

The SHORT WAVE Magazine

VOL. XX

APRIL, 1962

NUMBER 2

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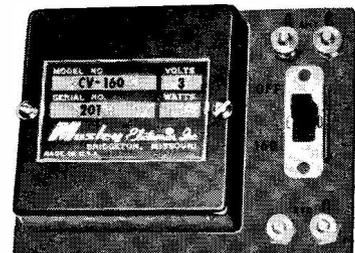
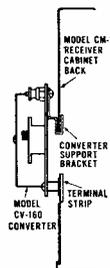
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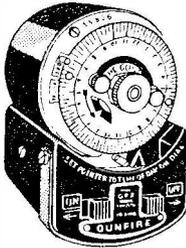
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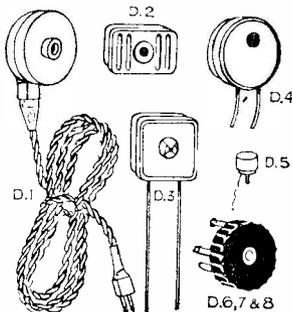
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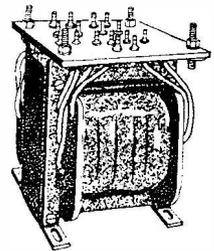
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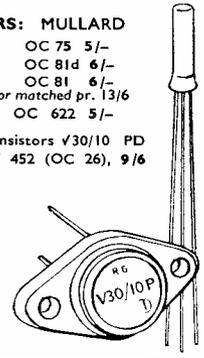
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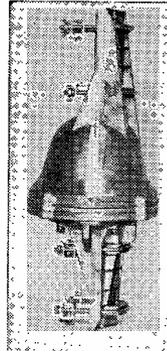
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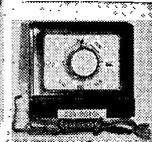
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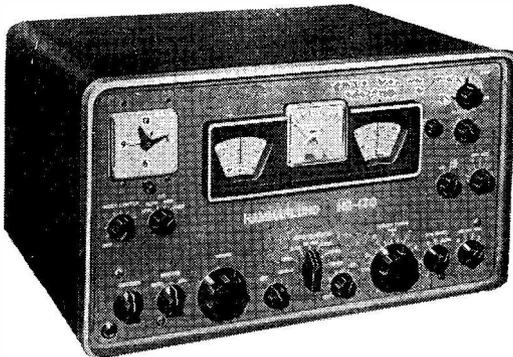
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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT-WAVE Magazine

E D I T O R I A L

Outdoors *As the seasons change, so the focus of the average enthusiast changes in relation to his hobby. With the summer coming, there is the prospect of portable work once more. For many, this means field days on the HF bands or trips round the mobile rallies; for others, it is VHF operation from some particularly advantageous location; and for some it may be a lone trip by car, by bicycle or even by "public transport," and then on foot to a quiet spot for a little DX under conditions very different from those at the home location.*

Whatever the objective or the gear to be used, everybody who wants to have first-hand experience of all aspects of Amateur Radio activity should spend at least one season working under "portable conditions." There is much to be learnt from the operation of building up simple gear with low-consumption battery valves or transistors, and taking it away on holiday. At the other end of the scale is the portable expert with a hot VHF converter, battery-operated receiver and transmitter, and knock-down beam aerial system — all capable of being transported to a distant mountain-top for a week-end's camping.

Radio in some form or other can be an accompaniment on any holiday, and if it means that "special gear" has to be provided to enable one to keep in touch with what is happening on the bands, so much the better! The point is that there is so much useful experience to be gained from all such activities.

Portable operation is something we would recommend all readers to try for themselves — and now is the time to be thinking about it.

*Austin Fobler
G6FO.*

WORLD-WIDE COMMUNICATION

Two-Metre Transmitter Circuits

PROVEN DESIGNS, WITH
ALL ESSENTIAL DETAILS

THE merit of the circuits discussed here is that they can be relied upon to work well and to give entirely satisfactory results. Within the scope of this article—which is intended for those with an active interest in VHF and some constructional experience—it is not possible to give detailed information as to construction in each case. The point is that with the values stated, and a good “low-loss layout,” *i.e.* all usual precautions taken as to short leads and screening, with the circuit elements following the diagram sequences, the PA should produce RF on two metres on the first tune-through. How much there will be, and how well the transmitter behaves, will depend upon how carefully the constructional work has been done.

It should also be noted that these circuits—which are for guidance and information as much as anything—can be used in pieces. That is to say, in the circuit of Fig. 1, the section V1-V3 can be looked upon as a complete exciter unit, to drive other types of PA, or an 832/832 combination tripling to 70 centimetres. Similarly, in the circuit of Fig. 2, V1-V2 comprise a standard CO/buffer unit to give output up to 72 mc, which could be used to drive a 5763 doubling to 144 mc, followed by, say, an 832 PA, for a low-power two-metre transmitter, perhaps running eventually to a Mullard QV1-150A (all-same 4X150A) for full power.

At Fig. 3 is the basic circuit for a medium-power two-metre RF amplifier, which will work well with all the valves specified (though, of course, with different HT/DC input and drive requirements) and with only slight variations in coil values, to compensate for differing valve inter-electrode capacities; usually, these can be corrected by squeezing in or spacing out turns, or separation. Probably, the best choice for this PA would be the Mullard QQVO6-40A, but the 829B (3E29) goes well in it, too. (See Fig. 3, p.68.)

Some General Points

In the circuit of Fig. 1, the PA stage V4 should be arranged so that its grid side is totally screened from the tank circuit—this can best be done by mounting the PA so that the upper part of the valve envelope and its anode connections project into one end of a box, like a trough, in which are mounted C18, L8, L9 and C19, with the Ac. output socket.

Similarly, in the Fig. 2 layout, valves and circuits operating at the same frequency should be well screened from one another—this is, indeed, one of the basic principles of VHF construction technique.

Turning to Fig. 3, the grid side of the valve should be wholly enclosed in a screening box, with only the glass envelope and its anode connectors protruding—from these connectors the output circuit C4, L4, L5, C5, C6, RFC can be built up, in such a way that no part of the grid side is “visible” to this tank section.

The capacities marked Cn in Fig. 3 are, of course, neutralising condensers; for most of the PA valve types mentioned, only a *very small* capacity is required, and is obtained simply by taking a short length of stiff wire from each grid and “showing” it to the opposite plate, alongside the valve envelope; the adjustment is so to dispose the wires, by bending, that with normal HT and bias on the PA, but *no drive*, there is no sign of self-oscillation, squiggers or take-off as C1 and C4 are varied against each other; similarly, with HT off but drive on, there should be no flicks in a grid current meter as C4 is swung through resonance. All the valves specified are sufficiently docile to allow this adjustment to be made quite accurately, *provided* the grid side is properly screened.

As regards PA tank circuit construction: In Figs. 1 and 2 the “long-lines” method is used, the circuit elements simply being laid out in parallel along a length of about 8 ins., suitably supported as necessary by stand-off insulators. In the case of Fig. 2, however, the tank is made in a manner (due to G3CGQ) more economical of space, by folding it to form a coiled Lecher line, as in Fig. 4, p.67. In practice, this has been found to give excellent results.

Modulation

A modulator for a two-metre PA is required to give plenty of audio—the ratio is of the order of 70w. minimum audio power available for 100w. DC carrier input. Undermodulated carriers are a common phenomenon on two

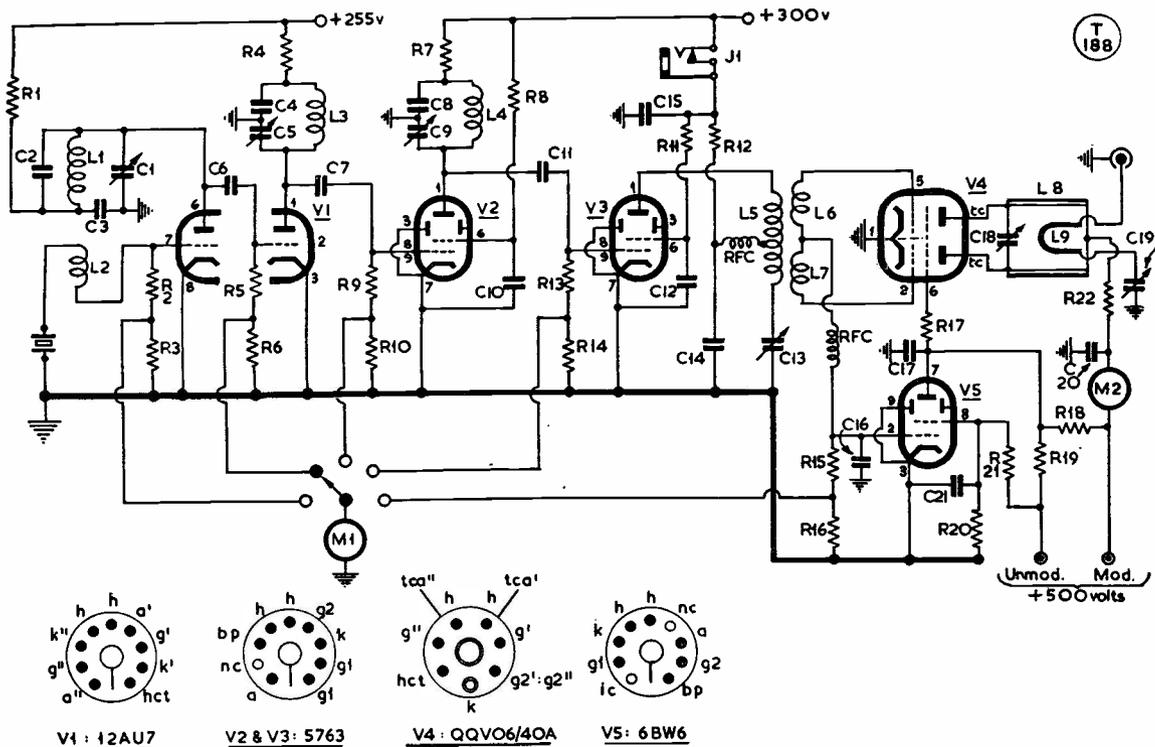


Fig. 1. General arrangement of an effective two-metre transmitter running about 90 watts input. V1-V3 is the exciter section, giving plenty of drive at 144 mc for the PA, the grid circuit of which is made self-resonant; that is to say, L6/L7 are tightly coupled into L5, which is tuned, and the inductance value of L6/L7 is adjusted (by squeezing in or opening out the turns) until enough grid current is shown at the operating frequency. In this circuit, the QQVO6-40A could be pushed to 100 watts input by coupling L9 to get 200 mA at resonance tune.

COIL DATA

- L1 — 12 turns 20g. enam., 1/2-in. dia., 5/8-in. long.
- L2 — 5 turns similar to L1 spaced approximately 1/8-in. from L1.
- L3 — 10 turns 20g. enam., 1/2-in. dia., 1/2-in. long.
- L4 — 4 turns 18g., silver plated, 1/2-in. dia., 1/2-in. long.
- L5 — 4 turns 16g., silver plated, 5/8-in. dia., 7/16-in. long with 2-in. leads.
- L6, L7 — 2 turns each, 16g., silver plated, wound in one piece with 5/8-in. gap; turn spacing approximately 3/16-in.
- L8 — Parallel line 7 3/4-ins. long, 3/8-in. dia. 1-in. c-to-c spacing. Leads to PA anodes 2-ins. long, 3/8-in. wide phosphor bronze strip.
- L9 — Hairpin, 1/8-in. dia. wire, 7/8-in. c-to-c spacing, 2-ins. long.

Table of Values

Fig. 1. Circuit design for Two-Metre Transmitter

- C1, C19 = 20 μ F variable
- C5, C9, C13 = 2-10 μ F variable
- C2 = 47 μ F silver mica
- C3, C4, C8, C10, C12, C14, C15, C16, C17, C21 = .001 μ F ceramic 500v.
- C6 = 22 μ F ceramic
- C7, C11 = 68 μ F ceramic
- C18 = Two circular metal discs, 1 3/8-in. dia. screw thread adj.
- C20 = .001 μ F 1500v. ceramic
- R1, R3, R4, R6, R10, R14, R16, R17 = 470 ohms, 1/4-w.
- R2, R5 = 100,000 ohms, 1/4-w.
- R7, R12 = 180 ohms, 1/4-w.
- R8, R11 = 12,000 ohms, 1/4-w.
- R9, R13 = 75,000 ohms, 1/4-w.
- R15 = 33,000 ohms, 1/4-w.
- R18 = 20,000 ohms (two 10,000 ohm 10-watt in series)
- R19 = 60,000 ohms (four 15,000 ohm 1-watt in series)
- R20 = 22,000 ohms, 10 watt
- R21 = 33,000 ohms, 10 watt
- R22 = 12 ohms, 1/4-w.
- RFC = Approx. 20 ins. 26 SWG enam., close wound 1/8-in. dia.
- J1 = Insulated key jack, closed circuit
- M1 = 0.5 mA meter
- M2 = 0.250 mA meter
- V1 = Brimar 12AU7
- V2, V3 = Brimar 5763
- V4 = Mullard QQVO6-40A
- V5 = Brimar 6BW6

metres, and are an irritation and an annoyance to a great many people attempting to resolve them. Very often this is due to "having to keep the gain down to avoid RF feedback," this in turn being because the speech-amplifier is not properly screened; for comfortable working with full audio power, the modulator unit as a whole should be well

screened, and all external leads by-passed; it is also very important to run PA and modulator from separate power supplies; where possible or convenient, it is likewise a good

COIL DATA

Fig. 2. Two-Metre Transmitter

- L1 — For 24 mc: 17 turns 24g. enam., close spaced on 3/8-in. diameter former.
- L2 — For 72 mc: 10 turns 14g. enamelled, 1/2-in. diameter, centre tapped and self supporting.
- L3 — For 72 mc: 8 turns 14g. enamelled, 7/8-in. diameter, centre tapped and self supporting.
- L4 — For 72 mc: 5 turns 14g. 1 1/2-in. diameter, split 2 1/2 turns each side of L3.
- L5 — For 144 mc: 4 turns 14g. enamelled, 7/8-in. diameter, centre tapped.
- L6 — For 144 mc: 2 turns 14g. enamelled, 7/8-in. diameter, closely coupled to L5.
- L7 — For 144 mc: 14 1/2-in. of 3/16-in. soft drawn copper tube, bent U-shape to 1/2-in. separation, coiled to 1 1/2-in. diameter. to form coiled Lecher line — see sketch Fig. 4.
- L8 — For 144 mc: Aerial loop, 8-in. of 14g. enamelled, bent U-shape to 1/2-in. separation, closely coupled to L7 — see sketch Fig. 4.

