attention to the fact that with several West Country stations keeping to their old frequencies, *i.e.* not conforming, it is difficult to work the northern stations who *have* moved into their correct zones as designated by the revised Plan—shown again this month for the information (and, we hope, action) of all concerned!

What all this boils down to is that keeping to the Zone Plan *is* important, in the interests of every user of the band.

G3MNL writes to say that Carlisle is on the two-metre map, and that he and G3MTV/T have a regular Wednesday, 2000-2230 clock time, cross-band schedule with himself on 145·64 mc and G3MTV/T (also Carlisle) on 432

". . . . I suppose you feed it with coax . . . ."

mc. They would like reports.

For G2CIW (Birmingham) an otherwise poor spell was cheered up by a phone contact with G6JY (Newcastle), G3IOE from up there also being heard on CW. Activity on 70 mc during the period produced 14 contacts, including G6NF, with G3JZG, G3KFD and G3LAY heard. G2CIW is another to comment on the zone situation, with many Midlands stations still in what is now the London zone "so that the QRM is appalling at times." We can well imagine it!

Annual Convention Plans

The proceedings, which will be on similar lines to those of previous years, will include two talks of particular interest, one by a member of the Jodrell Bank staff on Radio Astronomy and the other by a representative of Mullards on Microwaves. There will be an exhibition of home-constructed UHF/VHF equipment and, as usual, a free prize draw; this will take place after the dinner. The date is Saturday, May 21, the place the Kingsley Hotel, Bloomsbury Way, W.C.1 (within walking distance of Tottenham Court Road Tube), the price is 3s. 6d. for the convention only, or 24s. 6d. inclusive dinner, and the address for tickets (which must be applied for within the next few days) is: F. G. Lambeth, G2AIW, 21 Bridge Way, Whitton, Twickenham, Middlesex.

This event is always well supported and of considerable interest to all VHF enthusiasts, not only for what they see and hear, but also for the opportunity it gives of meeting one's friends and contacts on VHF. It is open to all with an interest in the subject.

Space News — and Reflections

During February, Jodrell Bank ran a series of moon-reflection tests with the Mass. Inst. Tech. at Cambridge, Mass., U.S.A. These were on telephony, with an 80ft. telescope at the M.I.T. end. A letter from Prof. Lovell gives us information that the frequency was 440 mc, with a 19 kW SSB transmitter on the other side. He also mentions that the power used on the *Pioneer V* control channel —this is the space vehicle to orbit the sun—is up to 10 kW.

With reference to the comment here last time on Fylingdales Radar, we are informed on the most reliable authority that all precautions are being taken to prevent local interference and that from theoretical studies and the checks already carried out, there is no reason to believe that there will be any BCI/TVI in the Whitby area. This is what we are told, and we can only hope that it will be borne out in practice.

The Americans launched two more satellites in April—on the 1st a fairly large one, called *Tiros 1*, carrying two TV cameras for observing cloud layers, of which some remarkable photographs have already been published; and the next, named *Transit 1B*, on the 13th, carrying four transmitters and intended as part of a new navigational aid system. Both are powered by solar batteries, and *Transit 1B* is designed for a life of five years; it is tracked from the ground and repeats its position so that a receiving station anywhere else on the earth's surface can determine its own position with great accuracy. As the Transit Satellite System is primarily a navigational aid for warlike operations, its actual working principles are hedged about with great secrecy.

And also during April, the Green Bank radio observatory in W.Va. opened watch on 1420 mc for signs of intelligent life from the stars Tau Cet and Epsilon Eridani: they have been chosen as representative of our own solar system while being within reasonable range—*see* p.544, February. We live in stirring times!

Conclusion

There is just time and space to say that the closing date for "VHF Bands" for the next issue is May 18, addressed A.J.D., who hopes to be here again on June 3 —and don't forget the IARU two-metre contest on May 8, if you see this in time. *73*.

BRITISH ISLES
TWO-METRE ZONE PLAN
Revision, March 1959.

Zone A: **144.0 to 144.1 mc.**	Cornwall, Devon, Somerset.
Zone B: **144.1 to 144.25 mc.**	Berks., Dorset, Hants., Wiltshire, Channel Islands.
Zone C: **144.25 to 144.5 mc.**	Brecknock, Cardigan, Carmarthen, Glam., Gloucester, Hereford, Monmouth, Pembroke, Radnor, Worcester.
Zone D: **144.5 to 144.7 mc.**	Kent, Surrey, Sussex.
Zone E: **144.7 to 145.1 mc.**	Bedford, Buckingham, Essex, Herts., London, Middlesex.
Zone F: **145.1 to 145.3 mc.**	Cambridge, Hunts., Leicester, Norfolk, Northampton, Oxford, Rutland, Suffolk, Warwick.
Zone G: **145.3 to 145.5 mc.**	Anglesey, Caernarvon, Cheshire, Denbigh, Flint, Merioneth, Montgomery, Shropshire, Stafford.
Zone H: **145.5 to 145.8 mc.**	Derby, Lancs., Lincoln, Nottingham, Yorkshire.
Zone J: **145.8 to 146.0 mc.**	All Scotland, Northern Ireland, Isle of Man, Cumberland, Durham, Northumberland, Westmorland.

TWO METRES
COUNTRIES WORKED
Starting Figure, 8

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

Some Circuits for Two Metres

TRANSMITTING AND RECEIVING

This article describes some practical VHF circuits of proved efficiency, which are given together with all necessary values. No detailed constructional information is thought necessary because most VHF operators have their own ideas about how to lay out a circuit—for those without this experience, and wishing to try these circuits, the advice is to study the VHF layouts illustrated in the handbooks and manuals — such as the *VHF Handbook*, the *Radio Amateur's Handbook* and the *Radio Handbook*—keeping well in mind the essential requirements of short leads and adequate screening, with the general arrangement of the parts following the circuit sequence as drawn.

Getting RF on Two Metres

Two circuits, excellent because they are simple and effective, are shown in Fig. 1 and Fig. 2. These are due to G3CVO. Both are intended to produce output at 144 mc from an 8 mc crystal, which needs to be a lively one. Fig. 1 will not give much RF in terms of power but what there is will be in the band and can, of course, be built up by, say, a 6AQ5 driving a 5763 into an 832.

The circuit of Fig. 2 could be regarded as a QRP arrangement to energise an aerial direct but, again, it would be better to follow it with a 5763 as buffer amplifier for a small PA stage. To get these circuits built and working would be a good exercise for the beginner on VHF.

COIL/CONDENSER VALUES for Figs. 1-2

24 mc Tank — 18 turns 18g. enam. close-spaced, ⅜-in. dia., tuned by 25 μμF air-spaced trimmer.
72 mc Tank — 3½ turns 18g., ½-in. dia., spaced wire dia., tuned by 15 μμF air-spaced trimmer.
144 mc Tank — 2 turns 18g. tinned copper, ½-in. dia. by 1 in. long, tuned by 15 μμF air-spaced trimmer.

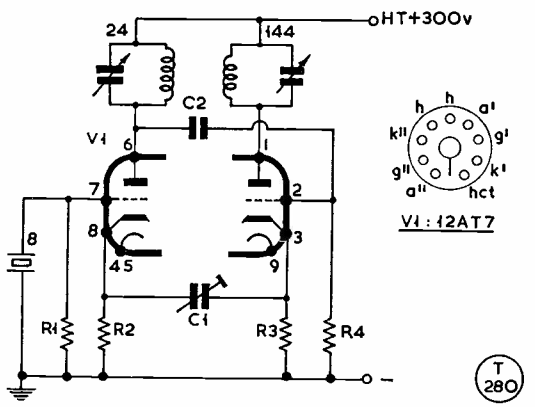


Fig. 1. About the simplest possible circuit for a two-metre crystal oscillator. The RF output at 144 mc will not be much, but it will be in the band. An 8 mc crystal is multiplied up in the sequence shown, and values are given in the table. The valve is a 12AT7.

Table of Values

Fig. 1. Single-valve two-metre CCO

C1	= 50 μμF pre-set	R2, R3	= 200 ohms
C2	= 50 μμF	R4	= 100,000 ohms
R1	= 20 000 ohms	V1	= 12AT7

Table of Values

Fig. 2. Two-stage oscillator-doubler

C1, C2,	= 50 μμF	R4	= 6,800 ohms
C3, C4	= .001 μF	R5	= 2,700 ohms
R1	= 20,000 ohms	V1	= 6J6
R2	= 300 ohms	V2	= G.E.C. Z77
R3	= 100,000 ohms	Xtal	= 8 mc, for Zone

Receiving Circuits

A neat crystal-controlled (tuned IF) converter design, due to G5JU, is shown at Fig. 3.