Table of Values

Fig. 2. Another Practical Two-Metre Transmitter

- C1, C9 = 82 μ F, ceramic
- C3, C8 = 30 μ F trimmer
- C4, C33 = .005 μ F, mica, 600v.
- C5, C6 = .001 μ F min., Hunts W99
- C7 = 30 μ F
- C11 = .001 μ F min., Hunts W99
- C12, C13, C14, C15 = 5 μ F
- C16 = 15 + 15 μ F split stator, Eddystone 476
- C17, C25 = .001 μ F min., Hunts W99
- C18, C19 = 20 μ F var., Eddystone 815 strip-ped to 4 fixed and 3 moving plates
- C20 = 500 ohms
- C21 = 8 μ F trimmer
- C22, C23 = .001 μ F min., Hunts W99
- C24 = 500 μ F, mica
- C26 = 60 μ F var., Eddy-stone 815
- C27, C28 = .005 μ F, mica, 1000v. wkng.
- C29, C30 = .001 μ F min., Hunts W99
- C31, C32 = 47,000 ohms
- R1 = 1,000 ohms
- R2, R3 = 3,000 ohms
- R4 = 330 ohms
- R5 = 82,000 ohms
- R6 = 10,000 ohms
- R7 = 200 ohms
- R8 = 22,000 ohms
- R9 = 1,000 ohms
- R10, R11 = 8,200 ohms
- R12 = 500 ohms
- R13 = 500 ohms
- R14 = 33,000 ohms, 2w.
- R15 = 1,500 ohms, 1w.
- R16, R19, R21 = Meter shunts (see text)
- R17 = 30,000 ohms, 1w.
- R18 = 200 ohms
- R20 = 30,000 ohms, 10w.
- Ch = 10 H, 50 mA
- RFC1 = 2.5 mH RF choke
- RFC2, RFC3 = 20in. 20g. enam., 1/2-in. dia., self supporting
- Xtal = 8 mc, freq. to Zone Plan
- V1 = ECC81, Mullard
- V2 = 5763 or QV03-12, Mullard
- V3, V4 = QV04-7, Mullard
- V5 = QQV06-40A, Mullard
- V6 = 6V6 or 6L6

(Note: Relay is single-pole with coil DC resistance of 500 ohms, acting as bias resistor in V3, V4 cathodes. Operates as aerial change over, and is mounted closely adjacent to L8).

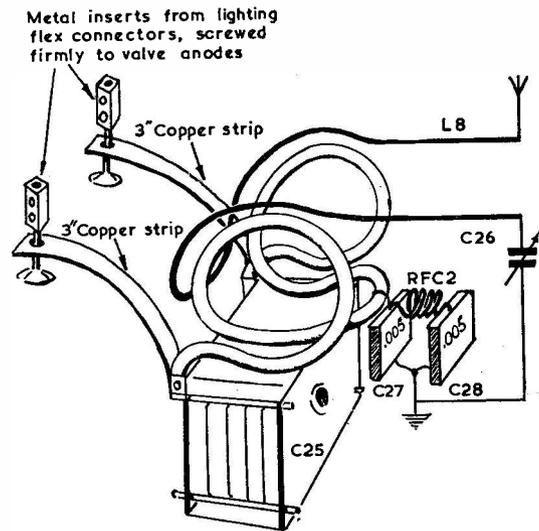


Fig. 4. Arrangement of coiled Lecher line tank circuit for the PA shown in Fig. 2. Considerable space is saved by adopting this configuration.

idea to separate the speech amplifier and modulator, driving the latter through low-impedance line, coupling being by two output transformers connected back-to-back.

Since a valve like the QQVO6-40A can be run at a 120w. DC input, it follows that about 80w. of audio should be available actually on the output side of the modulating transformer. The best way to obtain adequate audio is to use, not 807's, but a pair of KT88's which, driven by a single KT66, will give up to 150w. of audio—see circuitry and discussion in the March and May, 1958, issues of SHORT WAVE MAGAZINE. In Class-AB1, with only 560v. on the anodes, a pair of KT88's will give 100w. of audio.

However, for DC carrier inputs of 60-70 watts, which are usual with an 829B or 3E29 as a two-metre PA, the modulator circuit of Fig. 5 will do well, as it gives about 45w. audio output with the 807's in AB1; it was designed as modulator for the circuit of Fig. 2, with which it interconnects. It may, of course, be used as a modulator with any other transmitter by ignoring the switching immediately to the right of T2, C9, C10.

Essential Precaution

One final point—when messing about with two-metre PA's of the type discussed here, make sure that at all times you have some sort of load on. Valves such as VHF tetrodes simply must be handled gently in the electrical

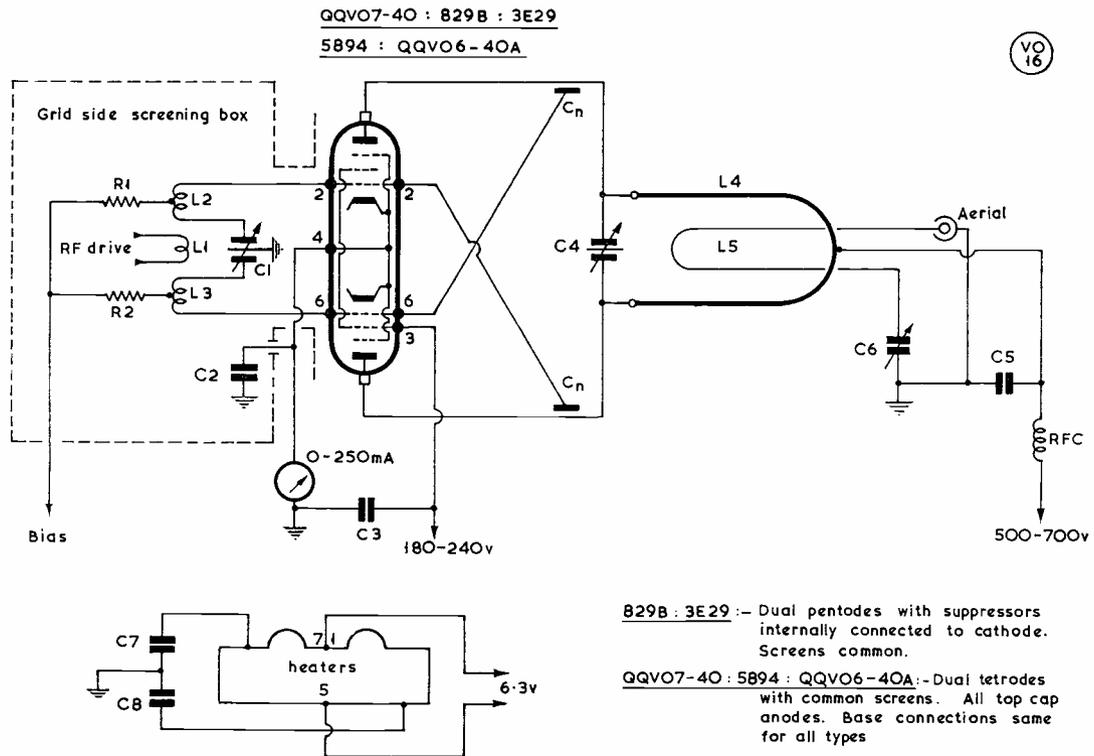


Fig. 3. Basic two-metre PA circuit for the valves specified — and see text. Using a QQVO6-40A, with 600v. on the plate and 200v. screen HT, the drive should be adjusted to give a grid current of around 15 mA against a fixed bias of about -20v. (or -75v. total bias, taking R1, R2 into account). With correct loading, the tank circuit will dip at about 200 mA, and at this input of 120 watts, a 100w. lamp should light up brilliantly. For this PA, the driver stage could be an 832, following the V1-V3 section of Fig. 1.

Table of Values

Fig. 3. Two-Metre RF Amplifier

- | | |
|--|-------------------------------|
| C1 = 25 + 25 $\mu\mu\text{F}$ | C6 = 20-25 $\mu\mu\text{F}$ |
| C2, C3 = .001 μF | C7, C8 = 500 $\mu\mu\text{F}$ |
| C5 = 6 + 6 $\mu\mu\text{F}$ per section, well spaced | Cn = see text |
| | R1, R2 = 7000 ohms, 1w. |
- L1 — Single turn 16g. enam., $\frac{1}{2}$ -in. diameter, between L2, L3.
 L2, L3 — Each 4 turns 16g. enam., $\frac{1}{2}$ -in. diameter, separated by $\frac{1}{2}$ -in., for placing L1, and centre-tapped.
 L4 — Total length of 15-ins. $\frac{1}{4}$ -in. soft drawn copper tubing, silver plated, folded U-shape, with arms $\frac{5}{8}$ -in., centre-to-centre. Ends connected to valve anodes by $1\frac{1}{4}$ -in. lengths flexible copper strip (or coax braid).
 L5 — 8-in. length 14g. enam., folded U-shape, with arms set to $\frac{3}{4}$ -in. separation.
 RFC — 20-ins. of 18g. enam. close-wound on a pencil and sprung off.

sense; the tank circuit should never be brought to resonance in the unloaded condition. A non-resonant length of coax plugged into the Ae. socket on the transmitter, with a lamp-holder at the other end, will enable you to put in lamps rated from 25 to 100 watts, and is as simple a way as any to provide a load while at the same time enabling you to see what is happening as the tuning-up procedure goes on. For one thing, you will find that the positioning of the hair-pin pick-up loop with respect to the tank section proper can be very critical, especially at the higher inputs; for another, an adjustment by which minimum dip under load almost coincides with maximum plate current off-resonance may be found to be giving maximum RF output as seen on the lamp load; and thirdly, the adjustment for

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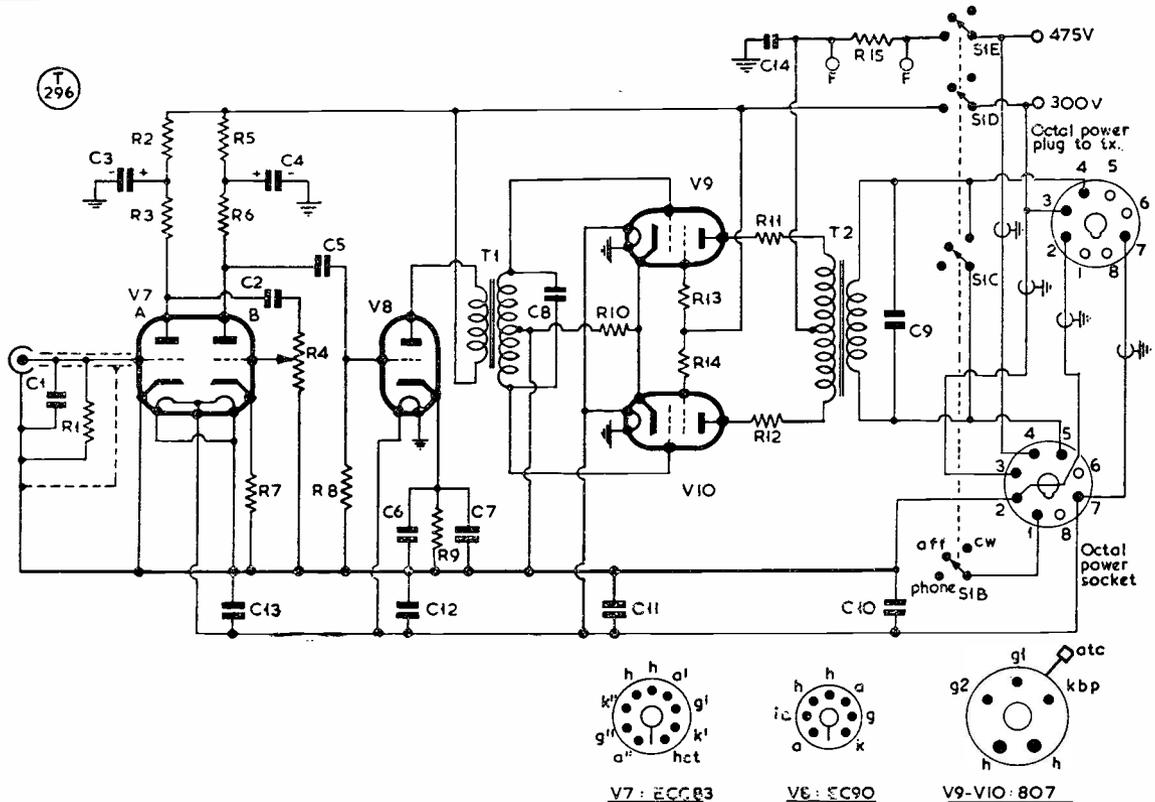


Fig. 5. Circuit layout for a 45-watt modulator, originally designed for the transmitter circuit of Fig. 2, with which it interconnects. For use with any other transmitter, either ignore, or modify suitably, the wiring beyond T2. As explained in the text, on VHF it is found better to work to a 7:10 ratio of available modulating power (watts) to DC carrier input (watts), rather than the 1:2 ratio recommended for AM phone operation on the HF bands. Note: The phone connection at S1B should be to HT—.

Table of Values

Fig. 5. Modulator for 45 watts of audio

| | |
|-------------------------------|---------------------|
| C1 = 100 μ F | R8 = 1 megohm |
| C2, C5 = .005 μ F | R9 = 1,000 ohms |
| C3 = 32 μ F, 250v. elect. | R10 = 250 ohms |
| C4 = 16 μ F, 250v. elect. | R11, R12 = 20 ohms |
| C6 = 25 μ F, 25v. | R13, R14 = 100 ohms |
| C8 = 500 μ F, 1000v. | R15 = Meter shunt |
| C9 = .005 μ F, 1000v. | T1 = Driver xformer |
| C14 = .002 μ F, 1000v. | (mod. xformer |
| C7, C10, C11, C12, | ex-SCR522) |
| C13 = .001 μ F min., | T2 = Mod. xformer, |
| Hunts W99 | Woden UM2 |
| R1 = 2 megohms | Sw. = 6-pole, 3-way |
| R2 = 47,000 ohms | Yaxley type |
| R3, R6 = 100,000 ohms | V7 = ECC83 |
| R4 = 1 megohm | V8 = 6X90 |
| R5 = 15,000 ohms | V9, V10 = 807's |
| R7 = 1,500 ohms | |

time taken in setting up the PA correctly is well worth while.

And having got maximum RF into the aerial, there should be enough audio power available to modulate it fully, without having to cut down on carrier level if reports of inadequate modulation are received.

CAREFUL ABOUT LAPSED LICENCES

We still hear from readers who, having let their licences lapse temporarily, find that to get a call-sign again (even their own old one "reserved" with the G.P.O.) they have to pass both examinations, no matter if they do hold what look like exempting qualifications. A case in point is a GM who was licensed in 1947 and then let his permit lapse in 1958 on becoming a commercial marine radio officer. Though he holds the 1st Class PMG and two higher City & Guilds certificates, he must still take the R.A.E. and Morse test (and pass them!) to get his amateur call-sign back again. For their own reasons, the G.P.O. will not budge on this issue—so the moral is, keep your licence going, which means not only "reserving" the call-sign but also paying the full fee.

maximum lamp indication may not be the correct setting for maximum RF into the aerial, as shown by a remote-reading field strength meter, or RF radiation indicator. Since it is RF into the aerial that is one of the important factors in establishing the efficiency of the installation as a whole, it follows that

STABILISED LOW-VOLTAGE DC SUPPLY

FOR TRANSISTOR APPARATUS,
AND USING TRANSISTORS
THROUGHOUT

B. J. P. HOWLETT (G3JAM)

The "stiffest" power supply in everyday use is the lead-acid accumulator, the word "stiff" being used to indicate very low internal resistance. The public mains supply is also stiff in the same way, but when transformed to a different pressure and rectified, the internal resistance of the components used to accomplish this can cause the final result to fall far short of the accumulator in terms of "stiffness." For units taking a variable current, such as Class-B audio amplifiers, any voltage-sensitive device, VFO's, electronic voltmeters, television waveform units, counter chains, digital voltmeters, wavemeters and frequency meters—to name only a few—very stable power supplies are not only desirable, they are essential. In this article an account is given of the processes involved in developing a low-voltage power supply for all kinds of transistor apparatus. Its uses are manifold and it can itself be taken as a calibration standard.—Editor.

UNTIL recently the writer knew very little about the design of electronically-controlled power packs using transistors, and imagined the process to be similar to that for valve types. However, it was decided to begin at the beginning, just as if such devices had never existed, and to see where the path led.

The basic principle involved is to employ a transistor or valve as a "valve" in the hydraulic sense of the word. To do this, one must first have a standard value of pressure, in this case electrical pressure—a battery or its equivalent, in fact. The simplest way to connect these two devices together as a control unit is shown in Fig. 1. Here we have a PNP transistor arranged so that the input, which must be at somewhat higher voltage than the desired

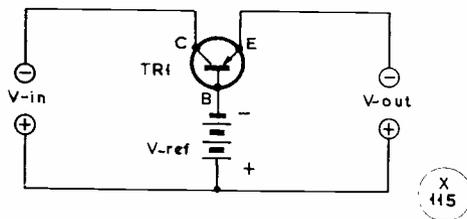


Fig. 1. Simplest stabiliser circuit. V_{out} will always be slightly less than V_{ref} , and V_{in} must at all times be greater than V_{out} by 3-4 volts at least.

output voltage, is applied to the collector, and the battery reference voltage to the base. The emitter will take up a potential substantially the same as the base.

On drawing current from the emitter, its potential begins to fall. However, the fall causes a (smaller) current to flow to the base from the battery, which enables the transistor to restore most of the lost voltage on its emitter. In other words, the transistor "opens up." The base current is smaller than the output current because, in this sense, the transistor is a current amplifier. In a practical case, an OC72 would have to draw 1 mA of base current from the battery to allow 50 mA to flow from the emitter, and the output voltage would drop slightly, but not as much as the input in many cases.

With this arrangement, one is tied to standard battery voltages only and, to gain freedom to change the output voltage at will, a second transistor is added (TR2 in Fig. 2). Here TR1 is the emitter follower, as before, but now the base is being fed from TR2, itself arranged as an amplifier of the reference voltage. The battery voltage is combined with a portion of the output, selected as a potentiometer, and applied to the base of TR2. If this causes TR2 to run a changed value of current, the resultant change of collector voltage (and hence the base voltage of TR1) will occur in such a direction as to reverse the action so as to produce equilibrium with V_{out} slightly higher than V_{ref} , plus whatever portion of the output was selected on the potentiometer. Minimum voltage occurs with the slider near the "top." With the slider at the bottom, $V_{out} = V_{in}$, and there is no control at all.

To produce the aforementioned 1 mA in the base of TR1, we may be pushing only 100 microamps. into the base of TR2 (which could be an OC71) at maximum load. This would represent a great improvement from the battery point of view, were it not for the fact that the battery is now being charged slowly! This may produce undesirable long-term variations which somewhat offset the greater sensitivity of the arrangement. The variable voltage might well outweigh this consideration.

To obtain greater power handling capabilities, a "current amplifier" can be tacked on (see Fig. 3). Here a suitable type for $\frac{1}{2}$ -amp. or so would be the

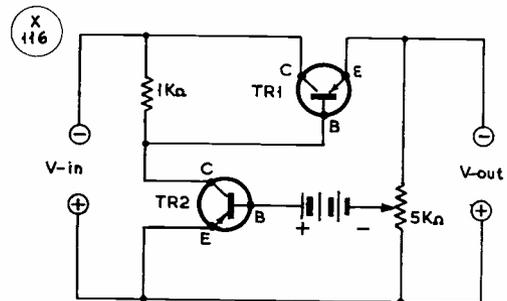


Fig. 2. Improved arrangement to obtain variable voltage and tighter control. A 4½-volt battery enables all voltages from V_{in} down to 5 volts to be obtained.

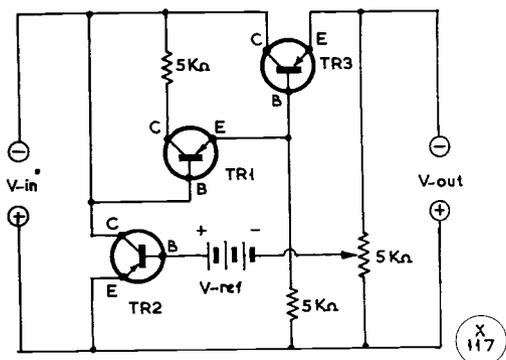


Fig. 3. Adding a current amplifier TR3 reduces the loading on TR2 and results in improved stability. About half-an-ohm of internal resistance is exhibited with one current amplifier, and a fifth of an ohm with two in cascade.

Mullard OC26 or similar. Alternatively, on the load originally considered of 50 mA only, the battery current would become smaller still, each current amplifier which is introduced increasing the control ratio. Extra current amplifiers are added for one or other of these two reasons, and it is not uncommon to see three or four in high-grade supplies.

Once the current in TR2 has been reduced to a fraction of a milliamp. in this way, we might consider rearranging this part of the circuit, including the battery in series with the emitter of TR2, taking the base to the slider of the control potentiometer direct (Fig. 4). The reason for making this change is so that a Zener diode can be introduced instead of a battery. Paradoxically, extra current must now be bled into the Zener diode (which has been described by one writer as a "low voltage neon") to swamp variations in the current of TR2; about 25 mA would be suitable.

However, both TR2 and the Zener diode are being supplied from the unstabilised part of the power pack, and small potential variations will occur even across a Zener diode.

It is at this point that professional designers begin to diverge. Some choose to build-in a second auxiliary stabilised supply just to feed the reference Zener diode in the knowledge that this auxiliary pack will be on constant load and can therefore be made quite cheaply. However, in a number of small packs built by the writer (in his professional capacity) a certain amount of artifice is employed to steady-up the reference voltage without recourse to a separate supply.

Practical Case

The maximum current required in this case was 300 mA to supply ordinary transistor radio receivers. Accordingly, the mains transformer is no bigger than 6.5 volts at 1 amp. and places a limit on the output straight away. The rectifiers are silicon ½-amp. type (though germanium ones are just as suitable). Referring to Fig. 5, it will be seen that these are arranged in a voltage doubler with two high capacity

electrolytic capacitors (*No!* there are not too many noughts) of 12v. DC rating. These particular condensers are very small (the Hunts is 2 ins. by 1 in. dia. and the Daly is 1¼ ins. x 1 in.) but appear to be as yet in short supply.

In the previous diagrams the circuit notation was kept the same to illustrate corresponding functions. In Fig. 5, we have returned to normal. It should be noted that the functions of TR3, 4, 5, and 6 have been explained, and it is now TR1 and TR2 which are new. TR1 amplifies and inverts any voltage across the 15-ohm resistor in series with the earthy end of the Zener diode. TR2 is an emitter follower supplying the Zener diode, and its base is direct-coupled to TR1. Consequently, TR1 and TR2 are solely employed in maintaining constant current through, and hence constant potential across, the Zener diode, despite considerable variations in the unstabilised supply. However, even when all this has been done, the pack still exhibits some positive internal resistance, albeit only a fraction of an ohm.

It seems absurd that, to include resistance in the output circuit, one can reduce the apparent output resistance. But such is the case; R6 (1/10th of an ohm approx.) is in series with the "earthy" output, and the lower end of the Zener diode network is taken to the load side of it. As current is drawn from the unit (and if the value of R6 is just right), a voltage will build up across R6 which "jacks-up" the Zener diode and the whole power pack voltage by just the right amount to counteract any slight residual internal resistance it may exhibit without it. The capacitor C3 (50 µF) reduces hum and the possibility of self-oscillation.

It is hoped that enough information has been given in this article to enable readers to alter or modify the power pack to suit individual needs quickly and accurately—and put in some fuses!

In general, the OC35 transistor is able to give a great deal more current than that required by the writer: if an unlimited source of power were available (for instance, from a large battery charger) and currents up to the maximum from the OC35 (several amps.) were to be drawn, it would first be necessary to ensure that its own base drive transistor is large enough to give this. Under these circumstances, it would be safest to leave the present circuit exactly as

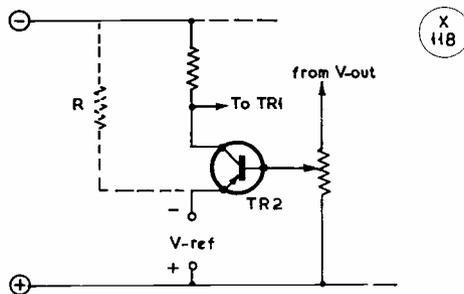


Fig. 4. Having reduced the current through TR2, the V-ref can be re-positioned and/or a zener diode used instead of a battery. With a zener diode, R should be about 300 ohms.

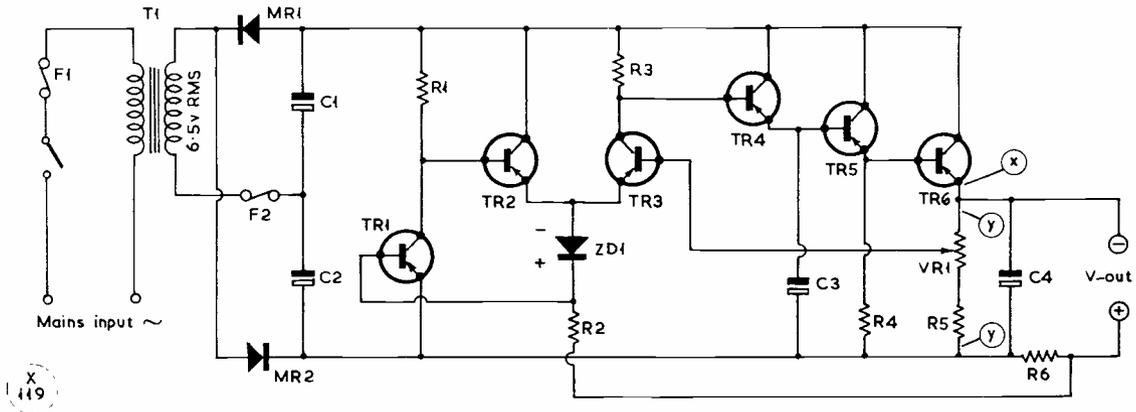


Fig. 5. Circuit complete of the stabilised DC power supply unit described by G3JAM, and intended for low-voltage transistorised equipment for which a constant terminal voltage is necessary over a wide current range. Output control is by VR1, and the unit as shown will give up to 400 mA or so at any voltage between about 6 and 12 volts. The development of this circuit, several models of which have been built for professional laboratory work, is discussed in the text.

it is, but to add another OC35 after the one shown, connected in the same way, so as to make the unit a four-current amplifier job. Large heat transfer capabilities would be needed up to a square foot or so, dependent on mounting position. The makers' data sheets should be obtained before running near maximum ratings.

The pack shown in Fig. 5 will give 400 mA at 6 volts, up to 250 mA at 12 volts, current limitation being the rectifier arrangement. The off-load rectified voltage before stabilisation is about 20 volts, sinking to 13 volts at 300 mA. This is why stabilisation can only be obtained within a certain range of voltages and currents. The output voltage is arranged to remain absolutely constant within the ranges given.

Some Special Applications

It sometimes happens, as in the writer's case, that the power supply is going to be subjected to frequent short-circuit loads, either in the course of testing unproved apparatus or during sessions of circuit design and development.

In many cases, where a certain amount of internal resistance can be tolerated by the load, it is sufficient to feed it through a small lamp. If a short occurs, the lamp lights as a warning, the fuse stays in and the voltage falls to nothing across the load. In other cases, where the protection which this practice affords is needed, often the lack of stability of the voltage after the lamp causes undesirable side effects, actual oscillation or, at least, falsifies results.

However, there is a way round this. It is to place the lamp in series with the emitter of TR6. Now the lamp is inside the control loop, and any voltage lost across it is made good by the circuit. It does have to be a higher voltage lamp, because, under s/c conditions, the pack attempts to make good the deficiency across the output, and pumps the output of TR6 up to the full value of 15 volts or so.

Sometimes the situation arises where the pack is supplying a unit 'way down the other end of the

Table of Values

Fig. 5. Circuit of the Stabilised DC Supply

| | |
|---|--|
| C1, C2 = 2,500 μ F, 12v. DC, Hunts MEF 106T or Daly W3 68/2 | F2 = 750 mA, DC fuse |
| C3 = 50 μ F, 12v. DC | MR1, MR2 = Mullard OA210 (many suitable types for other ratings) |
| C4 = 350 μ F, 12v. DC | ZD1 = 4.7-5.7v. Zener diode, Mullard OAZ200 or 201, for $V_{min}=6$ volts |
| R1 = 12,000 ohms, $\frac{1}{2}$ -w., 20% | TR1, 2, 3, 4 = Mullard OC84 preferred, but OC81, OC81D, OC78, OC78D, OC72, OC71 suitable |
| R2 = 15 ohms, $\frac{1}{2}$ -w., 10% | TR5 = As for TR1-4, but OC71 too small |
| R3 = 27,000 ohms, $\frac{1}{2}$ -w., 20% | TR6 = Mullard OC35, or OC16, 19, 26, etc. |
| R4 = 4,700 ohms, $\frac{1}{2}$ -w., 20% | |
| R5 = 3,900 ohms, $\frac{1}{2}$ -w., 10% | |
| R6 = see text | |
| VR1 = 5,000 ohms, linear track | |
| T1 = 6.5 Volt 1 Amp., heater transformer | |
| F1 = 250 mA, mains fuse | |

(Other makers' equivalents or near-equivalents available for TR1-TR6)

garden—a field strength meter, for instance. A volts drop occurs on the cable, undoing all the good work in the unit. There are two answers to this situation: The first is to raise R6 slightly so as to over-compensate the supply for the terminals, but keeping a constant voltage at the load. The other way—the better way, in the writer's opinion—is to break the leads to the control potentiometer at Y, and take its connections to the remote load *via* separate wires. The main feed cable then comes inside the control loop just as the lamp did earlier, and the volts should remain constant across the remote load. Over-compensation will be exhibited by the local terminals.