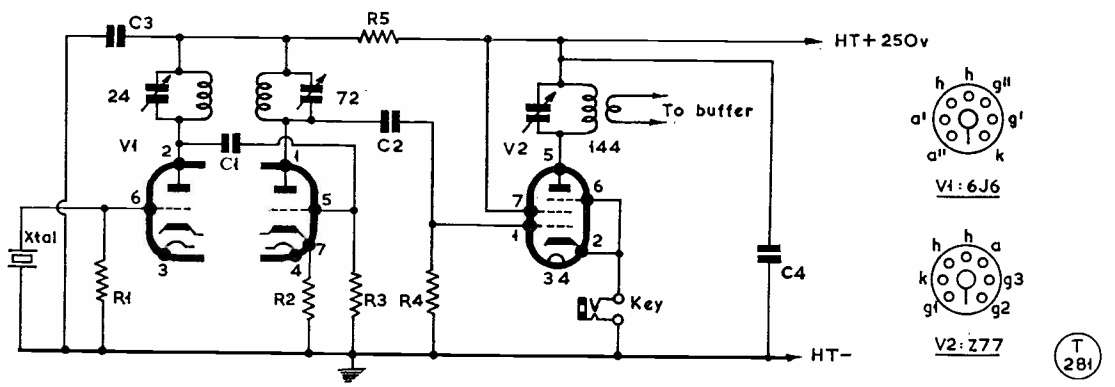


Fig. 2. Using a 6J6 and Z77 to get output at 144 mc from an 8 mc crystal. The multiplication sequence is 8-24-72-144 mc and there would be enough RF drive for a small buffer stage.

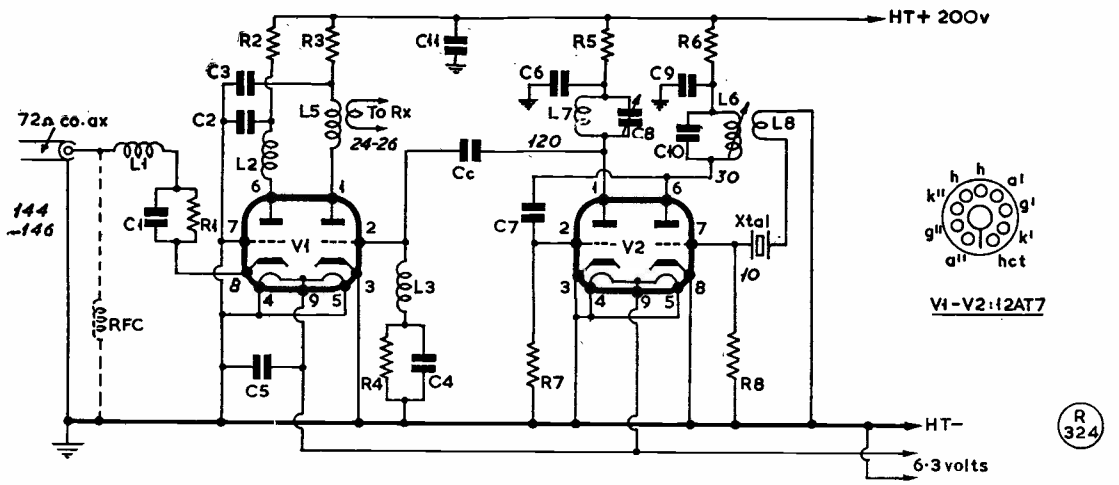


Fig. 3. A double twin-triode crystal-controlled converter circuit, using a pair of 12AT7's, and designed for a receiver tuning 24-26 mc to cover the two-metre band. Injection is at 120 mc, and the mixer output is peaked at 25 mc. A circuit of this kind, built as a small unit to fit inside the main receiver, could take power from it and would extend the range of almost any communications-type receiver into the two-metre band.

Table of Values

Fig. 3. Circuit of the 12AT7 Two-Metre Converter

C1, C2, C5, C6 = 750 $\mu\mu$F moulded mica (midget type)
C3, C9, C11 = .001 μF moulded mica
C4, C7 = 50 $\mu\mu$F ceramic
C8 = 3/30 $\mu\mu$F concentric trimmer
C10 = 20 $\mu\mu$F ceramic
Cc = Injection coupling very small capacity
R1 = 220 ohms
R2, R6 = 5,000 ohms (2 watt)
R3, R7 = 150,000 ohms
R4 = 10 megohms
R5 = 1,000 ohms
R8 = 5,000 ohms
V1, V2 = 12AT7

(All resistors ½-watt unless otherwise stated).

L1 = 7 turns 16g. enamelled, ¼-in. inside diam., ½-in. long, air-spaced.
L2 = 3 turns, 22g. enamelled, spaced two wire diameters at flange end of Eddystone 847 former.
L3 = 3 turns, 22g. enamelled, turns spaced one wire diameter, at other end of same former holding L2 coil.
L5 = 18 turns 30g. insulated wire towards flanged end of 847 former (coupling winding L4 two turns same wire at earthy end).
L6 = 7 turns 22g. enamelled, near flanged end of 847 former.
L8 = 1½ turns at other end of L6 former.
L7 = 4 turns, 16g. enamelled, air-spaced, ⅜-in. inside diam., length ¾-in.

Using two 12AT7's, it could be built, as a separate unit, into most receivers that are tunable across 24-26 mc—and, because the loading is low, HT/LT feeds could be taken from the receiver's own power supply. With a 10 mc (surplus type) crystal, the multiplication sequence is 10-30-120 mc. With L5 peaked at 25 mc, the main receiver is tuned over 24-26 mc to cover the 144-146 mc band.

This converter was originally designed for the Eddystone S.640 receiver, of which there are large numbers in use and with which it works very well, built on to a small chassis fitting right inside the S.640.

In Fig. 4, we have a much more sophisticated type of crystal-controlled two-metre converter, designed by G6UH. In this, the oscillator sequence is 6-30-120 mc, the 6 mc crystal going off on its 5th harmonic, extracted by the circuit L7,TC3, and then multiplied by four in the other half of the 12AT7 oscillator-multiplier V5. With the values given in the tables, this converter is also designed for a tunable IF of 24-26 mc to cover the 144-146 mc band. A modified cascode with controlled regeneration (VC2), it incorporates a cathode-follower V4 which ensures a good match into the front end of any receiver, most of which are intended for low-impedance input.

In setting up, L6 is adjusted for maximum "sharsh" with the main receiver tuned to 25 mc; the slug of L3 must be in such a position that no self-oscillation occurs in V1 as VC1 is swung through 180° with VC2 at maximum capacity; trimmer TC1 is then tuned for maximum "sharsh" at mid-band. Turning VC2 towards minimum should bring the circuit to the point of oscillation, approaching which there will be an increase in signal strength.

TABLE OF COIL VALUES

Crystal Controlled Converter, Fig. 4

L1—3 turns 20g., sleeved, wound over earthy end L2.
L2—7 turns 16g. on ⅜-in. dia. former, turns spaced over one inch.
L3—5 turns 16g. on ⅜-in. dia. former; tuned with dust-iron slug ½-in. long. Coil in screening can.
L4—3 turns 16g. ½-in. dia. self-supporting, spaced over about ½-in.; centre-tapped for C3, R2 connection.
L5—4 turns 16g. ½-in. dia. self-supporting, spaced over ½-in., centre-tapped for C6, R5; one-turn tap for VC3.
L6—10 turns 28g. on $\frac{5}{16}$-in. dia. former with dust-iron slug; turns spaced over $\frac{5}{16}$-in.
L7—11 turns 20g., p.v.c. covered, on $\frac{5}{16}$-in. dia. former, without slug; tapped at 8th turn for C11, R11, TC3 connection.
L8—3 turns 16g., ½-in. dia., self-supporting.

Heater Chokes (Fig. 5) each made up of 13-in. length of 26g. enamelled wound on ceramic ½-watt resistor former (1K or more); each pair of chokes to be mounted 1-in. apart and parallel (five required).

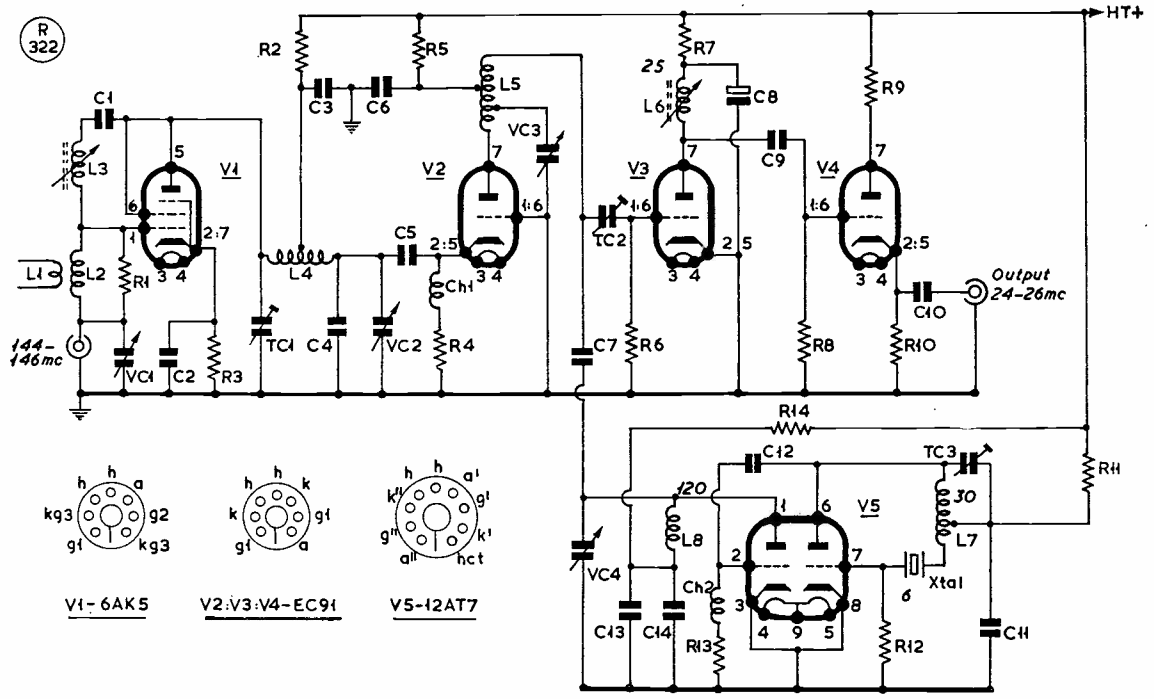


Fig. 4. Circuit of a good crystal-controlled two-metre converter, having such additional features as controlled regeneration on the RF side and cathode follower output. With a 6 mc crystal, injection is at 120 mc to give a tunable IF of 24-26 mc for the 144-146 mc band. This converter will give excellent results with any good communications receiver and, if the oscillator-multiplier frequency comes out at or very near 120 mc and the main receiver has a well calibrated dial, frequencies in the two-metre band can be read off accurately — for example, 24.26 on the main dial would correspond to a signal frequency of 144.26 mc.