These special uses are only two of the ways in which an electronically-controlled power supply can give you the results you could never have obtained, even from an accumulator.

For Readers' Small Advertisements
—see pp. 105-112

FULL ANODE MODULATION ON THE DX-40U

SIMPLE CONVERSION TO
PLATE-AND-SCREEN CONTROL
BY EXTERNAL SWITCHING

J. MAHAN (GM3OTF)

QUITE a number of amateurs may have considered the possibility of converting their Heathkit DX-40U to plate-and-screen modulation but, being unwilling to embark on a major internal alteration, have more or less abandoned the idea.

Described here is a method adopted by the author which gives the advantage of alternative plate-and-screen or controlled carrier modulation by the operation of a single switch and—what is most important—leaves the transmitter in its original form internally.

A separate modulator giving about 25 watts of audio is, of course, required, together with its own power supplies; a modulator HT line giving 400v. seems to be ample to plate-and-screen modulate the 6146 PA in the DX-40U.

The modification is to remove the small inspection cover on the rear of the transmitter and, from sheet aluminium, fabricate another to carry a 5-pole double-throw switch which, incidentally, must be capable of standing up to the voltages involved.

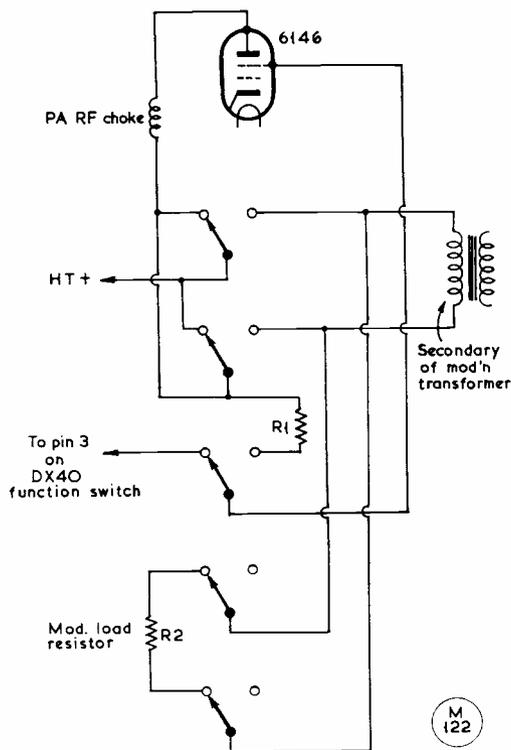
This switch is used to change from controlled carrier to plate-and-screen or *vice versa*; connections to the switch are as shown in the diagram herewith.

The only alterations to the DX-40U itself are to remove the connection from the cold end of the RF choke feeding the anode of the 6146 and extend another connection to the appropriate tags, as shown in diagram. Next, at pin 3 of the 6146 base, the existing screen feed is removed and extended to the switch and another lead is soldered to the screen pin and back to the switch, as shown. This completes alterations to the transmitter, and it will be seen that no boats are burnt.

Resistor Values

The value of resistor R1 switched into the screen circuit would be as normal for a 6146 plate-and-screen modulated, and the resistor R2 shunting the secondary of the modulation transformer in controlled-carrier position is merely to prevent high voltages being developed across the secondary of the transformer should power be left on in the modulator when the change-over switch is in the normal-operation position.

To bring the wiring under the chassis to the switch, one of the crystal holders fitted in the space behind the inspection plate can be removed and wires brought



Illustrating the DX-40U modification devised by GM3OTF, for full plate-and-screen modulation of the 6146 PA. The 5-pole c/o switch is mounted on the rear chassis drop of the transmitter, and the merit of the arrangement is that no serious internal disturbance of the DX-40U itself is called for, controlled-carrier operation still being possible. Here, the external control switch is shown in the off-AM phone position. The function switch on the Tx is set to "CW" for AM phone.

up through the hole thus left. A screened two-core cable is taken from the change-over switch to the modulator.

Finally, it is wise not to exceed a loading of 95 mA on the plate current meter when plate-and-screen modulating, so as to keep within the 6146 rating.

SUSPECTS APPREHENDED

With reference to the note on p.44 of the March issue of SHORT WAVE MAGAZINE, relating to the theft of equipment from K.W. Electronics, we are informed that arrests were made, a committal in custody was ordered by the local magistrates, and the case was to have been heard at the Quarter Sessions in Canterbury on April 2.

NEW POSTAL-MATCH STYLE CLUB CONTEST

On p.103 of this issue of the Magazine appear details of a new sort of contest we have devised for active Clubs with a station of their own on the HF bands. All hon. secretaries and members of Club committees are asked to bring this idea up for discussion and, if they operate a Club station, to send in a score for the first round.

POCKET FAULT FINDER

TRANSISTOR CIRCUIT TESTER

J. BALLINGER (G3NAJ)

ONE of the most useful aids to rapid fault finding is the multi-vibrator signal injector, with its rich harmonic output, from audio through to radio frequencies. The writer has, for a number of years, used such a unit based on two SP61 valves, and became fired with the idea of building a transistorised version which would be perfectly safe to use on transistorised apparatus.

The first attempt, built into an aluminium tube (which had held a Christmas cigar!) proved to have so much spare space that it was decided to build another version inside a Drydex "Pentorch." This has proved so popular and effective that it is difficult to keep it in one's own pocket.

With the circuit values specified, harmonics up to 5 mc are produced at good strength, with sufficient power on the fundamental to drive a loudspeaker when connected across the output transformer primary winding.

Other transistors may be used, of course, some producing higher frequency outputs—page 256 of the Mullard *Transistor Reference Manual* gives circuit values for the OC71, OC41 and OC200 transistors, which can be used in this assembly with the same three-volt supply.

Construction

The case of the Pentorch—a standard Drydex product obtainable at any electrical supply shop or cycle dealer's—requires only one modification, the substitution of a probe for the bulb. With the bulb removed, a 4BA bolt is fed into the plastic nose, and secured with a nut on the outer side. The pocket clip acts as an on/off switch, and this is retained to switch the battery of the multi-vibrator.

The isolating condenser fits snugly into the clips which formerly held the bulb, first forming the connecting wires into small coils and fixing them with a blob of solder to act as contact buttons. If the condenser has no insulating sleeve, a turn or two of tape will be required to insulate the outer case from the clips.

The battery is, unfortunately, of the type with a negative outer case, and must be adapted to contact

the spring in the base of the torch with its centre positive pole. The easiest way to do this is to solder a piece of wire approximately $\frac{3}{8}$ in. long across the brass cap, supporting it with a cardboard washer to prevent the spring from pressing it into contact with the outer case and so shorting the battery.

The formers must now be made, two of "A" and one of "B"—see photograph and Fig. 2. These are cut from any insulating sheet of suitable thickness, and can be roughed-out with side cutters and finished to size with a file. It is advisable at this stage to ensure that the formers are a free fit in the narrowest part of the torch case.

The resistors should now be threaded, one wire of each into each "A" former, pulling the resistor bodies flush to the former faces to form a neat cage. Make sure that the resistors are placed alternately around the cage, and that the emitter holes are in line. The wires at one end are shortened about $\frac{1}{4}$ in. and bent over into the centre of the disc, being fixed with a blob of solder to form a contact button.

Next, the transistors must be soldered into position, with very short leads. Much has been written about the use of heat shunts when performing this operation, but the writer prefers to rely on the use of quick localised heat from a very hot iron. One of the units as described here is in working order in spite of the fact that the emitter lead fractured flush with the transistor base and was soldered back into position!

The transistors are fixed into position so that the spacing between the transistor body and the resistor stubs is such that the broadest parts of the two transistor bodies do not lie together.

The emitter leads are looped back across the filed notch in the former, and this loop must be strained out a fraction so as to contact the sides of the torch case very lightly, to make the positive connection.

The condensers are assembled into the former "B." The connecting wires are looped into a ring and blobbed with solder to form yet another contact button—see Fig. 2.

The battery is fed case uppermost into the pentorch, followed by the multi-vibrator assembly (the end formed by the resistor cage first). When the cap is screwed on, the isolating capacitor C3 should lightly compress the torch spring—if not a shorter or longer isolating condenser can be fitted to compensate. The spring will take up errors of $\frac{3}{8}$ in. or so, so no difficulty should be experienced; as a guide, the multi-vibrator assembly should be approximately the same overall length as the battery.



The transistorised pen-torch pocket tester devised and described by G3NAJ; from this photograph, and the accompanying exploded view, the general construction and assembly can be followed. The text explains some uses to which a tester of this kind can be put.

Using the Fault Finder

The constructor will discover many uses for this little instrument. The following examples will show the principle involved:

Dead superhet receiver: Touch the grid of the output valve with the probe; an audio signal will be heard from the speaker if all is in order. If not, check HT and heater; if these are OK, the fault must lie in the output valve or the associated components. To check speaker and o/p transformer, switch off set and apply tester output across the primary. If o/p stage is in order, proceed to apply the probe to the grids of the remaining valves, working from the AF amplifier back to the front end of the receiver. As the receiver is faulty, somewhere along the line there will be no response from the speaker, and the fault will lie between the last stage at which a response was obtained and the "dead" grid. Now apply the probe to the anode of the valve; if a response is obtained, the fault is in the valve itself or its associated components; if not, then the coupling between that valve and the following one should be investigated.

Transistor Receivers: Fault-trace exactly as before,

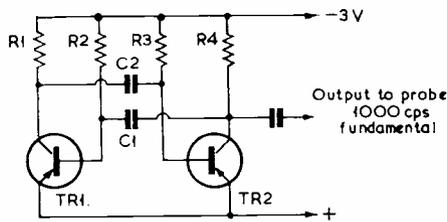


Fig. 1

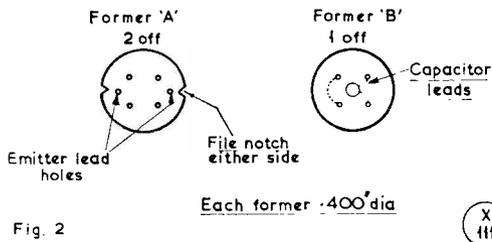


Fig. 2

At Fig. 1 is the circuit of the 1000-cycle oscillator, which is inherently rich in harmonics — see text. At Fig. 2 is the detail for preparing the mounting formers. Values are: C1, C2, C3, .01 μ F, miniature type; R1, R4, 1K; R2, R3, 22K; TR1, TR2, BTH 3-volt "greenspot"; Drydex pen-torch; $1\frac{1}{2}$ -volt battery, Ever-Ready type D22. (Note that the output capacity in Fig. 1 should be marked C3.)



This view of the pen-torch tester in its component parts shows the assembly on the formers sketched with the circuit diagram. It should be noted that in this photograph the battery is shown wrong way round — it should be negative (case) end to resistor contact button.

using the base connections instead of the grids, and the collectors instead of the anodes. Care must be taken in this case to differentiate between the clear response obtained during the application of the probe to the transistors and the faint note which will be apparent whenever any part of the receiver is touched. This should not be a problem, but earthing the probe case to the chassis would eliminate the effect if thought worth while.

Tape Recorder fails to record: Insert plug in appropriate socket (the input may be grounded when the plug is withdrawn), switch controls to "record" and apply probe to input. If record-level indicator shows a response, microphone or lead is at fault. If there is no response, remove recorder from case, switch on and replace plug, then follow the input from the plug and around the circuit, applying the probe at each joint. When a response is obtained, the fault obviously lies between the last two points checked.

CHAIRMAN, NATIONAL JOINT COUNCIL, CIVIL AIR TRANSPORT

Mr. G. R. Scott-Farnie, C.B.E. (G5FI), Managing Director of International Aeradio Limited, has been appointed Chairman of the National Joint Council for Civil Air Transport for the coming year. Mr. Scott-Farnie has, for the past year, been Chairman of the employers' side and also vice-chairman of the Council.

International Aeradio Limited installs, operates and maintains aeronautical telecommunications, navigational aids, and air traffic control services at numerous airports along the world's air routes and is closely linked to the air transport industry.

MOBILE RALLY PROGRAMME

The up-to-date list of Mobile Rally events published here shows that there is quite a good selection of fixtures, fairly well dispersed in date and location—though clashes are always unfortunate.

Starting the 1962 season is the ever-popular *Trentham Gardens* affair, known as the North Midlands Mobile Rally and organised by the Midlands Amateur Radio Society in co-operation with the Stoke-on-Trent Amateur Radio Society; a first-class programme has been arranged, including an exhibition, closed-circuit ATV, prize draw, separate parking sections (and, of course, talk-in) for LF and VHF band mobiles, ample general parking space, good catering facilities, and uncrowded cover in the event of wet weather. The date is *April 29*, opening from 10.0 a.m., and for those who have not been there before, the site is off the A.34, between Stone and Newcastle-under-Lyme, Staffs., and there is a small admission charge.

Following is the full Mobile Rally fixture list, as at present notified:

April 29: North Midlands Mobile Rally, Trentham Gardens.

May 6: Thanet Radio Society Third Annual Mobile Rally, at Cliffsend, Ramsgate, on cliff-top overlooking Pegwell Bay (A.256). Described as "an ideal spot for a family outing to the sea." Talk-in will be by G3DOE/A on Top Band, and by G3BAC/A on two metres. Further information from: R. A. Bastow, G3BAC, 31 Canterbury Road East, Ramsgate, Kent.

May 20: Hunstanton bucket-and-spade Rally and mobile D/F contest.

June 17: West of England Mobile Rally at Longleat, nr. Frome, Wilts. Competitions and talk-in on LF/VHF.

June 24: Mobile Rally at U.S. Air Base, Barford St. John, Oxon., organised by Amateur Radio Mobile Society.



"... A little less capacity, perhaps, moddom ..."

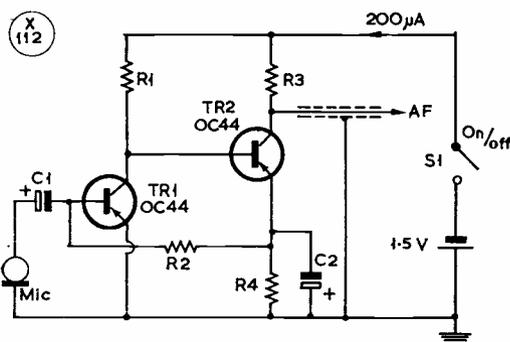


Fig. 1. Circuit of the transistor speech amplifier used by G3OYX for his mobile Tx described in the March "Short Wave Magazine"—see note below, with values.

June 24: Yorkshire Coast Mobile Rally, Spa Royal Hall, Bridlington, East Yorkshire (new event organised by Bridlington and District Radio Society).

July 8: North-Eastern Mobile Rally at Bents Park Recreation Ground, South Shields (S.S. & District A.R.C.).

July 14: Southern Counties Mobile Rally, on Southampton Common. (Note that this is a Saturday.)

July 15: Harlow Mobile Rally, Harlow New Town.

July 15: Mobile Rally organised by Chiltern Amateur Radio Club at West Wycombe Estate, near High Wycombe, Bucks.

August 29: Annual Rally, Derby & District Amateur Radio Society, Rykneld Schools, Derby.

September 16: Annual Lincoln Hamfest and Mobile Rally, organised by Lincoln Short Wave Club.

This makes it a total of a dozen rallies scheduled so far for this season. As there are probably a few more being organised, we should like to have the dates as soon as possible for publication in this space, deadline for May being April 13.

Transistorised Speech Amplifier

On p.18 of our March issue was shown the circuit of a transistor-cum-valve Top Band transmitter, capable of radiating a well-modulated 10w. carrier. In his article, G3OYX suggested two possible microphone connections — either moving coil through a transistor amplifier, or carbon type direct.

In Fig. 1 above is the circuit of the little transistor job, which could be built into a small torch case (complete with microphone) and gives a gain of about 46 dB. The transistors TR1, TR2 are both OC44; C1, C2 are 8 μ F; R1 is 12K; R2, 68K; R3, 6.8K; and R4, 3.9K. The battery is a 1½-volt cell, load 200 μ A, and the point marked AF connects to "mic." in the circuit on p.18, March.

The carbon microphone connection, shown at Fig. 2, is a very simple one; the 2:1 step-up transformer T can be a transistor interstage type and the resistor R 100-150 ohms as a wirewound potentiometer.

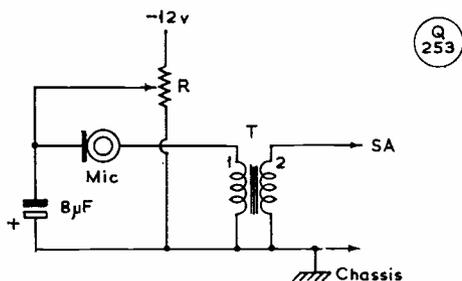


Fig. 2. Connection for a carbon microphone into the speech amplifier section of the G3OYX/M transistorised Top Band transmitter — see text and p. 18 March.

meter, for setting the correct polarising voltage and acting as a gain control. In this arrangement, the point SA goes direct to the "mic" connection in the original circuit.

What About Ten?

Even if most people start up, and appear to continue, on Top Band for their mobile experience, there is no reason why other bands should not be tried—not so much 80 or 40m., because of the QRM level, nor 20 and 15m., because of the difficulty there would usually be in getting U.K. contacts. The next band up is 10 metres, and is just about ideal for short-haul contacts under normal conditions, with world-wide DX possible when 28 mc opens. The great attraction of Ten for /M working is that the perfect aerial condition can be easily contrived—a $\frac{1}{4}$ -wave ground plane. This is given by no more than an 8 ft. dural rod fitted through insulation to the rear bumper, and fed by coax at the junction.

Under good propagation conditions on ten metres (admittedly not very frequent just at present) extraordinary DX has been worked with $\frac{1}{4}$ -wave rods.

Of course, two metres also offers a very fruitful field for mobile operation, and there is excellent commercial equipment available for the purpose; indeed, after 160 metres, the band most populated by mobiles is two metres.

ANOTHER MAN'S NIGHT OUT

Inspired (if that is the right word) by the G3LSD picture on p.663 of the February issue of SHORT WAVE MAGAZINE, G3TR sent us the photograph herewith. He is careful to explain that he does not *always* come on the air in full evening dress; the occasion in view was the start of the CQ 160-metre World Wide DX Contest, at 0200 GMT on February 24, when G3TR and his XYL had just got home from an energetic session of competitive ball-room dancing. Anyway, that's his story, and here's the picture to prove it. G3TR is operated by John Critchley Graham, at The Willows, Church Road, Lowfield Heath, Crawley, Sussex, and he is a well-known and very active member of the Crawley Amateur Radio Club.

PRICE OF CERAMIC TRANSFILTERS

With reference to the article "Ceramic Transfilters in Transistor Circuits," in the November, 1961, issue of SHORT WAVE MAGAZINE, we are informed that the price of single items in the TF-series is 22s. 6d. each, and of the TO-series, 27s. 6d. Full details can be obtained from: The Brush Crystal Co., Ltd., Hyde, Southampton.

HEATHKIT CREDIT TERMS

All Heathkit gear as advertised can be obtained on the basis of a short term credit sale agreement or deferred payment plan, of which some examples are as follows: *Mohican Receiver*, deposit £7 18s., with nine monthly payments of £3 13s., making a total of £40 15s. against the cash price of £38 15s.; the *DX-100U Transmitter* works out at £17 3s. down, £7 12s. monthly, a total of £85 11s. against £81 10s. cash; the *Oscilloscope, 5-in.*, is £7 4s. down and £3 10s. monthly, total £38 14s., cash price £36 10s. The limit of credit is nine months, and charges include free delivery in the U.K. Heathkit gear is designed and intended for the home-constructor, who can build first-class equipment at a very reasonable cost. Full details can be obtained on application to: Daystrom, Ltd., Dept. SW4, Gloucester. Ask for the new catalogue and price list.

USKA — CHANGE OF ADDRESS

Every now and again, the Secretary of U.S.K.A. (the Swiss amateur organisation) changes, and when this happens he takes not only the office, but also the HB QSL bureau, with him. It is now HB9NL, Buron/LU, Switzerland, and that is quite sufficient.



G3TR assures us that he's not always dressed like this when working the DX shown by those very nice cards.

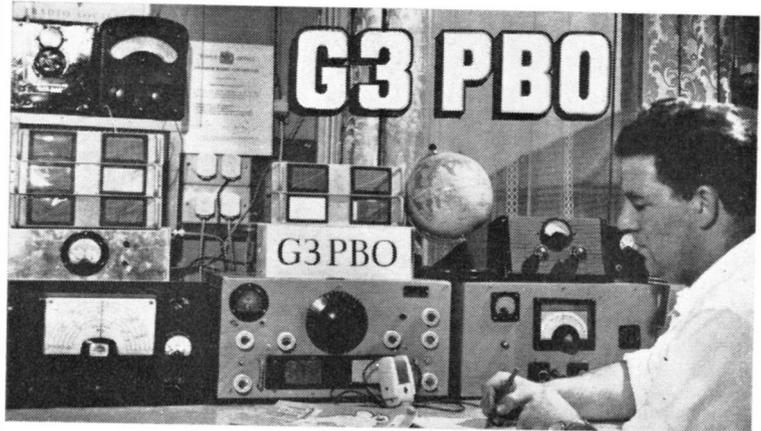
DX COMMENTARY

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

ALL bands have been giving a good account of themselves during the past month, and the general level of conditions has been far higher than most of us dared to hope. The sunspot cycle may be declining, but there is, as yet, little or no sign of depression among the DX-chasers. *Ten* comes to life fairly frequently, even to the extent of East-West openings; *Fifteen* is still in many ways the best DX band of all (for those who like a little peace and quiet now and then); *Twenty* is hopping with all sorts of things for about sixteen hours a day.

Then, on what we lump together as "LF Bands," we have an apparently inexhaustible supply of DX on *Forty* and *Eighty*—if you can hear it!—and Top Band has sprung more surprises and acquired more of an international flavour this year than it has ever done before.

What more could anyone ask for? Well, plenty . . . and first of all a filtering out of all the weirdies that clutter up our bands without (apparently) serving any useful purpose to anyone. Disembodied bits of jammers float about *Twenty* (*Fifteen* is much clearer of them these days); pirate broadcasters and their parasites (the jammers again) make a mess of the pathetic little slice that is left of *Forty*; jingle-bells and creepy-crawlies beset *Eighty* to such a degree that one really has to search for amateur signals in among them; and Top Band has its problems, too—such as keeping out of the way of the coastal stations that pop up at every 7 kc throughout the band; dodging the over-modulated fish-fone; and



G3PBO

CALLS HEARD, WORKED and QSL'd

reading some of the incredibly weak DX signals that compete with the incredibly noisy stuff in the foreground.

With all these natural hazards (or are they unnatural?) most amateur operators seem to be able to cope, and even to remain reasonably cheerful. Let us not add to them by introducing clottedry of our own to make things more difficult. In particular, we are thinking of the fatuous display of inept operating that showed up on *One-Sixty* during the *CQ* Worldwide Contest. The W's and VE's were coming through well, but for some strange reason a whole rash of G's appeared, calling them on their own frequencies. Of course, they had no success, but most of the regulars, who know the ropes by now, packed it in and went off to bed in disgust.

On all bands one notices, more and more, how bad the standard of listening has become. One hears a G station in the middle of a QSO with a nice piece of DX, and up comes another G, right on the DX, calling CQ DX himself. This means that he will probably not work the DX station, or even

hear him; and, in addition to ruining a perfectly good QSO, he has merely wasted his own time and effort in putting out a perfectly pointless call—wrong frequency, wrong time.

So—an appeal for more listening and less calling . . . not on behalf of someone or other who wants to work DX, but for the benefit of everyone, most of all those who waste their own efforts. We could do with a lot less "CQ DX" and a lot more listening, culminating in a successful call to a DX station who has probably been putting out fruitless calls himself.

With that little grouse out of the way, on to the activity reports, more numerous than ever this month . . .

DX-Peditions — Future

The following sorties are currently in the news:—*Baja Nuevo* and *Serrana Bank*: HKØAA should be on for five days, starting April 27, and KS4BF around May 3; this one will be operated by a bunch of W's, with HK1QQ and the HK gang, and promises to be really well organised.

Aldabra Islands: The W4BPD expedition will be leaving the States during March and making first for the Seychelles (VQ9). The VQ7 operation, from the Aldabras, should last for fourteen days at the latter end of April; QSL's to W4ECI. *St. Pierre:* An FP8 (call letters not yet known) should appear during the first week in May, operated by K7AEJ.

Gilbert & Ellice Islands: Mike of G3JFF will be returning to VR1M in April, in fact he hoped to open on April 1; he will not be doing another trip to YJ1MA. *Tahiti:* Danny Weil has been operating FO8AN from Tahiti, since moving across from the Marquesas (the latter were not recognised by ARRL for DXCC credit). His next stop is planned to be either Flint or Vostok Island—600 miles N. by W. of Tahiti, under British administration, with U.S. claim. They *might* count . . . and from these islands a trip may be made to Starbuck or Malden Island, roughly halfway between the previous two and Christmas Island (they all come in the group known as the Line Islands—and if you have a good atlas you will find plenty more!)

DX-Peditions — Past

Angus of 5N2AMS did indeed manage his Gabon trip, whence he made over 500 contacts signing 5N2AMS/TR8 . . . VP2VI put the British Virgin Is. on the air (activated by VP9's and W2YTH) . . . VP5BP did the same for the Cayman Is., with VE3CJ in the operating position.

VP1JH (British Honduras) and KV4CM (U.S. Virgin Is.) were two more successful Caribbean sorties during March; the latter may still be on when you read this.

Several new ones (not expeditions) have cropped up and may or may not be there permanently. Among them we list YA1AN, said to have started up recently; FB8WW (Crozet), who is very elusive; and EP2BK, who did much good work from Iran on all bands including One-Sixty, but is probably QRT by now.

Reg Tibbetts of W6ITH is now really well installed in his home on St. Martin Is., whence he signs FS7RT, mostly on SSB. He says

he uses the highest frequency band that happens to be open at the time; he is the first and only station in FS7-land, and also runs (occasionally) PJ2MC from the Dutch half, Sint Maarten. PJ2ME also operates from there, but CW only. The other outlet for Reg is Anguilla, where he signs VPØRT. This call has been queried from time to time, but he explains that when he obtained operating permission he suggested that a more exclusive call than a VP2 would be a nice thing, and the Governor duly gave permission for the VPØ prefix—on to which Reg tagged his initials.

New Prefixes

The following Central African countries have been allotted new or changed prefixes since the List of Countries was published in our January issue, and these amendments should be made, if you wish to keep your list strictly up to date:

Cameroons
(listed as FE8)—TJ
Dahomey
(listed as TD8)—TY2
Upper Volta
(listed as TV8)—XT2
Togo (not listed) — 5V

Though our list was correct at the time of preparing for publication, there are constant amendments, and there will be more yet.

DX Gossip

VK3AHO has permission to go to FW8 during May and June, but hasn't yet got a licence . . . MP4TAO operates MP4QBA from Qatar, and will be on SSB as soon as his KWM-2 arrives . . . AC4NC was worked or heard by several W's during February and March; no confirmation yet . . . UB5FG plans a three-week stay in each of these districts: UM8, UI8, UH8 and UJ8.

TL8AB closed down in February, but TL8AE is still there, though not very active. TL8AC will be back later in the year . . . Gus Browning, W4BPD, has been allotted the call VK2SI and has permission to operate from Cocos, VK9. Christmas Island turned out to be impossible and there is

“not much hope” for Willis Island.

TA2BK is said to be the only licensed amateur in Turkey; he is now on one year's military service and inactive, but hopes to be on with QRO when he returns . . . ZS6PC was due to be signing /ZS8 during March . . . VR4CV is on and operates during 0700-1000 GMT daily.

VU2NR's proposed expedition to AC3 and AC5 was finally killed off by a letter from New Delhi saying “no go” . . . so it seems there will be no hope for W4BPD in those parts.

Ten Metres

The 28 mc band has opened up far more frequently than one would have expected, from the predictions. The path from the U.K. to Africa has been extremely good at times. Reports from the States show the same state of affairs—the W's have been working not only South Americans, but also many African countries and even New Zealand.