Table of Values

Fig. 4. Circuit of CC Two-Metre Converter

VC1, VC2, VC3, VC4 = Polar 25 $\mu\mu$F, with $\frac{1}{4}$-in. spindle
TC1, TC2, TC3 = 3-30 $\mu\mu$F concentric trimmer
C1 = 150 $\mu\mu$F silver mica
C2, C3 = .003 μF tubular (Hunt's midget type)
C4 = 12 $\mu\mu$F silver mica
C5 = 270 $\mu\mu$F silver mica
C6 = .01 μF tubular
C7 = 2.2 $\mu\mu$F silver mica
C8 = 4 μF electrolytic
C9 = 100 $\mu\mu$F silver mica
C10 = .05 μF tubular
C11 = .005 μF silver mica
C12, C13 = 50 $\mu\mu$F silver mica
C14 = 0.1 μF tubular
Heater By-Pass (Fig. 5)
V1 and V2 = .003 μF tubular (Hunt's midget)
V3 = 270 $\mu\mu$F silver mica
R1, R13 = 100,000 ohms $\frac{1}{4}$-watt
R2 = 10,000 ohms $\frac{1}{4}$-watt high stability type
R3, R5, R7, R9, R10, R14 = 100 ohms $\frac{1}{4}$-watt
R4 = 68 ohms $\frac{1}{4}$-watt
R6, R8 = 470,000 ohms $\frac{1}{2}$-watt
R11, R12 = 2,300 ohms $\frac{1}{4}$-watt

Ch1 = 13 inches of 26 swg. enamelled copper wire, wound on a ceramic $\frac{1}{4}$-watt resistor (1,000 ohms or above)
Ch2 = 50 turns of 30 swg. DSC wire wound on $\frac{1}{4}$-watt resistor as above
Xtal = 6 mc, surplus type, adjusted to give 30 mc when X5.

VC3 tunes the mixer input and VC4 controls (to some extent) the oscillator injection, with TC2 set at about mid-capacity or a little more. To check for correct crystal oscillator functioning, adjust on TC3 until an unmistakable crystal beat is heard near 30 mc on the main receiver—as this is 6 × 5 mc, it may not come up exactly on 30 mc. Any difficulty in getting the oscillator to function properly will in all probability be due to a sticky crystal.

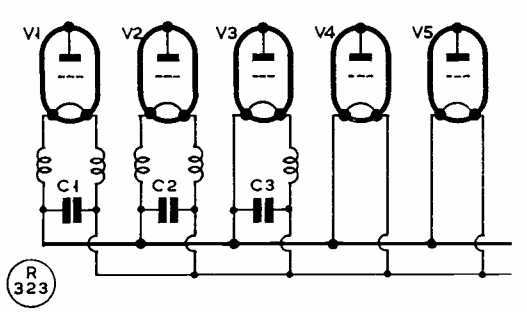


Fig. 5. Heater by-passing for the circuit shown in Fig. 4. C1, C2 are each .003 μF and C3 is 270 $\mu\mu$F. Values for the heater chokes are given with the coil table.

NEW QTH's

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

G3NLN, R. E. Andrews, 84 Mayflower Road, Droitwich Spa, Worcs.

GW3NWC, A. C. Fry, 16 Hilary Road, Pantside, Newbridge, Newport, Mon.

G3NYB, W. L. Bingham, 1a, Haigh Road, Balby, Doncaster, Yorkshire.

G3NYN, J. H. M. Kirk, 40 Melling Lane, Maghull, Lancs.

GM3NZI, B. G. Taylor, St. Margarets, Irvine Crescent, Bathgate, West Lothian. *(Tel.: Bathgate 2859.)*

G3NZL, H. S. Chapman, The Pantiles, 20 Wanlip Road, Syston, Leicester.

G3NZM, B. E. Jackson, Plot 340, Clovelly Road, Glenfield Frith, Leicester.

G3OAH, P. R. Whittlestone, Flat 12, Chestnut Grove, Boston Spa, Yorkshire.

G3OAQ, M. Newland, 129 Billy Lows Lane, Potters Bar, Middlesex.

G3OAX, I. F. Anderson, 19 Colwell Avenue, Stretford, Manchester. *(Tel.: LONgford 3329.)*

GW3OAY, R. N. Graham, 23 The Rise, Llanishen, Cardiff, Glam.

G3OAZ, J. Akehurst (DL2BC) *(ex-DL2VM/5A4TZ),* 14 Victoria Gardens, Eastbourne, Sussex.

GM3OBC, R. Thompson, Knowehead, Star, Markinch, Fife.

G3OBE/T, W. E. Hazlehurst, 28 Broomfield Lane, Hale, Altrincham, Cheshire.

G3OBK, N. Goad, 363 Plodder Lane, Farnworth, Nr. Bolton, Lancs.

GC3OBM, E. R. Deveau, L'Abri, Rouge Huis Avenue, St. Peter Port, Guernsey.

G3OBU, D. J. Goodman, 11 Morden House, London Road, Morden, Surrey.

G3OBV, P. H. Harris, 34 Valley Walk, Croxley Green, Rickmansworth, Herts.

GW3OCD, V. A. Davies, 16 New Road, Llandovery, Carms.

G3OCE, J. Davies, 62 Bonington Road, Mansfield, Notts.

G3OCH, J. Hulett, 21 Exmoor Avenue, Blackbird Road, Leicester.

G3OCI, D. W. Hayter, 42 Hunts Mead, Billericay, Essex.

G3OCM, D. A. Hills, 264 Springfield Road, Chelmsford, Essex.

G3OCU, D. C. Haestier, 8 Recreation Ground Road, Newport, I.o.W.

CHANGE OF ADDRESS

G2ALH, H. W. Haynes, 8 Watling Street, Radlett, Herts.

G2DHV, G. V. Haylock, 28 Longlands Road, Sidcup, Kent *(Tel.: FOOtscray 1649.)*

G3BNI, D. L. K. Coppendale, 25 Corby Avenue, Swindon, Wilts. *(Tel.: Swindon 6421.)*

G3BVG, N. Caws, 51 Grosvenor Street, London, W.1. *(Tel.: MAYfair 4044.)*

G3ENT, GB3ENT North Kent Radio Society, c/o D. W. Wooderson, 75 Mount Road, Bexleyheath, Kent.

G3FUN, R. E. Kemsley, 1 St. Mary's Road, Faversham, Kent. *(Tel.: Faversham 2608.)*

G3HIA, H. C. Young, 1 Derwent Avenue, Droylsden, Manchester.

G3HLW, D. A. Pilley, 3 Dacombe Close, Parkstone, Poole, Dorset.

G3IAK, F. S. Miller, M.P.S., c/o Townson, 114 Greenway Road, Runcorn, Cheshire.

G3KWI, Dr. R. W. G. Stewart, 25 Birchover Way, Allestree, Derby.

GW3KYA, R. B. Davies, 40 Bedwellty Road, Cefn Fforest, Blackwood, Mon.

G3LBO, P. Laughton, 11 Strickland Close, Shadwell, Leeds, 17, Yorkshire.

GW3LJN, E. A. Herbert, Wynberg, Dyffryn Road, Llandrindod Wells, Radnorshire.

G3LJW, L. D. V. Taylor, 172 London Road, Wembley, Middlesex.

G3LMP, B. Page, 126 Malvern Avenue, South Harrow, Middlesex.

G3LUK, Amateur Radio Club, 59th (Huddersfield) Sqdn. A.T.C., Drill Hall, 81b Fitzwilliam Street, Huddersfield, Yorkshire.

G3MEM, D. Morgan, Jevington, Hilltop Road, Earley, Reading, Berks. *(Tel.: Reading 62230.)*

G3MZN, R. W. Lightfoot, 18 Sturgeons Way, Walsworth, Hitchin, Herts.

G3NEA, L. J. Saunders, 38 Devon Square, Newton Abbot, S. Devon.

G3NGH, T. J. Glave, 64 Moor Lane, Bramcote, Nottingham, Notts.