L F BANDS TABLE,
(Countries Worked)

| Station | 1.8 mc | 3.5 mc | 7 mc |
|---------|--------|--------|------|
| G3FPQ | 23 | 100 | 137 |
| G3IGW | 23 | 51 | 97 |
| G2YS | 20 | 75 | 94 |
| G3NFV | 16 | 25 | 27 |
| GW3CBY | 15 | 35 | 52 |
| G2DC | 12 | 101 | 142 |
| G3NYQ | 11 | 28 | 31 |
| G3NNO | 10 | 23 | 24 |
| G4JA | 10 | 43 | 58 |
| G3FXB | 9 | 78 | 152 |
| G3JWZ | 9 | 52 | 62 |
| G2BLA | 9 | 39 | 73 |
| G3NYA | 9 | 26 | 32 |
| G3IDG | 9 | 16 | 22 |
| G3DRN | 9 | 13 | 42 |
| G3NPB | 9 | 8 | 21 |
| G3HZL | 8 | 44 | 81 |
| G3PEK | 8 | 19 | 30 |
| G3PDM | 8 | 10 | 23 |
| G3OQK | 7 | 5 | 23 |
| G2DHV | 5 | 25 | 35 |

This Table derives from Countries Worked.
To become 5-Band Table—see p.84.

G3NOF (Yeovil) says that the W's are often very strong around 1700 GMT, mostly from the 4th and 5th districts. Apart from these areas, he worked VP6PV and PZ1BN (both AM). G3NWT raised ZD6RM and ZS6XP.

G2FUU (Waltham Abbey) found much the same, including CX2DT and YV3BW worked. But the best list of stuff comes from an SWL . . . Ian Stewart (New Barnet) offers the following, and the times should help you: CR6CA (1155), CR6BY (1635), CX2CO (1725), HC4CD (1645), KG4AO (1735), KP4BCA (1645), KZ5AQ (1722), VP6PV (1648), XE1CT (1735), ZC4SS (1345), ZD6HK (1015), W's (1600-1800) and ZS's (0930 and 1630). All these were on AM; VQ2AT was heard on SSB at 1400.

Fifteen Metres

For those who would just as soon have a good ragchew with some W's as chase the rare DX through thick and thin (mostly thick!) there is no doubt that 21 mc is the best band. The W's reach fantastic strengths during the afternoons and early evenings; sometimes the West Coast is there in force. SSB on 21 mc has increased enormously, and the strengths are usually higher than on 14 mc.

G3NWT (Sandiacre) remarks that VS4RS has had a fabulous signal at times and has been working G's "by the shoal." G3NWT raised him, as well as CR6BX, 5H3PBD, ZD6RM and 6HK, VQ4GT, 5N2JKO and a bunch of ZS's; but he has had "a sea of troubles" with the rig, in addition to gale damage to his Quad. Finally, he mentions that ZS9G and ZS4PB/9 have both been active on the band.

G2FUU sends a long list of AM QSO's, from which we select EP2BK and 2AR, 5H3PBD, 5N2FEL, and 2DMS, HI8JMS, TN8AD, YN6HH, HK3LX and 3AAU, OX3KM, YS1JM, VP2LS, HC2BC, CO8RA, ZE, ZL, ZS and such. 5N2FEL was worked seven times in fourteen days.

G3NOF lists HC2RM, PJ3AD, PZ1BN, TT8AL, VP4LG and 9DL, XE1JP, ZL's, 5N2AMS, 2NFS, and 9G1CC—all AM; on

February 26 he found the band open to South America until midnight.

G2DC (Ringwood) thinks that really good Spring conditions are in the offing, and has worked W's and VE's as late as 2200, already. No new ones, but the best contacts (on CW) were CE3RG, CR4AD, VP3MC, 4LG, 8GQ, 9BO, VS1FE, VS9OC (Masireh Is.), VS9MB, VU2XN, 5H3HD and 3HZ, 6W8BQ, VK2-7, ZL1-4, W1-Ø and VE1-8.

G3LPS (Blackburn), also on CW, raised 6W8DF, VS9AAC and 9MB, 5N2LKZ, 2RSB and 2JKO, 5H3HZ, V P 8 G Q, VQ8BM, KZ5TD and VQ4's. G3JOC (Norwich) worked both CW and AM on 15 metres; the former brought him HK1QQ, JZ2CMD, 8AMF and ØSU, MP4BBE, PY2BQL and VS9AAC. The AM list includes several JA's, HK1ZU, KR6MF, MP4's, PZ1BE, SV1AT, UL7AW, V S 1 K F, V S 4 R S, VS9ARC, VU2BK, ZE's, ZL's, ZS's, 5H3PBD, 5N2FEL and 2JKO, 9M2AD and 9U5PD. His operating times for netting this lot were 0730-0830, and 1330-1415 GMT.

Twenty Metres

It still seems that most AM work is on Fifteen; much of the phone DX reported on Twenty is on SSB, and there's no shortage of it. Starting with that mode, then, we have MP4BBW's list, from which we select FK8AC, OA4DI

and 4EA, CX2AX, HC1FG, K X 6 A E, K 3 C J M / K G 6, WG6AKU, VQ1DR, 9M2CR, 9 Q 5 A F, H V 1 C N, DU1GF, VP2DA, XW8AS, K6CQV/KS6, VK3AHJ/9, KC4USR, TU2AK, HS1W, VK9BM, HH2P, AP2AD, CR9AH, OA4J, VP1WS, VP2GAC, and ZS6PC/ZS8. Ian comments: "No early morning operations this month; in other words, *all* of the above DX is possible from Europe during the day." (One would like to think that it was! Surely latitude makes *some* difference?)

G3PEK (Stockport) raised ZL2UW, who was on SSB, by calling him on CW with 10 watts; this cheered him up somewhat . . . G3NOF, on AM, collected EA8DM, UA2KAA, ZE, ZS and 5T5AD. SSB fetched in CR7CI, CX2CO, HH2P, VE4XO, VP1WS and 2GAC, XW8AS, YV5BC, ZE, ZS, 5H3GC and 9G1CY.

GM3JDR (Sutherland) has just completed one year's operation on SSB, to the tune of 175 countries in 38 Zones (19 and 23 missing). This month's bag included CN8's, CR7, EP2AT, HH2P, HS1X, KL7, KR6, LAILG/P, MP4T A O, PJ2AA, PZ1BJ, SM5ZS/ZC6, TU2AK, VK, VP1WS, VP2AB, VU2NR, XW8AS, ZE, ZS, ZS6PC/ZS8, 5H3HH, 9M2FX and 2GA. He has just built a new receiver—hitherto all the good work has been on a "barely-modified" HRO.

Back to CW, with a list from G3LPS: KH6BLX, 6W8DD,



"... tell him he's solid copy . . ."

EL4YL, VP8GQ, K2BBY/KL7, 6W8DF, 5R8AG, HK7BE, VP6RG and 7NQ, ZD9AD, VK6RU, VR2EA, 5H3HZ and 5N2JKO. ZD9AD, who popped up on 14090 kc, said he was "part of the expedition to Tristan da Cunha."

G2DC, also swinging the key, collected CO3NR, JA's, VP3MC, VP5MJ, VP6RJ, VP8GQ, VR2EA, VU2MI, all districts W, VE, VK and ZL, UM8, UAØ and 5H3GC.

Forty Metres

We will skip all the usual remarks about the state of the band, QRM-wise . . . everyone knows what it's like by now. Suffice it to say that some marvelous DX is around at the most unexpected times.

On CW, G3LPS contacted YV5BLA, KP4DJ, VP9BO, PY7TJ, VP8A1 and 8GQ, 5N2LKZ, VK's, ZL's, ZB1 and ZC4. G3PEK wasn't able to work them because of QRP, but he was amazed at the South Americans he heard at 0300 one Sunday morning—CX6CB, CE, LU, YV and innumerable PY's, with no W's coming through at all.

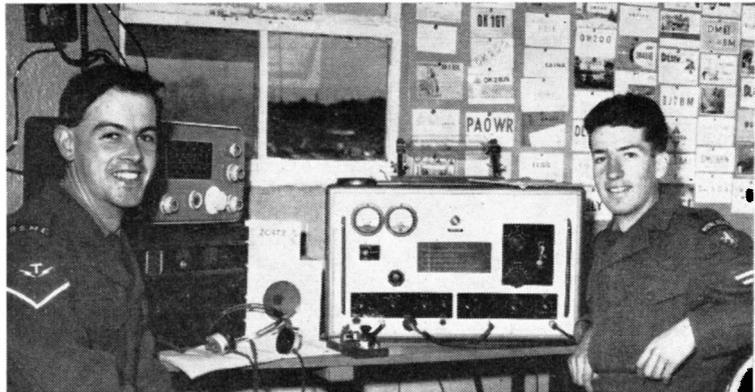
G2DC lost the top two feet of his ground-plane, and had to make it up at the bottom end; but he managed to raise VS4RS for a new one, and others included MP4BBE, VP8GQ, VE1-3, W's, VK's, ZL's, 5N2JKO and 2LKZ.

SWL Bethune (East Barnet) covered the band on SSB and logged VP1WS (0815), OA4NO (0610), ZL1AIX (0730), ZS1JA (2120), VE7YY (0540) and many VK's, with VK3HG at 0840 the strongest (S8). CW loggings were VE8RX, 5N2JKO and JA3AIS.

Eighty Metres

This is turning out to be an incredible band, especially on SSB, and much of the DX takes place relatively early in the evening. Many of those known to be working it regularly have not written in—they look on it as quite commonplace these days! But even they were surprised when VK3BM broke through one evening on 3795 kc SSB, around 2000 GMT.

A recent recruit to Eighty SSB was MP4BBW, and although his



ZC4TX is the club station of the boys at Episkopi, Cyprus, where they run a Minimitter on 10-15-20-40 metres, with a variety of dipoles. About 130 countries have been worked, mainly on CW, since the Club was established in June, 1961. On the left is ZC4TX, and his backer-up is GM30XK.

aerial consisted of the two-metre beam with the bottom end of the coax shorted, he worked G's, F's, DL, UB5, LA, SM, PA, GI, OZ and the like—to say nothing of VK3BM, 3AHO, 5A3TQ, EP2AT, 4X4's, OY7ML and many other nice ones. He had a frustrating morning calling, but not working VE1CN, YV5AGD and YV5AEC—all S6. When he gets a good aerial . . . !

G2DC holds up the CW end and comments that the chief difficulty is "finding a hole." However, he must have found one, as he worked all W districts except the 7th, VE1-3, VO and UM8KAA.

The SWL's are playing their part on this band, too. Those selected as being of special interest are as follows: Graham Knight (Aberdeen) heard a four-continent QSO (0740-0810) between XE1CV, VE3BWY, ZL's and G3DO, and one evening there was another good multi-way with SVØWT, CN8FU, VE3BQL/SU, 3V8CA and G's. All this, of course, on SSB. SWL Knight sends a terrific list of VE's heard (the best was VE7ZM, logged at 0820), to say nothing of W's and ZL's. Other outstanding DX for Eighty SSB was HC1AG1, HK4EB, KP4AWH, TG9AD, VP9DL, PZ1AX and UL7JA.

Richard Limebear (London, N.21) logged ZK1BS, KZ5LC, OX3AI, VE7XM and VP1WS; and David Hayes (London, N.3) collected MP4BBW, ZL4OD, ZL1AIX, 5H3GC, EP2AT and a

lot of the more usual stuff (all this on a 15-foot wire and an RME-70 "not in good shape").

Top Band DX — Wonderful!

Extreme compression is the order of the day here, since the Top-Band mail is equal in volume to that for all the other bands together! The wonderful DX conditions and the CQ Worldwide Contest are responsible for this.

First, the Contest (February 24-25). Conditions were excellent and some high scores were put up, but, as already mentioned, there was some dreadful clottedy in the early morning of the 25th, when the W's were coming in well, and many G stations just turned it in. Highest score heard of comes from K8HBR (152 QSO's, score 12,792). VE2AYY made the same number of contacts and scored 11,760.

G3CHN (Kingsbridge) made about 6800 points, working W, VE, VO, EL4A, UB5WF, HB9T and ZC4PB. G3OLN worked eight countries and scored 3280; G3IGW worked fourteen countries but doesn't mention a figure. GM3PBA heard sixteen countries. G3PDM (Durham) worked six countries for a score of 1100.

G5JU (Birmingham) reported that "absolute bedlam" prevented him from making a single W contact; despite this, he knocked up 140 QSO's and scored 4188. G3PU (Weymouth) heard VO1FB, WØVEH / VP9, HR3HH and FP8BX, but couldn't work a single W (same reason!) (over)

VO1FB says he did very well, starting at midnight with a VE, then raising GW3JI (0055), G6BQ and on to FP8BX, W0VEH/VP9, EI9J and G's, GD's, GI's, GM's with W's and VE's filling the gaps in between. But his biggest surprise was the emergence of EP2BK at 2200 on February 24, followed by UB5WF. Next day a violent blizzard and 100 m.p.h. winds removed his mast! (He will operate from FP8BD again in September, then back to G-land and G3LMD.)

So much for the Contest. Other DX results on 160m. are equally good, with, first, the news that SWL Richard Limebear (London, N.21) heard ZL3RB working HC1AGI at 0720 on February 28. And G3PPU (Basingstoke) reports that on March 10 he heard HB9T call CQ and then reply to ZL3RB, to whom he gave a 229 report. ZL3RB is, of course, well known as a Top Band DX'er from his record-breaking QSO's with G6GM and G6CJ in earlier 160-metre DX seasons.

W1BB's bulletins show that many new stations have come up on the band, such as VP2VL, SV0WZ, EP2BK, FP8BX, VO1's, VP9's, OX3CB, VE3BQL/SU, VP8GQ and HC1AGI. Stew adds that ZL1AH is now known to be very interested. From his news, also, it appears that February 25 was the best opening of the season. From our own chasers come the following snippets . . .

GM3PBA: Identified XE2A calling W0NWX, during Contest . . . **G3IGW:** Between February 10 and 25 worked ZC4PB, VE3BQL/SU, VE1ZZ, VO1FB and 1DX, EP2BK, FP8BX, UB5WF, VE1JX, W1FRR and 1PPN . . . **G3OQT:** Worked FP8BX, VO1FB, UB5WF, EP2BK, VE1JX, W1BB and 1PPN . . . Heard, among others, HR3HH, W0VEH/VP9, VP8GQ and a massive list of W's . . . **G3PEK:** Worked VE1ZZ, UB5WF, W1PPN. Heard EL4A.