GW3NJY, M. M. Bibby, Rhosynfa, Fron Crescent, Valley Road, Llanfairfechan, Caerns.

GM3NRB, N. H. Kempt, Broomcraig, Largs, Ayrshire. *(Tel.: Largs 2406.)*

GW3VL, P. R. Jenkins, Ty Melyn, Black Brook, Caerphilly Mountain, Glam.

G6TZ, R. Bottomley, 229 Grangemouth Road, Radford, Coventry, Warks.

G8FG, H. G. Cunningham (ZB1A). *QSL via St. Joseph Mansions, New Street, Luqa, Malta.*

G8GJ, T. G. Whitworth Collyer *(ex-GW8GJ),* 58 West Coker Road, Yeovil, Somerset. *(Tel.: Yeovil 2480.)*

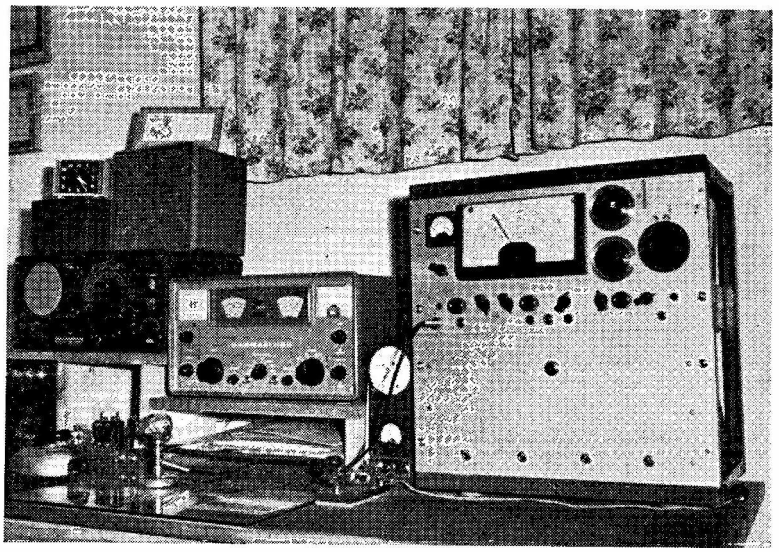
AMENDMENTS

G2SC, J. M. Scott, Nore Lodge, Nore Road, Portishead, nr. Bristol.

GW3ITD/MM, H.M.S. *Puma,* c/o G.P.O., London.

THE OTHER MAN'S STATION

ZS6CR



OWNED by E. W. Osborn of Pretoria (P.O. Box 87), South Africa, ZS6CR has been active since 1957. Amateur activity, however, dates back much further than that, the call of ZT1H having been held early in 1930, when WAC was made on 5 watts of CW, using a TPTG self-excited oscillator and an O-V-2 receiver! Early in 1938 Amateur Radio gave place to a spell of model making, but inevitably the bug bit again—hence, ZS6CR.

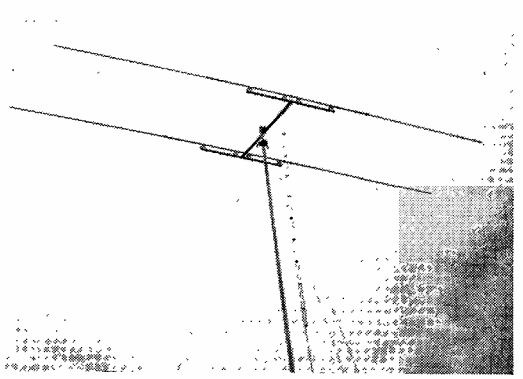
The photograph shows the equipment in use at present. On the left is a general coverage receiver, a PCR3 "surplus" job, suitably modified with a BFO, built-in speaker, and so forth. Below this is the aerial patching panel and beam direction indicator, also the CW/Phone monitor, behind the bug key. The main receiver is a Hammarlund HQ110. Between this and the transmitter is a GDO.

The home brewed transmitter, covering 7 to 28 mc, is based on a Geloso VFO into a 5763 buffer stage which drives a pair of 6146 valves in the final. Differential keying is used on the oscillator and buffer stages. Modulation is by the series-gate controlled-carrier system, as used in the DX-40U, which has given very excellent results over the past six months. This form of modulation can be thoroughly recommended to those interested in a simple and economical method of getting phone out.

The lower chassis in the transmitter rack houses three power supplies, whilst the top one carries the RF and modulation sections. A CRT monitor unit, using a 1CP1 tube, is also available, but is not shown in the photograph.

The only aerial in use at the moment is a "ZL Special" for the 21 mc band. This is mounted on a telescopic mast, 30 feet high. The elements are of 1in. dia. aluminium tubing, carried on bus-bar type insulators, mounted on an H-shaped frame of thin-wall steel tubing. The coax phasing between the elements passes through the centre boom, thus being protected from weather. The beam is fed with coax, through a linear balun.

This station is always on the look out for U.K. contacts, as ZS6CR is an old Derbyshire-born lad!



The "ZL Special" for 21 mc in use at ZS6CR — see text. It is a two-element beam with both elements driven, giving much more gain than comparable three-element parasitic types — see "Short Wave Magazine," December 1956.

POLICE TRANSMISSION OVERHEARING

It is reported that the Metropolitan Police have been worried by the fact that the more organised crime gangs are using tunable VHF receivers to listen on police frequencies when they are "out on a job," thus obtaining sufficient warning to make a getaway if Squad cars are being sent to the scene. While the immediate remedy seems to be coded messages using the "square six" technique, the next move might well be jamming of the police channels or the transmission of false instructions if the master-mind is sufficiently enterprising! However that may be, the police could have a difficult problem to solve if radio comes to be used really intelligently on the criminal side. We may assume that those responsible for police communications have such possibilities in mind.

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Deadline for June issue: May 13)

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

LAST month we commented on the importance of looking after junior members and SWL's. This brought forth interesting comments from two Clubs, who seem to have the right ideas.

Reigate, formed just over a year ago, started their existence with seven members (five with licences) and now stand at twenty-five members (ten with licences) —figures which speak for themselves. The two SWL's who were among the founder-members now have tickets of their own, and nine more are sitting for the R.A.E. this month—and jolly good luck to them. The Club also runs a Sunday-morning net on Eighty, to which several SWL's are known to listen, and this is a good source for recruitment of new members.

Aberdeen, also, hold the view that encouragement of SWL's, beginners and those "just interested" is essential. Seven of their members sat for the last R.A.E.—six passed. Two of these are fully licensed, although still at school, and the other four are having to concentrate on their general studies for examinations, otherwise they, too, would have call-signs. The average age of the "passes" was *only* 15½. Another junior member up there has produced an excellent closed-circuit TV system, quite unaided—a fine effort.

We hope other Clubs will take heed and not allow themselves to become a collection of old buffers lamenting about the sad state of Amateur Radio in these wicked days!

At **Bradford,** G3KLZ has arranged a meeting for May 10 to be called "Top Score"—valuable prizes will be presented. On May 24 they have a lecture on Transistors, and on June 14 they pay a visit to the BBC at Holme Moss.

The British Two-Call Club have elected DL2YU to be their president, with G6UT as vice-president. Membership is open to all those with at least one overseas call-sign, in addition to their "G" call.

Bury recently visited the ITV transmitter at Winter Hill, and were interested to find that there, too, they have a use for SP61's! They meet at the George Hotel, Kay Gardens, Bury, at 8 p.m.; on May 10 to hear G2HW; and on June 14 for the annual Junk Sale.

Cray Valley offer a welcome to all those interested in Amateur Radio; they meet at the Station Hotel, Sidcup, on the fourth Tuesday at 8 p.m. May 24 is fixed for a Brains Trust.

Crystal Palace will hear a talk by G3AAE on Working DX on May 14; on the 31st there is a Morse class and technical lecturettes; and June 4 is the date fixed for their Junk Sale. **Enfield** will be hearing a talk by G3AGP about RF Heating, on May 26. **Hastings** have a lecture by G3MQT on Constructional Practices on May 17 and a Film Show (Vacuum Practice and Ultrasonics) on May 31.

Hull have arranged a visit by Mr. C. R. Rowland, of the GPO, who will discourse on TVI and BCI, on May 10; on the 31st, G3NIE will lecture on The Use of Formulæ. **Leeds,** meeting weekly, list the following: May 11, Tape Recorders; May 18, Field Day Discussion; May 25, Bring and Buy Sale (for Club funds); and June 1, the AGM.

Lothians visit the Edinburgh Police Radio Station on May 12, and the "re-arranged item" for May 19 is the Construction Competition. On June 2 they will hold their field day briefing. All meetings at the YMCA, St. Andrew Street, Edinburgh 2, 7.30 p.m.

At the annual dinner of the Derby & District Amateur Radio Society, the "G5YY Trophy" was presented to SWL Duffy. Left to right: Mr. A. G. Melville, F.R.C.S. (president of Derby), Mr. C. Middleton (director of education, Derby), SWL Duffy, and G2CVV, hon. secretary, D.D.A.R.S.

Medway report the following change of officers: secretary, Mr. E. Gunnee; president, G6NU; chairman, G3MSK; treasurer, G3HQS. **Midland** meet on May 17, and the scheduled talk (not confirmed) is on SSB. **North Kent** were the victims of a slight slip last month, and we must apologise for crediting them with a tenth anniversary. Actually, they are nearer to fourteen years old! The anniversary luncheon referred to was that of quite a different organisation.

Peterborough put their Technical College on the air for the first time recently, when G3KPO/P went into operation. Several contacts were made, including one with G3EEL working mobile; they will be holding a Mobile Rally and a Bucket-and-Spade meeting at Hunstanton, during July. Future meetings will be at the Technical College, 7.15 p.m. on the first Friday. May 6 is booked for a Film Show, and on June 10 they will be out on field day.

Listening to a lecture at a recent meeting of the Scarborough Amateur Radio Society, in their club-room. Those present include G5VO, G2YS, G3FVW, G3FMW, G3JBR and G3HFW, with SWL members.

Reigate have recently had interesting talks on TVI (G4ZU) and KW Equipment (G8KW). The May meeting is on the 21st, but not yet finalised at the time of writing; the Clubroom is at The Tower, Redhill, and meetings at 7.30 p.m. on the third Saturday.

Slade have a talk on Receivers (G2ATK) on May 6; a Topical Film Show on the 20th; and Technical Problems in Sound and Vision on June 3. For June 17 they have secured a lecture-demonstration by the Collins Radio Co., and we are asked to state that admission will be by ticket only—obtainable by personal application to the secretary.

South Birmingham gather at the Friends' Meeting House for a lecture on Two Metres (G3BMN) on May 19; on the 22nd they hold a dummy run for field day (10.30 until late afternoon); on June 4 they have their Mobile Rally.

Southgate, Finchley & District recorded an attendance of 61 for a recent meeting, when a visiting lecturer talked on the Signal Generator. G3BWQ's lecture on Transmitter Design attracted an audience of 57. Hazelwood School, Hazelwood Lane, N.13, is where the next meeting will be held on May 12, when the visitor will be from Avo Ltd. **Spen Valley** will be hearing Dr. J. Sikorsky on The Electron Microscope on May 11; on the 25th, T. C. Isaac, ex-G4RQ, will be the speaker; and on June 8 they will be visiting Joshua Tetley & Son Ltd., of Leeds.

Wellingborough have now changed their title to Wellingborough Radio Club, but their programme and meeting-place remain unchanged.

Wirral meet for their "Chairman's Evening" on May 6, and on May 20 the lecture will be on Receiver Alignment with appropriate test gear. A welcome visitor to recent meetings has been DJ3FM. Winners in the constructional contest were G3FXC (hi-fi amplifier), G3NTI (Voxbox), and G3QX (Top Band transceiver).

Acton, Brentford & Chiswick will hold a general discussion on Contests on May 17; on June 21 a talk on New Test Gear will be given by G4LS. Meeting date is the third Tuesday, at 66 High Road, Chiswick, W.4.

Chester held their Annual Dinner in March, attracting a good number of members, XYL's and visitors from other Clubs. On March 8 they held their AGM. Local club net night is still the first Tuesday, and is growing in popularity; on the other Tuesdays, meetings are held at the YMCA, St. John's House, Chester, 8 p.m.

Reading report a successful meeting on March 26, when they heard a talk on radio operating in the Merchant Navy as a career. On April 30, G3GKH gave Morse instruction for the first half-hour, after which there was a talk and demonstration on Work-

SPECIAL NOTICE — ALL HONORARY SECRETARIES

All hon. secretaries are asked to ensure that their Club activity reports, addressed "Club Secretary," Short Wave Magazine, 55 Victoria Street, London, S.W.1, reach us by the due date—given each month at the head of the "Clubs" article—all through the year. We constantly receive a number of late reports, which it is impossible to write in after we close for press. This leads to misunderstanding and disappointment. All reports must include the name and QTH of the hon. secretary.

shop Practice. A new two-metre transmitter built by the speaker will be exhibited to show how a finished job should look.

Sutton & Cheam have their meetings at The Harrow, Cheam Village, on the third Tuesday, 8 p.m. On May 17, G2AHL will be talking on Mobile Amateur Radio. At the recent AGM it was decided to offer reduced subscriptions to members under 21 years of age.

Cannock Chase had the bright idea of arranging a Quiz between licensed members and members taking R.A.E. this year—result not stated! Next month's meeting will be followed by a Junk Sale, and future items will be talks on Two Metres and SSB.

Cheltenham continue to look for Top-Band contacts on Wednesday evenings from G3GPW, and are working for their WABC on phone. D/F tests this year will be in two parts: 1st, May 22, 29 and June 5; 2nd, July 3, 10 and 17. Future events include a possible /P venture on 70 cm.

Cornish held their AGM at Redruth on April 6, and elected new officers, G3BHC now being president and G3LPB chairman. They will be taking part in field day activities and have also decided to hold a Club Dinner in early November.

Harrow meet every Friday in the Science Lab., Roxeth Manor Secondary School, Eastcote Lane. Visitors are always welcome. On May 6 they hold their Constructional Contest; on May 20 a Junk Sale (non-members permitted to buy); and on June 3, G3HBN will talk about his mobile Top-Band transmitter. Alternate Fridays are practical nights.

Stoke-on-Trent held their AGM on April 7 and elected G3UD president, G3DML chairman and G3COY secretary. They have a big programme over the next six months, in conjunction with the city's Jubilee Celebrations. Morse tests under G3COY will begin on May 23, following up the R.A.E. course given by G3EHM.

Sutton Coldfield gather on the second and fourth Thursday, 7.30 p.m. at the Club HQ—92 The Parade. Visitors always welcome. The Club Tx, a modified 36 Set, is working well and has given contacts with all continents. On May 12 there will be a talk on The Oscilloscope; for May 26 the subject is Tape Recorders, with a demonstration of some unusual recording possibilities.

Cambridge will meet at The Jolly Waterman, Chesterton Road, on May 27 for the first of a series of lectures on Simple Test Equipment. This one will cover meters for voltage, current and resistance.

Crawley had an interesting talk on the IGY on March 31; and on April 28, G4ZU lectured to them on Aerials for Restricted Spaces. The May meeting (on the 26th) will be devoted to NFD matters. Visitors welcome, at the Brewery Shades, Crawley High Street.

Gravesend now meet in a new headquarters, at the R.A.F. Club, Overcliffe. The day has been changed to Thursday (except the first in the month) and the time 8 p.m. Recent talks have covered Modern Antennas (G3IEW) and Constructional Practice (G3FST). The latter's son and daughter are now licensed as G3OBF and G3NYL respectively,

Names and Addresses of Club Secretaries Reporting in this Issue

ABERDEEN: W. K. Heggie, GM3NHW, 80 Leslie Terrace, Aberdeen.
ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
BARNET: D. K. Robinson, 3 Castle Road, London, N.12.
BRADFORD: M. Powell, G3NNO, 28 Gledhow Avenue, Roundhay, Leeds 8.
BRITISH TWO-CALL CLUB: G. V. Haylock, G2DHV, 167 Engleheart Road, London, S.E.6.
BURY: Mrs. Jean Hodgkins, G3JZP, 24 Beryl Avenue, Tottington, Bury.
CAMBRIDGE: A. H. G. Waton, G3GGJ, New Road, Barton, Cambridge.
CANNOCK CHASE: P. J. Davis, G3NTU, 45 Broad Street, Bridgtown, Cannock.
CHELTENHAM: J. H. Moxey, G3MOE, 11 Westbury Road, Leckhampton, Cheltenham.
CHESTER: H. Morris, G3ATZ, 24 Kingsley Road, Boughton Heath, Chester.
CORNISH: W. J. Gilbert (no address given).
CRAWLEY: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.
CRAY VALLEY: H. Miles, G2NK, 59 Amherst Drive, St. Mary Cray.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
ENFIELD: V. Croucher, G3AFY, 15 Nelson Road, London, N.15.
FLINTSHIRE: J. Thornton Lawrence, GW3JGA, Perran Porth, East Avenue, Prestatyn.
GRAVESEND: D. Andrews, G3MXJ, 42 The Fairway, Gravesend.
HALIFAX: A. Robinson, G3MDW, 7 Upper Brockholes, Ogden, Halifax.
HARROW: S. C. J. Phillips, 131 Belmont Road, Harrow Weald.
HASTINGS: W. E. Thompson, 8 Coventry Road, St. Leonards-on-Sea.
HULL: G. G. Wray, G3MVO, 93 Wolfreton Lane, Willerby, Hull.
INTERNATIONAL HAM HOP CLUB: M. Allenden, G3LTZ, Glendower, Grovefields Avenue, Frimley, Aldershot.
LIVERPOOL: H. James, G3MCN, 448 East Prescot Road, Liverpool.
LEEDS: D. Dinsdale, 8 Quarry Mount Road, Leeds 6.
LOTHIANS: L. Lumsden, 33 Hillview Drive, Edinburgh 12.
MEDWAY: E. N. Gunnee, 57 Saxton Street, Gillingham.
MIDLAND: C. J. Haycock, G3JDJ, 360 Portland Road, Birmingham 17.
MITCHAM: M. Pharaoh, G3LCH, 1 Madeira Road, Mitcham.
NORTH KENT: D. W. Wooderson, G3HKX, 75 Mount Road, Bexleyheath.
PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye.
R.A.I.B.C.: W. H. Harris, 25 Playford Lane, Rushmere, Ipswich.
READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham 23.
SOUTH BIRMINGHAM: G. E. Simonite, G3JAO, 19 Wistaria Close, Birmingham 31.
SOUTHGATE, FINCHLEY & DISTRICT: A. G. Edwards G3MBL, 244 Ballards Lane, London, N.12.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
STOKE-ON-TRENT: V. J. Reynolds, G3COY, 90 Princes Road, Hartshill, Stoke.
SURREY (Croydon): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
SUTTON & CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
SUTTON COLDFIELD: K. H. Varney, G3DMV, 149 Whitehouse Common Road, Sutton Coldfield.
TORBAY: C. Western, G3LFL, 118 Salisbury Avenue, Barton, Torquay.
WELLINGBOROUGH: D. J. Trusler, 87 Irchester Road, Rushden, Northants.
WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington.