G3ORD: Worked OX3CB (February 18, 0340) . . . **G3OIT:** Worked VE1ZZ, W1PPN and 2FYT, CN8PZ, and heard HC1AGI, UB5WF, HR3HH and VP8GQ . . . **G3FPQ:** Worked

EP2BK and EL4A on CW, and had SSB to AM contacts with VE3BQL/SU and W1PPN . . . **G3PU:** Worked W1BB, 1PPN, 2EQS, 2FYT, 2GGL, 2IU, 2UWD, 8GIY, K8HBR/8, W8NSF, 8WQV, VE2AYY, VE3ABG—all March 4.

G5JU: Worked VE1ZZ, FP8BX, VO1FB and VE1JX . . . **G3ORH:** Worked UB5WF and ZC4PB (February 25, 0300) . . . **SWL Limebear:** Logged ZL3RB, HC1AGI, VE3BQL/SU, UB5WF, UO5AA and numerous W/VE stations.

Top Band — Normal Usage

After all that DX, the normal goings-on seem a bit tame! However, a few points are worth comment. G3PDH is 2nd R/O in the M.V. *British Sportsman*, and gets about a bit. From Oslo he heard G3PDM, 3OIT, 3KVG, 3DHE, 3PKC, 3IGW, 3KP, GW3MOP, G16TK and UA3AWD; off Gibraltar he logged EP2BK (2335 on February 24); north of Algiers he heard G5LP calling CQ at 1550 (note the time) as well as several OK's calling and working G's. He promises a report from the Persian Gulf in due course.

GM3KLA (Haroldswick) is right at the northern end of the Shetlands and is very good DX for most G's. From London he is almost exactly the same distance as Prague (650 miles)! He is on several nights a week, 2230 onwards.

Expeditions: The Simon Langton Boys' School, Canterbury, will be *hiking* with a portable in Caernarvonshire over Easter, the gear being split up between the party and including 250 feet of wire. Look for them signing GW3OSL/A, April 12-17, 2000-2200 GMT. They would like a few QSO's "in return for humping the gear over some of the roughest terrain in the U.K."

G3LIG (Canterbury) and G3FUN (Faversham) will be operating from Golspie (Sutherland) from April 24 until May 1. All bands, CW, but Top Band every night at 2000-2300.

Other news in brief: G6QN of short aerial fame (score 98/98) is starting again, "just for fun" . . .

GM3NHQ says that five, including himself, are active on 160m. from Clackmannan . . . G3NNF has worked 31 counties on SSB and is setting himself the goal of an SSB WABC.

G3OXI heard OK1ADX calling a DM, but didn't hear whether he raised him (a G sat on the frequency!) G3OXI's log shows 600 QSO's on Top Band, excluding contests.

The Overseas Mail

VK3SR is *ex-G6KP* (of London, S.E., and a pre-war operator of very long standing). He should be on the air by now and hopes to meet old U.K. friends. VK6AJ (Perth) finds conditions improving there—he worked his first W's for many months, and they said he was their first VK for many months, too. He remarks that at certain times of the year the 14 mc band is choked with W's, and it's morning with them, most of them getting ready to rush off to work. They all want a contact, but there are always some who prattle on about weather, family, ailments, ambitions and the lot . . . so VK6AJ would like to see a semi-official Q signal meaning "I want to give rubber-stamp QSO's for the time being." He thinks it is selfish to ragchew when there are

TOP BAND LADDER

From January 1, 1962

(G3O-- and G3P-- stations only)

| Station | Counties | Countries |
|---------|----------|-----------|
| G3PDM | 53 | 6 |
| G3PGN | 52 | 10 |
| G3PLQ | 50 | 7 |
| GM3PBA | 49 | 8 |
| G3OLN | 47 | 8 |
| G3PEK | 47 | 8 |
| G3PPP | 47 | 5 |
| G3OXI | 45 | 6 |
| G3ORH | 44 | 10 |
| G3OQT | 39 | 14 |
| G3PRM | 37 | 7 |
| GW3PHH | 32 | 7 |
| G3PPU | 31 | 6 |
| G3PHO | 30 | 8 |
| G3PJD | 18 | 3 |
| G3OHL | 15 | 2 |

New Claims for this Table may be made at any time. Confirmations not required.

obviously many others waiting on the frequency; but on the only occasion when he *was* rude, the other station apologised so nicely that he "felt a perfect crumb" and will never do it again! How about "QKS" (for "keep short") and its companion "QKO" (meaning "please keep off"—for unwanted breakers)?

5A5TY (R.A.F. Idris) has been operating from Tripoli for a month or so, and hopes to be on Top Band with AM and SSB one day. On all other bands he will be mainly SSB. He says that 5A5TR (*ex*-YA1IW) has returned to the States, but may show up from HK-land. No QSL cards yet at 5A5TY, but as soon as they arrive he will get busy.

VE3BWY (Ham Whyte of Toronto) comments that manners seem to be breaking down on the bands, as tempers wax hotter. Comments of "shut up," "lid," "nut" and so on appear when there is a pile-up, and we are approaching jungle warfare! But Ham, with his second op. Bob, has been on 3795 kc SSB working Europe, with some fine QSO's, including one with G5ZT/M and another with F7BD/M, both in motion. VE3BWY now has a "summer location" whence he will be signing VE3EWY later in the year.

Top People

The current DXCC list shows that KV4AA is now the Top Person, with 318 countries worked and confirmed! Bracketed second, with 317, are W3JNN, 2AGW, 8JIN, 4DQH, 3GHD, 8BRA, 2HUQ and PY2CK. The latter has the same score on Phone Only, which puts him at the top of that list. Highest-scoring G's in the list (Phone and CW) are G4CP (310) and G2PL (309). Other high scorers outside the U.S.A. are CE3AG (312), LU6DJX (310), 4X4DK (309), CX2CO (309) and ZL1HY (308). Anyone below 308 does not even qualify for the Roll of Honour these days!

Population

From the latest *Call Book* (Winter 1961/62) we gather that the FCC have issued 11,245 new U.S. licences since the autumn

edition was published; the corresponding increase in the rest of the world amounts to 2,371. And the present amateur population of the U.S.A. is 237,000, with "over 100,000" spread over the remainder of the Globe. Here is a possible explanation for the congestion on certain bands, at certain times . . . !

Our Heading Photograph (p.78)

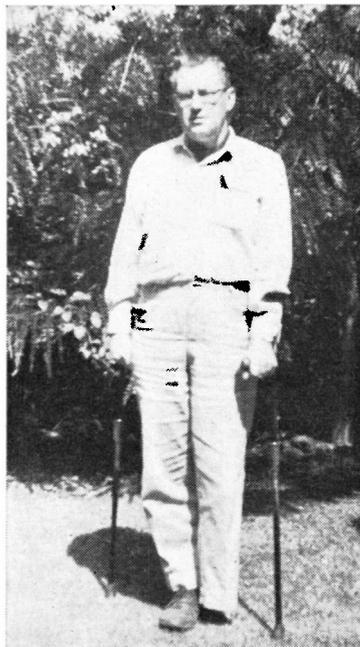
Since July 1961, when he was licensed, G3PBO (R. F. Collins, 15 Rochdale Road, London, E.17) has had about 700 QSO's, on all bands 10-160m., CW and AM phone. The Tx is a 100w. job, consisting of a Gelo VFO driving a TT21 PA, modulated by a pair of KT88's. For Top Band the transmitter is a separate 807-PA outfit, with its own modulator and built-in power supplies. The station Rx is an HRO with miniaturised front-end, and B/S coil packs. Aerials include ZL Special, a 10m. dipole, and a 135 ft. wire fed through an ATU. Much constructional work is in hand and the station is well equipped with test gear, tools and bench facilities.

Miscellany

G6TC (Wolverhampton) is back with us after a long absence, and now operates CW and AM (he was previously a CW man entirely). He is even on Top Band again after 13 years' absence; he thinks that conditions are similar to those of 1950-51, and that we probably have two years to go before we reach the lowest point of the cycle.

G3LCK (Canterbury) writes that he helps to run G3OSL at Simon Langton Boys' School in the same city, whence they have plenty of fun, mostly on 14 mc and infrequently on 7 and 3.5 mc.

GM3IAA (Inverness) sends a long letter dealing with both his present and past activities. He has been going through his log for VS2AA (1946)—unfortunately, his VS1AA and VS2AF logs were lost during the war—and he agrees entirely with last month's Editorial on the subject of *Records*. Some of the old calls worked make one's mouth water. Nowadays he wonders why it is so difficult for GM's



When Mal Geddes, ZE3JO, Box 2462, Salisbury, Southern Rhodesia, sent us this, his comment was simply: "It proves that I can never again be accused of keying with my left foot (OLF)." He will have the sincere sympathy of many in the U.K., having been well known as G2SO in the early post-war period before emigrating to Rhodesia.

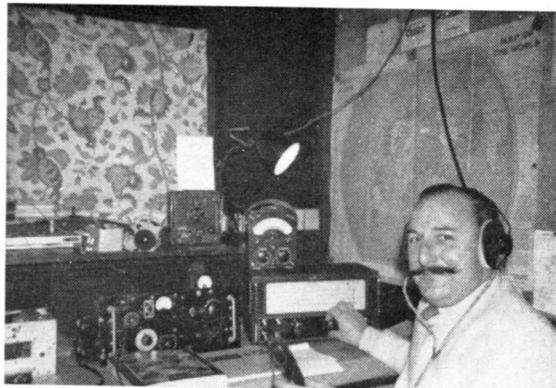
to get across to W/VE on Top Band. After several months of fruitless attempts, he finally made it with W1BB and W1PPN in March.

Any doubts about HB4FD are settled by GM3NFR (Glasgow), who forwards a card from him and explains that the HB4 call is used from military locations by amateurs doing their compulsory military service . . . See any issue *Call Book*, over HB listing.

G3PLQ (Salisbury) has *three* pirates using his call. Two of them are on Top Band and Eighty, and the third on 14 and 21 mc. SWL friends in Salisbury have confirmed this activity—any help would be welcomed.

More DX Shorts

G2DC says that Danny Weil (FO8AN) has been running special skeds for European contacts on 14195 kc SSB (1600 GMT), but with very little success . . . FW8AJ and BY1PK have both been active, 14 mc CW, 0930 and 1400 GMT



G3OSH is operated by Arthur Haines, at The Laurels, Roping Path, Yeovil, Somerset. The SSB side of the station (left), consists of a Drake 2B receiver and K.W. Viceroy Mk.III, auxiliary items including an F/S meter, ATU, crystal calibrator and a home-built Top Band Tx. On the right (featured with G3OSH himself) are a home-built NBFM transmitter for 20-40-80 metres and an Eddy-stone 840A receiver. Aerials include a Minibeam, various doublets and a long-wire for the LF bands. G3OSH first became interested in "wireless" (as we knew it then) in 1922, obtained an artificial aerial licence in 1929, and the present call sign in 1960. He says he is "Essentially a communicator, ready to work all and sundry on any band, and is naive enough to enjoy QSL'ing."

MP4BBW thinks that some genuine CR10 activity is really coming, this time with a Portuguese Naval radio man; frequencies 14048 and 21087 kc with a DX-40U . . . Also look for ZS6PC/ZS9 at Easter.

VK3AHO has been assigned the call FW8AS for Wallis Island, and the dates quoted are March 25 for "about two weeks"—so this may not be too late . . . ZD9AD has been worked or heard by several W's, 14035 and 14085 kc CW around 1900 . . .

The I.R.T.S. intend to repeat their DX-pedition to the Isle of Aran, dates for this year being June 9-11. The call, as before, will be EIØAB, so the WPX-hunters should be in full cry. Operation, all bands from Eighty to Ten, and also Two Metres. The transmitters comprise a DX-100U, a Globe Scout and a Viceroy; receivers "a collection of modified HRO's"; aerials, Mosley TA-33 Jr and a couple of dipoles. Ten EI operators and a GI, together with SWL's and an official photographer, will complete the party.

EI6X tells us that the cost of the trip is only £3 per head, including the boat trip to Inishmore (15 miles each way) and all food and accommodation on the island, which seems wonderful value—but it will not be all holiday for the gang. Present intention is to start up at 1600 on June 9 and to QRT at 1200 on June 11: QSL via EI6X.

Late Flashes

G3GGS (Chorley) forwards news from VP8GQ, who still has not managed to work a G station on Top Band, although he identified G6GM and GD3UB last month. He puts in a very consistent signal on 7, 14 and 21 mc, and worked Europeans on 3.5 mc during February, but rarely heard the U.K. G3GGS also says that ZD9AD is with the Royal Society expedition to Tristan da Cunha; he was worked on 14082 kc around 1930, fading out after about 40 minutes. They will have left the island before you read this.

Activity from San Marino was promised by IISVZ/M1 and IIPGM/M1, during the SSB Contest (March 24-25) . . . The Millennium SP Contest will run from 2000 GMT, April 7, to the same time on April 8 (CW) and a week later (Phone). Normal rules, serial numbers, call "CQ Mil"; two points for all QSO's with SP stations, one for others; usual multiplier (countries worked) except that the SP districts, 1-9, will count as separate countries. Logs to PZK, Box 320, Warsaw 10, not later than July 1.

The Tables

As the originally proposed 14-21 mc Marathon Table attracted hardly any entries, and it was decided not to pursue it, we are left with no ladder covering the HF bands at all. So it is now

possible to do as many correspondents have requested—reinstate a **Five-Band Table**. This will be a replacement for the present LF Bands Table, to which we will simply add two more bands—14 and 21 mc. Note, therefore, that the five bands concerned will be 1.8 mc to 21 mc. The 28 mc band is not a prolific source of DX just at present, and many of the newcomers have never had a chance to use it properly, so we feel that it should be left out of the picture for the time being.

Entries next month, please, for a Five-Band Table as described above, with six columns: countries worked (all-time) on each band, and in the last column *total countries worked*—not the sum of the other columns. We will do the sorting out and give a different band precedence each month, so that you always have the chance of heading the list by making a good score on one band.

And so to the sign-off, with thanks and acknowledgments to all our correspondents and to *DX Magazine* (W4KVX), the *DX-er* (NCDXC), the *Western Radio Amateur*, the *WGDXC* bulletin, and numerous other sources of small snippets. Don't forget your entries for the new Five-Band Table, and let us have everything by the deadline, **first post on Friday, April 13**. Address it all, as usual, to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. 73, BCNU.

RTTY Topics

T/P NEWS BROADCAST

INAUGURATED—

INTERESTING BOOK REVIEW—

DESCRIBING THE BIAS METER,

FOR BETTER PRINTING—

ON4's ON 80m. RTTY

W. M. BRENNAN (G3CQE)

RTTY seems to be gaining more adherents daily, and this is particularly noticeable on the usual 80-metre frequency on Sunday mornings, when at times it seems there is not a clear channel anywhere near the normal spot that is not already occupied by two or more RTTY stations in QSO. Recently, one operator was heard to complain (on CW) that he could not "Find anywhere to park his mark." There were too many other QSO's going on on RTTY. This is surely a sign of the times and perhaps the opening of the case for narrower shift techniques!