CLUB PUBLICATIONS

We acknowledge, with thanks, the receipt of the following Club publications: **Crystal Palace** (Newsletter No. 50); **Enfield** (Vol. 11, No. 12); **Hastings** (Natter-Net Notes No. 6); **Mitcham** (Newsletter, April); **R.A.I.B.C.** ("Radial," Vol. 6, No. 1); **South Birmingham** (Vol. 1, No. 3); **Surrey** (S.R.C.C. Monthly News); **Derby** (Newsletter No. 2/1960); and **Southgate, Finchley** (April Newsletter).

making three in the same house! G3NYL is 19, and supposedly the youngest YL operator in the country. Congratulations to the Woods family.

Aberdeen meet on May 27, when GM3NOV will give a review of his SX-100 after six months' use on the bands. For June 3 the subject will be VHF Technique (Mr. G. Berry). **Halifax** visited a TV Studio in Manchester on April 9; on the 12th they heard a lecture on Fire Prevention. May 3 was the date for the AGM, and on May 24 there will be an informal meeting.

The **International Ham-Hop Club** now records 347 members in 38 countries, and continues to encourage these admirable international visits. The world president (WØGDH) will be visiting Europe from May 18, visiting 15 countries in five weeks. Club members will provide all his accommodation—even in Poland. Other European tours are planned by W6THN, and by ZS1IR with his XYL. Full details from the hon. sec., GB & I Division *(see* panel for QTH).

Surrey (Croydon) held their AGM on April 12 and re-elected their officers, G4ZU now having joined the committee in place of G3EUE. The Constructional Contest will be held on May 10—judging will be by show of hands of those present.

Liverpool, who run their own station G3AHD (a well-known call in MCC) have regular Tuesday meetings, the programme for the next few being as follows: May 10, open discussion; May 17, G2AMV on The Panadaptor; May 24, G3KOR on Contest Operating; May 31, G3JIR on Tape Recording. The club is very busy with exhibition stations at various public functions, where they have done exceedingly well.

At **Torbay,** they have 45 members, and the recent AGM was attended by 30 of them—progress has been very good during the past year, and they now have their own club station G3NJA on the air. The officers of the club include G5SY, president; G2GK, vice-president; G2GM, chairman; G3MEP, hon. treasurer; G3IEA, hon. auditor; G3NCC, experimental manager; and G3LHJ, contest manager, while the onerous job of hon. secretary remains the responsibility of G3LFL; committee members are G2CWR and SWL's Barratt and White. Next meeting is on May 14, at the YMCA, Torquay, when G3CMT will talk about Valve Development.

Flintshire have a good programme arranged for their meetings on May 23 and June 6, at the Railway Hotel, Prestatyn; on August 14 they have a picnic party (bucket-and-spade type) on the Central Beach, Prestatyn.

The **Derby** programme includes a two-metre field day on May 18, "particularly for those with an inclination for climbing," and on May 25 the talk will be on Crystal Filters. June 1 sees a Surplus Sale (always good value), while May 11 and June 8 are open nights. The club station signs G3ERD and the meeting-place is at the College of Art, Green Lane, where visitors are always welcome on club nights.

SMALL ADVERTISEMENTS
(" SITUATIONS " AND " TRADE ")

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SITUATIONS VACANT

DON'T MISS THIS CHANCE. — Army Wireless Reserve, 404 Signal Squadron, offers twelve free scholarships for **R.A.E.** (Morse included). Also vacancies for enthusiasts training for radio, driving, motor-cycling, etc. Fifteen days' camp each year with other hams; full pay and up to £25 Bounty.—Write for details to **G3FDU,** 28 Jack Lane, Davenham, **NORTHWICH,** Cheshire.

RADIO MECHANICS required for interesting work on aircraft MF, HF, and VHF Installation and Servicing.—Apply Chief Engineer, Dan-Air Engineering Ltd., Lasham Airfield, Nr. Alton, Hants.

TRADE

ORDER YOUR "COMMUNICATOR" now for the 1960 mobile season. This unique 16-valve 2-metre Tx/Rx is at present available from stock. Price £90 with 12-volt transistor power unit. Deposit £9, and 12 monthly payments of £7 7s.—R.E.E. Telecommunications Ltd., 15a Market Square, Crewkerne, Somerset.

PHONE Transmitter, 60 watts, complete; Geloso VFO driving 807 PA, fully band switched; modulator complete with pair of 807's in Class-B. All power supplies; £20 o.n.o.?—D. Francis Jones, G3MLG, Tamworth.

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

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

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

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SAVE OVER £50: Panda Explorer, all bugs removed, and no TVI here. KW-Geloso converter, manual and AVC. CR-100, 6SG7 front end. Tiger 250w. Z-Match. Panda LP filter. AVO signal generator, RCA cased speaker. Acos 22-2 mic. Solon 65w. and 25w. irons. Bridges drill. Mosley Tri-band vertical antenna with 11 yards co-ax. Lots of spare valves, and other Tx and Rx spares. All first-class working order and as new, £120 the lot. Buyer collects.—Box No. 2266, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: AR88LF, £35 ; AR88D, £45 ; Geloso G209, £65 ; B.S.A. Dandy motor scooter, 1958, done 5000 miles, one owner, £40. Willing part-exchange (cash difference either way). WANTED: Crystal-controlled 2-metre converter, 160/10-metre mobile transmitter and receiver. Full details, please. —Box No. 2267, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

RCA-AR88D for quick sale, £50.—Box No. 2268, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

B. & W. 51-SB SIGNAL GENERATOR, £135 OR NEAREST OFFER.—BOX NO. 2251, SHORT WAVE MAGAZINE, LTD., 55 VICTORIA STREET, LONDON, S.W.1.

ONE HRO, one power pack, 9 coils covering 50 kc to 30 mc, £30 o.n.o.?—27 Otford House, Staple Street, Long Lane, London, S.E.1.

GELOSO 209 Amateur Band Receiver, £65 ; Geloso 212 Transmitter, £60 ; in matching cabinets and mint condition ; complete in original crates with manuals. Advertiser going SSB with U.S.A. equipment. Will despatch passenger train. Terms can be arranged if necessary.—G3DUV, 28 Kempson Avenue, Sutton Coldfield, Warks. *(Phone 7240.)*

FOR SALE: Recent Panda Cub, mint, £30 o.n.o.? Type 247 PSU, 650v. 200 mA, £3. Class-D Wavemeter, £3. Buyer collects or carriage extra.—Box No. 2252, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

1960 HALLICRAFTER S107, with auto xformer ; cost £52, sell £38 (carriage paid).—Box No. 2253, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MAINS TRANSFORMERS, 200-250v. primary, one off 1000/750/0/750/1000v. at 250 mA, one off 500/400/0/400/500v. at 250 mA, 4 or 6v. at 3½A, and 4 or 6v. at 3A twice ; made by Gardner ; £3 each. Woden DTI, £1 10s. 2½ in. m/c flush mounting meters, 500-0-500 micro-amps., Weston, new, £2 each.—Box No. 2254, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TWO NAVAL Tx, 160-15 metres, xtal mixer VFO, 100 watt, parallel 807's, modulated four p/p, parallel 807's, one Tx with additional Tx, modulator and power unit for spares ; other with Tx and modulator units and aerial tuner. ET4336 Tx. Near-new 1131 VHF Tx. Naval B40 Rx, 640 kc to 30·5 mc 14-valve superhet, turret tuning ; B46 Rx, not complete, suitable spares. Almost mint 62 Transceiver, complete with every possible accessory, xtal calibrator No. 10, unused.—Offers to Box No. 2255, Short Wave Magazine, Ltd., 55 Victoria Street, London S.W.1.

SALE: Panda Cub Tx, FB condition, £40 o.n.o.? G4ZU 10-15 Minibeam, co-ax feed, with mast, £17, or the lot £55.—Gill, 84 Chevinedge Crescent, Exley, Halifax, Yorks.

WANTED: Instruction Manual for BC-224E Rx, your price. All letters answered.—Box No. 2256, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

EHT Power Pack, 1000v. at 250 mA (U19's), 19-inch rack mounting, £4. BC453 (0·5-1·5 mc), £2. 6v. Vibrapack (AR88), 300v. 90 mA, 10s., new. Mains trans., 200-250v. pri., two 440-0-440v. secs. 100 mA ea., £2. Matched pairs KT66, 10s. Two new GU50's, 10s. ea. Also 6J4 and 5686 at 10s. ea.—Box No. 2257, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

RECEIVING Station, complete, Airmec C864 (12 valves), £75. LM type frequency meter (Navy version BC221), mounted on mains p/pack, £15. R1155A with p/pack (internal speaker), £10. All mint condition.—Berry, 4 Falcon Road, Bingley, Yorks. *(Tel. 4376.)*

WANTED: 2m. Tx with Rx converter ; must be good and cheap—no junk. — Box No. 2558, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EASTER GIFT: Valves 813, 811, 815, 829B, TZ40, 25s. each ; U19, 10s. each. AR88 Mains xformer, 35s. RCA 25w. speech amplifier, fitted Woden modulation xformer, £5.—4S7FJ, 132 Windsor Road, Torquay.

SALE: AR88LF in FB condx, with handbook and spare valves, £35. (East Midlands).—Box No. 2259, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HAMMARLUND HQ-110 Amateur Band Receiver, new, 160m.-6m., dual conversion, Q-Multiplier, product detector, xtal calibrator, for 220-250 volt operation, £125. New Hallicrafter S37E, with built-in speaker, broadcast and amateur bands with bandspread, 115 volts AC/DC, £26 10s. RCA audio amplifier MT-11220, 230 volts, pair of 1622, output for 2·5 to 600 ohms, as new, in unmarked silver hammer finish, £10. SX-28 Hallicrafters, excellent condition, 0·5 to 43 mc, 110 and 230 volts, silver hammer finish, £35.—Reid, GM3NFR, 55 Nithsdale Drive, Glasgow, S.1.

R1155A, built-in PSU, high-gain front-end and 12AH8 mixer, AR88 type noise limiter, controls symmetrically laid out on engraved traffolyte panel, £12 10s. o.n.o.? — G3KMY, 39 Belfield Road, Paignton, Devon.

RCA speech amplifier, Type MI11220, new ; BC221AA with charts and mains p/pack ; Hammarlund HQ129X, manufacturer's mods., 21 mc bandspread, completely overhauled. Table-top transmitter, 80 to 10 metres, bandswitched, gang-tuned multipliers, 4-125A PA, with pi-tank, no TVI here ; worked 240 countries. Rack-mounting power packs, time sequence keyer unit and Class-B TZ40 modulator for the above. RCA 2000-1500-0-1500-2000v. 800 mA transformer. Eddystone 5ft. 6in. rack, one undrilled chassis and panel. Four 805 valves, new. Two 815 ditto. Woden transformers, chokes, meters, etc. All above gear must be sold as lot or separately, and best offers received by May 26 will be accepted. Send s.a.e. and want list.—Webb, 233 Warwick Road, Kenilworth. *(Tel. 679.)*

G.E.C. BRT400B Receiver, excellent condition, £75. CR150, resprayed cabinet, £25. Laboratory-built QRO modulator, 19in. rack mounting, £25. Buyer to collect.—Box No. 2260, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: Superior 14/21/28 mc 150w. relay controlled Tx, QY3-65 pi-cct final with built-in electronic keyer, Antennamatch, LP filter, ATU and dummy load; in double-fronted steel cabinet with writing shelf; TVI-proof; CW, AM and NBFM; £85. CR150 with p/pack and LS, £50. Or the lot with home-calibrated LM14, plus *etceteras* and magazines, £135. Carriage extra. Demonstration Surrey. Photo and description.—Box No. 2261, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: DST-100 or similar receiver in good condition.—Offers to Pollard, 3 Highfield Road, Chertsey, Surrey.

FOR SALE, 2s. doz.: EF50, EF55, EB34; ECC32 6d., 7475 1s. each. Ex-equipment. Postage, doz., 3s., single 6d.—P. Spragg, Clifford Chambers, Stratford-on-Avon, Warwickshire.

WANTED: Complete R208 band switching assembly or band-switch only (broken wafers). —G8IX, 11 Bottleslow Street, Hanley, Stoke-on-Trent, Staffs.

WANTED: 62 Set or complete 160-metre mobile, good condition essential. Collect London area. —T. Delvin, 32 Downs Road, London, E.5.

WANTED: B2 transmitter section with coils and valves; unmodified, or would consider complete outfit. SALE: New Franka Solida Camera, £5·6, 1/200 sec., with flashgun, £5. — G8UA, 406 Higher Brunshaw, Burnley, Lancs.

EDDYSTONE 840A Receiver, mint condition, manual, £33 (carriage paid). Eddystone Bug, 57s. 6d. 4in. AC 0-250 voltmeter, 35s.—G3HID, Armadale, Burnham-on-Sea, Somerset. *(Tel. 2511.)*

WANTED: "Command" Transmitters and Receivers for 2-3 mc. £6 each for ARC5, T-18's and R-25's; £5 each for CCT or CBY 52232's and 46104's.—G3NES, Mellow End, Broad Oak, Canterbury.

REFLECTOGRAPH TAPE DECK for sale; three Bradmatic heads, three motors — continuously variable speed, 3 to 8 inch per second; little used; £15, cost £40.—G3BIW, Alford, Lincolnshire.

G5TH Tx, covering the amateur bands 1·8 mc to 7·0 mc; two transformers 620-0-620v. at 250 mA. Also other items.—Any offers to: R. W. Bates, 4 Summer Lane, Minworth, Sutton Coldfield, Warwickshire.

EXCHANGE an Eddystone 840A under guarantee, immaculate, for an AR88 in good condition, and cash adjustment. — Freck, 90 Vancouver Drive, Winshill, Burton-on-Trent, Staffs.

LABGEAR WBMU, £4; Canadian Multimeter, 50 μA movement, £12 10s. Jason FM Tuner, £5. Sand-filled corner unit, £7 10s. New 500 μA meters, 10s. Dummy Loads, 5s. 464 kc xtals, 5s. W1191 Wavemeter, less xtal, 15s. 813 valves, 25s.; bases, 2s. 6d. 365 $\mu\mu$F variable Tx condensers, 7s. 6d. Transmitter using Geloso VFO and Elizabethan PA and modulator, £12 10s. Have Konica 111 F2, 35 mm. camera and light meter; dealer value, £45; exchange for good receiver.—G3IDW, 14 Cricklade Road, Swindon, Wilts.

EDDYSTONE S640, matching speaker, manual; purchased new, no modifications; £25. Buyer collects; bargain.—Fawkes, St. Chloe Green, Amberley, Stroud, Glos.

SMALL ADVERTISEMENTS, READERS—*continued*

COLLINS 75A4, condition as new, untouched, manual, matching speaker ; offers invited (no exchanges). Also HRO-60 with speaker and coils ; offers invited. WANTED: As new, USA Mobile, complete ; similar Collins KWM-2 or Gonset MSB-1, complete.—Details to Box No. 2262, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TIGER 60B Transmitter for sale, in perfect order, newly overhauled by makers. Owner going QRO. £50 or near offer? — Write GM3BRF, Ambleside, Carberry Road, Leven, Fife.

12,050 kc CRYSTALS, 7s. 6d. each. WANTED: Labgear Wide-Band Multiplier Unit ; *Short Wave Magazine*, May, June, December 1952 ; and *R.S.G.B. Bulletin*, July, December 1952. State price and condition.—D.M.P., 30 Lyndale Road, Bingley, Yorkshire.

WANTED: Eddystone S-Meter, Z-Match Coupler, Monimatch, Aerial Measuring Equipment.—Box No. (Scotland) 2263, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

QVO4/7 and RK75 valves, 8s. each, or 3 for £1. Money-back guarantee. — G. A. Jeapes, 165 Cambridge Road, Great Shelford, Cambridge.

SALE: 522 mod. and driver xformers, 6s. each. Table-top xformer, 620-550-375v. at 200 and 375 mA simultaneously, 35s., plus 5s. carriage. Zenith Variac, Type 80-C-12, 200-240v. in 220v. out at 7·5 amps, new boxed, £3 10s. Chromed cabinet handles, 10½-inch, 5s. pair. 829B (2), 30s.; 832A (2), 20s.; 717A (2), 3s.; new, boxed.—Box No. 2264, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE, as new: Panda PR120V, £70. Tiger TR200, £125. Eddystone 888, £75. K.W. 2m. mobile Tx/Rx, £60. Pye PTC35ID, 60 watts RF on 2m., cost £200, £100. ASB-8, £5. All above in mint condition ; used few hours only. Pye PTC704, 15 watts RF on 2m., cost £120, £50. Tannoy 60-watt PA Amplifier AB24/AC/60X, cost £84, £30. BC625A, £5. New guaranteed valves: QQVO6-40A, £3 ; 813, £3 ; 832, 30s.; 866A, 20s.; HK254, 30s.; QVO4-7, 25s.; 100T, 50T, RK20, RK28, 836, all 20s. A number of ½ and 1 kW tuning condensers, mod. xformers, HT xformers, etc. Offers considered.—W. G. Sherratt, 82 High Street, Newport, Isle of Wight *(Telephone 3358.)*

RX EDDYSTONE S640, plus matching S-meter and 6-volt power pack, recent overhaul, fair appearance ; this Rx is DXCC ; £17 10s. o.n.o.? Also Weltaflex twin lens reflex, F3·5 in 8-speed shutter, Gnome enlarger, ortho ennit enlarger lens, Sixon electric exposure meter, ancient slide projector, plus all dark-room gubbins and stacks of materials ; this gear has produced exhibition prints ; £25 o.n.o.? Reason for sale—comprehensive rebuild. Delivery by arrangement, depending on DX from London.—Box No. 2265, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Rotary Generator, 12v. input, 300v. 100 mA output.—Details to Southend Radio Society, c/o 2 Edith Road, Southend-on-Sea, Essex.

FOR SALE: Heathkit DX40U with VFO-1, £30. Also Panda ATU, £10. Both in FB condx. Prefer buyer collects.—Sullivan, 33 Keswick Road, Blaby, Leics.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: CR100 coil assembly and main tuning condenser unit, required for modification experiments; must be in fair condition and reasonable in price.—V. Bamsey, 74 Lammas Avenue, Mitcham, Surrey.

SALE: Surplus contents of Shack, including complete Top Band station in good order, comprising ATU, Command Rx with noise limiter and internal power supply, Power pack/Modulator unit (line-up EF86, ECC81, 2/6V6) with switched meter and 100 kc marker (with Brookes certificate), Command Tx. These units fit together with decent plugs and sockets to form a neat outfit; one switch control. Also very solid beam rotator with 12v. DC reversing motor, numerous valves, bits-and-pieces. In one lot at £15. Delivered free 30 miles radius. Further by arrangement.—G3MEL, 12 Links Avenue, Felpham, Bognor Regis, Sussex. *(Bognor Regis 842.)*

FOR SALE: Hallicrafter SX28 "Super Skyrider," with manual, in first-class order. Free delivery first fifty miles by British Road Services. A snip at £25.—C. Ford, GM2DWW, 87 Ardenslate Road, Kirn, Argyll.

R107 RECEIVER, good condition, £8. — R. Haggarty, 38a Quernmore Road, London, N.4.

FOR SALE: Minimitter ATU, new, £5; Wilcox-Gay VFO, £3 10s.; Class-D Wavemeter, £3 10s.; and UM1 Mod. Trans., 25s.; carriage paid.—Scully, EI2I, St. Theresas, Avenue Road, Dundalk, Eire.

MINIMITTER MR-37 Receiver, perfect. Mosley Tri-Band aerial. — Baily, Gatehurst Cottage, Pett, Hastings.

PANDA LP FILTER, £2. K.W. Multiband Dipole with super Aeraxial coax, £2 10s. Two HRO Coils, 14 to 30 mc GC, £1 12s. 6d. each. All post free.—Box No. 2269, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

COLLINS 75-A-1, mint condition; part-exchange considered or first offer over £100; buyer collects.—Poulter, 80 Endsor Street, Manchester, 16.

WANTED: Crystals FT241, Channels 46 and 47. FOR SALE: BC-453 mod. for Q5'er, perfect order, with o/p stage, £2, o.n.o.?—GM3KAJ, Fortrose, Ross-shire.

MINIMITTER 150-watt Tx, 80-40-20-15-10 metres, in working order, £20. Type 36 Sender Tx, complete with power pack, modulator and coils, etc., £8. Hammarlund Super-Pro Receiver, bandspread on all bands 1 to 40 mc. £18. Hallicrafters S-meter in box, 35s.—K. Jackson, 6 Birk Green, Park House Est., Barnsley, Yorks.

EF50's, new, in box, 2s., p/p 6d. GU20's, new, in box, £1, p/p 2s. BC-906D Frequency Meter, £1 10s.—S. R. Walker, 34 Humberstone Road, Grimsby, Lincs.

ELIZABETHAN Tx, 5 bands, 150w. CW, 120w. phone, in 4ft. rack, relay controlled, Z-Match ATU with built-in monimatch SWR Indicator and aerial change-over relay. Labgear Low Pass Filter and Class-D Wavemeter, £35 the lot. Commercial Transistorised El-Bug, exchange for Vibroplex or similar Bug Key.—G3LGZ, 63 Dosthill Road, Two Gates, Tamworth, Staffs.

SMALL ADVERTISEMENTS, READERS—*continued*

AMERICAN Printed circuits for Hams. Transistorised Grid Dip Oscillator. VHF Transmitter. Single Sideband Receiving Adapter. SSB Driftless VFO. 100 kc Frequency Standard. Compression Amplifier, etc.—Stamped addressed envelope for full details of circuits available : Mortimer, 51 Townhead Road, Dore, Sheffield.

SALE: Minimitter, complete, working order, £30 secures bargain. Reason: Purchased Tiger TR200/HF. (Dorset), s.a.e. details.—Box No. 2270, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BC-348, good condition, two RF, three IF, Int. AC p/pack, £12. RF-26, £1. Buyer collects ; s.a.e., please. WANTED: DST-100 Manual.—Thompson, 39 Devonshire Avenue, Dartford, Kent.

SALE: Marconi CR-150, 14-valve double superhet receiver (new), with handbook. Cost £60 ; will accept any reasonable offer ; must sell.—54, Victoria Avenue, Redfield, Bristol.

GOING QRT: GEC 60-watt modulator with multimatch transformer, £8. Converted Class-D Wavemeter, £6. Brand-new valves: 813, 35s.; 829, 20s.; 832 and QVO4/7, 10s.; s.a.e. for other bargains.—G6BP, 35 Highfield Gardens, Aldershot. *(Phone 21119.)*

FOR SALE: CR-100, reconditioned, noise-limiter, manual, spare valves, speaker, £20.—Young, 1 Rugby Avenue, Neath, Glamorgan.

SWAP: B2 Tx/VFO/PSU, 4 coils, spare valves, Rx 5·9-18 mc, PSU, spare valves, both PMO. WANTED: Rx 160-10m. in good condition.—Write G3LAT, 19 Tonge Road, Bournemouth.

HALLICRAFTERS SX-28, "Super-skyrider" 0·55-42 mc, ANL, xtal gate, BFO, S-meter, calibrated bandspread, fine condition, buyer inspects and collects Midlands, £35, o.n.o.?—Box No. 2271, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

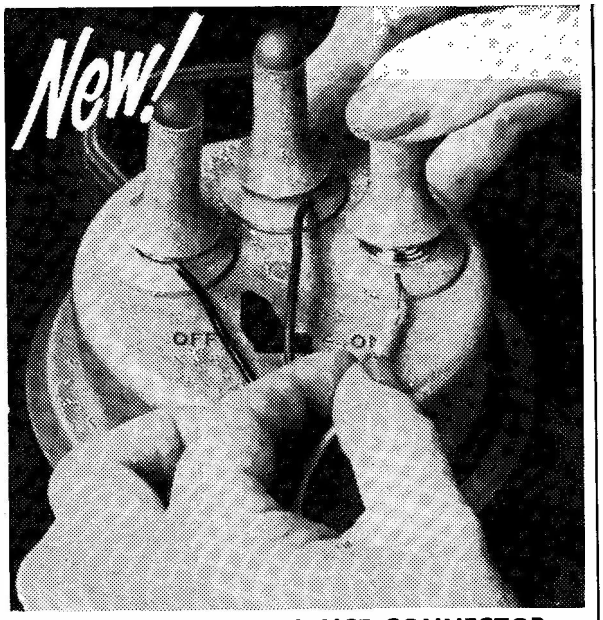
R.107, good S-meter, excellent condition, £9. R208, modified as in *Short Wave Magazine*, March, £4. Delivery 20 miles ; the pair, £12.—Ward, 64 Farm Road, Maidenhead, Berks.

EDDYSTONE 680X matching speaker, mounting blocks and filter unit, new condition ; offers around £75. Could deliver reasonable distance.—Lymna, 4.O.M.Q., R.A.F. Langtoft, Market Deeping, Peterborough, Northants.

DX MINIMITTER CONVERTER, perfect ; reasonable offers with s.a.e. — Box No. 2272, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BRAND-NEW Eddystone 358X receiver, 40 kc to 32 mc, crystal filter, BFO, AVC, ANL, metered, manual, etc., £16 10s. Valves, 5670, Signal Generator 100 mc-156 mc, 30s. Oscilloscope unit TS-74, 50s.; s.a.e. list.—R. V. Wright, 4a Nepal Avenue, Atherton, Manchester.

WANTED: AR88D, working.—Particulars to: D. C. Dodd, Somerset House, Stanley Mount, Ramsey, I.o.Man. Cash waiting for right model.



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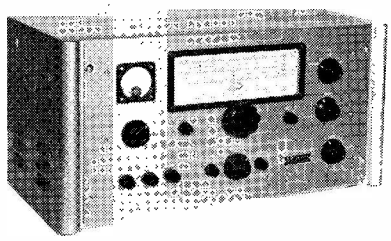

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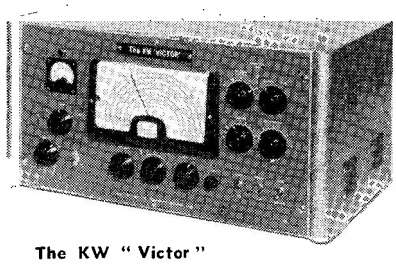

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