Belgium has just joined in the 80m. fray, too, as on March 11 both ON4HW and ON4UN made their appearance on the band for the first time, at the same time and at a peak operating time for G stations. The result was some fine QSO's and a nice orderly queue of stations waiting to exchange a few *bauds* with the newcomers.

Both ON4 stations are using Creed Model 7B machines, and the U.S.A. "Twin City" TU. ON4UN has a phasing-type SSB Tx with AFSK keying, running 75 watts input; the aerial is half-wave for 80m. ON4HW's Tx runs an input of 150 watts and the aerial is a $\frac{1}{4}$ -wave on 80m.; on 15 metres he has collected ZS1FD and K3GIF and is therefore halfway towards WAC already!

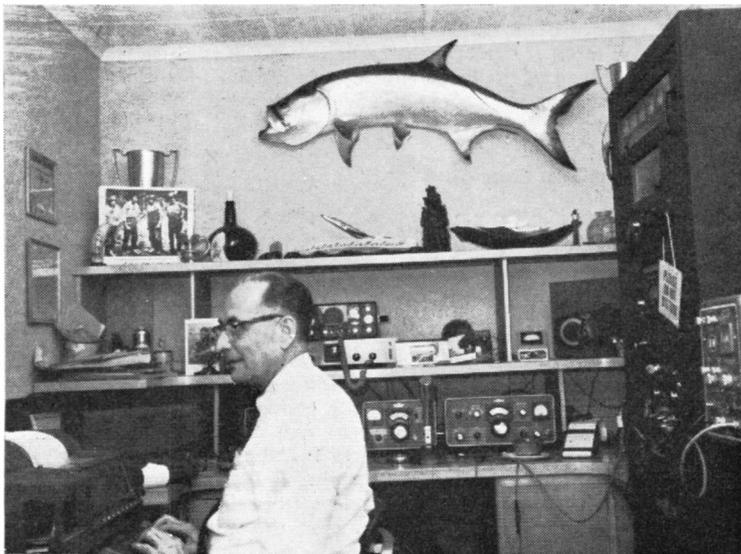
On the same day that Belgium appeared on RTTY, another European country made RTTY history. This time it was Holland. PAØAA, the Hq. station of V.E.R.O.N., broadcast a news bulletin for amateurs on RTTY. This station has for some time been active on amateur T/P, and V.E.R.O.N.—which is the Dutch National Association—have now extended their normal news bulletin service (usually transmitted on CW in Dutch and English) to include a special bulletin in English for RTTY operators. These broad-

casts will take place every Sunday at 1330 GMT on 3625 kc, using the 50-baud speed. There is also a transmission on 145.14 mc, and plans are in hand to extend the RTTY bulletin to 20 metres, where the 45.5-baud speed will be used. Complete tape equipment has been obtained for PAØAA by the Dutch Army Authorities. The first bulletin came over without a single error, a fine start to a very welcome service to RTTY amateurs. PAØYZ is the radio T/P operator at PAØAA, and reports on the reception of these transmissions on RTTY are welcomed by him; he would also like to receive news items of RTTY interest for inclusion in the bulletin; the QTH is P. Van Weerlee, PAØYZ, Diefsteeg 17, Leiden, Holland. All concerned in this Dutch enterprise are to be congratulated.

New RTTY Handbook

The RTTY handbook by W2NSD and W2JTP was published in 1957 and was, until quite recently, the only such publication in the amateur field. Unfortunately, it has been out of print for the last two years or so and there were few copies available in Europe. Those who have tried to obtain a copy of this book and failed will be pleased to hear that a new version of it has just been published as one of the well-known CQ Technical Series and appropriately entitled *The New RTTY Handbook*. The subject matter has been completely revised and brought right up to date, and so such things as semiconductors have found their way into many of the circuits.

The book runs to some 191 pages, eight chapters, commencing with a brief history of amateur RTTY development in the U.S.A. From this it is interesting to note that RTTY activity there commenced in late 1946, nearly 16 years ago. Chapter II deals with



Not only is WØNFA (Chester Franz, 1 Finlay Road, Kirkwood 22, Missouri), a keen fisherman, but he was also the winner of the 1961 RTTY Sweepstakes Contest. His printer is a Teletype Model 28, and the TU is described as an Electrocomm FSC-250, evidently a commercial unit marketed in the U.S. WØNFA also has some Collins equipment.

basic principles and machines, some thirty pages being devoted to wiring diagrams and pictures of all the various types of Teletype machines. Although of general interest, these pages are of little practical use to owners of Creed machines. Owners of certain Lorenz models will, however, find that their machines have quite a lot in common with some of those described.

The rest of the book is of considerable value to anyone interested in RTTY. A full chapter is devoted to receiving equipment and contains complete details of various types of TU's (RTTY converters), ranging from IF to transistorised audio types; there are also details of the system known as "Autostart," whereby an RTTY station can be set up for the unattended reception of messages from other stations at pre-arranged times throughout the day. This system is normally used on VHF. Another chapter discusses transmitting equipment such as valve and transistorised types of Audio Freq. Shift-Keying oscillators, FSK keyers, and a heterodyne FSK exciter. Other sections deal with the setting up of an RTTY station, and operating it.

Perhaps the most interesting part of all for those already on RTTY is that which describes the various accessories for amateur T/P operating. These include such items as CR tuning indicators, AFC circuits (one using only semiconductors), bandpass input filters, bandpass channel filters, a very ingenious notch filter for rejecting interfering heterodynes that fall into the TU passband, and a transistorised tuning fork AF standard for producing the two usual audio freqs. of 2125 and 2975 c/s from a 425-cycle tuning fork. A section containing references to various publications of interest to RTTY operators completes this welcome addition to the field of Amateur Radio literature.

At 32s. post free, the price is a little high, but this is the sort of book that is constantly referred to, a fact that is often really brought to light when it is out on loan to one of the locals! It can be obtained through the Publications Dept., Short Wave Magazine, Ltd., from stock.

Useful Piece of Test Gear

A fault which is often apparent on amateur RTTY transmissions is "bias distortion." This is the term given to a signal in which the duration of the mark pulse is lengthened and the space pulse shortened, or *vice versa*. A signal in which the mark pulse is longer than normal and the space correspondingly shorter, is said to possess a "marking bias"; the opposite case is a "spacing bias." This form of distortion is usually due to incorrectly adjusted T/P sending contacts or to a badly-set polar relay which may be part of the keying circuit between the T/P contacts and the Tx. Bias can also be introduced at the receiving end, too, again by incorrectly adjusted polar relays (this time in the TU) or even by faulty operation of the T/P electromagnet. At best, the effect of bias is to reduce the overall distortion margin of the T/P-to-T/P link—at worst, it will cause misprinting.

It is possible for a spacing bias produced (for example) by the T/P sending contacts to be cancelled-

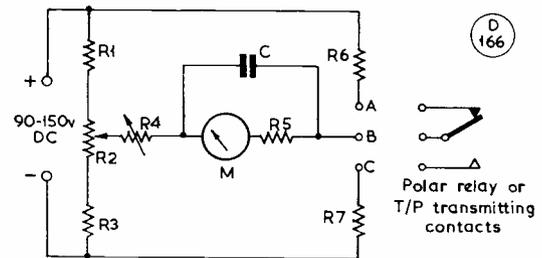


Fig. 1. The bias meter described by G3CQE is suitable for checking "printer or polar relay contacts — see text. Values are: R1, R2, R3, R5, 10K; R4, 5K; R6, R7, 15K. The size for C and scaling of the meter are discussed in the article.

out by an equal, and opposite bias introduced by a relay in the T/P receiving circuit. Such correction is, of course, fortuitous, and will only hold good for that particular circuit. This fact is mentioned only to show that to adjust the transmitting contacts until good copy is obtained on local loop does not necessarily mean that the adjustment is correct.

Illustrated here at Fig. 1 is the circuit of a simple device that can be used to help in the adjustment of T/P or auto-Tx contacts or polar relays. It is usually referred to as a "Bias Meter." Briefly, the circuit is a modified Wheatstone bridge, the meter associated with it being a heavily damped centre-zero milliammeter. When the terminals A, B and C are connected to the mark, centre tongue and space contacts (respectively) of a T/P, and a series of characters sent on the keyboard, the meter deflection will be proportional to the mark/space ratio of the characters transmitted. For example, if the moving centre tongue is in contact with each of the fixed contacts for 50% of the time, the average voltage across the bridge, thus giving a balance of the bridge and a reading of zero on the meter. This point on the meter scale could therefore be labelled 50% mark or 50% space, or even 1:1 mark/space ratio. If, on the other hand, the tongue was permanently in contact with the space contact, the meter would read full-scale deflection in one direction, *i.e.*, 100% space or zero mark. On the other contact, of course, the meter deflection would be full scale in the opposite direction, 100% mark. The percentage mark and space of any RTTY character can be easily calculated and compared with the reading obtained on the meter. Any discrepancy indicates a bias, and adjustments can be made accordingly. Several different RTTY characters have the same mark/space ratio but, of course, a different mark/space sequence. Certain characters are, however, more suitable than others of the same mark/space ratio for purposes of these tests. This is because they have fewer transitions from space to mark and so give a smoother deflection on the meter. The letter "T" is one of these, and the complete sequence for this is five pulses, each 20 milliseecs of space followed by one 20 milliseecs of mark, and a further 30 milliseecs of mark (the stop pulse). The percentage of mark is, therefore:

$$\frac{50}{100 + 50} \times 100 (\%) = 33.3\% \text{ mark.}$$

Other suitable characters are: "O," 47% mark; "M," 60% mark; and "V," 77% mark. These are sufficient to give a good check but, as a matter of interest, the two old favourites of RTTY test sequences, R and Y, are 47% and 60% mark respectively.

Points to Watch

When using this method of checking bias, it is important that the character repetition be carried out at maximum transmitting speed, *i.e.*, no pauses between the characters. This is because during a rest period the T/P sends a mark signal, and this, added to the required character, will show up as a false mark bias on the meter. The easiest way to send a single character repetition at maximum signal speed is to lift the transmitting cam pawl abutment and, at the same time, press the required key on the keyboard. The pawl abutment normally trips the transmitting cam pawls at the end of the transmission of one character and, by temporarily disabling this action, the T/P will continue to send the character selected. Most RTTY amateurs are familiar with this trick and will therefore know that if, under these conditions, no key on the keyboard is depressed, the T/P will send the "letters" signal continuously.

In order to check a polar relay, its contacts must be connected in the same manner as were those of the T/P, and the relay operating coils connected to some suitable signal source of known mark/space ratio. A convenient source is a 50-cycle supply derived from a transformer; for example, a 6.3-volt heater winding is sufficient to operate a Carpenter 5C9 polar relay with its two 1685-ohm coils in parallel. The waveform applied will be approximately a sine wave, the mark/space ratio therefore 1:1, and so, for correct adjustment, the meter should indicate 50% mark.

The contacts of an auto-Tx are connected up in the same manner as those of the teleprinter. A series of punched tapes with the required characters on them is used to produce the required signals for the test. Since the auto-Tx normally transmits at maximum signal speed, there are no complications in this direction.

A word about the bias meter circuit: The indicating meter used by the writer was originally one of the 30-0-30 mA type often encountered in T/P line circuits. An investigation into the "innards" revealed a sizable shunt; on removing this, the basic movement of the meter was found to be 1.5-0-1.5 mA. However, any meter in the range 500-0-500 microamps, to, say, 5-0-5 mA should be suitable. The resistance values of the bridge network can always be altered in proportion. The important point is that the meter should be very heavily damped. The value of the condenser C is best found by experiment, since much depends upon the meter with which it is associated. If the capacity is too high, the meter deflection will be slow to reach its final value; if too low a value is

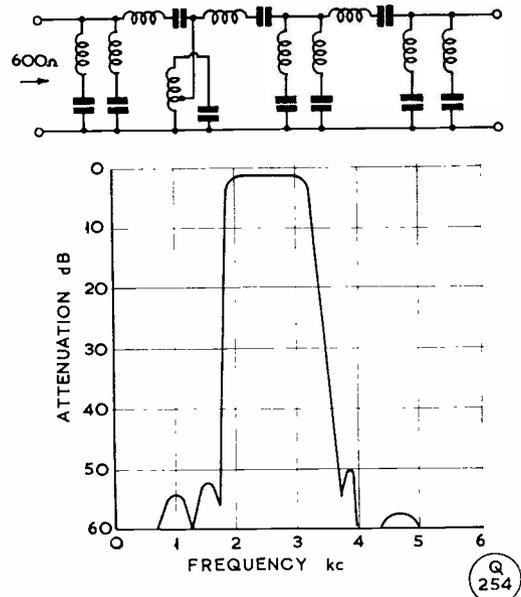


Fig. 2. In the February "RTTY Topics," on p. 649, mention was made of the A.T.M. Band-Pass Filter, type AP6682, available on the surplus market and very suitable for incorporation in TU's. The circuit and response curve of this filter are shown here.

used, the pointer on the meter will tend to "hunt." The capacity should be between 4 and 50 μ F, with a working voltage of 24 volts AC or more. The DC supply to the bridge can be derived from a 90-volt battery or from a small stabilised supply in the region of 105 to 150 volts. One of the miniature type of mains transformers can be used to build such a supply, and the 6.3v. winding can be wired-up to a polar relay base, so that relays can be plugged-in for test.

To set up the meter initially, the terminals A, B and C are strapped to complete the bridge and the potentiometer R2 set to give a *null* reading (mid-scale) on the meter. Then, with terminals A and B connected, R4 is adjusted to give full-scale deflection. Connecting B and C should give full-scale deflection in the opposite direction. If not, check the values of R6 and R7.

A bias meter will amply repay the amateur T/P operator for the time spent in constructing it. It is particularly handy to have around the shack when the printing starts to go wrong, since it can quickly eliminate items of equipment that are often suspected to be causing the trouble.

That is all till we meet again in the June issue—GL with the printing meanwhile.

RTTY operators and all interested in the subject are invited to write in for this feature, the next appearance of which is in the June, 1962 issue. Photographs of RTTY stations are also welcome, and those used are paid for on appearance.

Aerial Hints, Tips and Ideas

Based on the experience of

THE OLD TIMER

Part III

Dealing mainly with the technique of feeding aerials, such as doublets and Zepps, which require twin feeder lines. The last two articles in this series appeared in our December 1961 and February 1962 issues.—Editor.

THE simple ATU described in Part II of this series (Fig. 3 on p.645, February SHORT WAVE MAGAZINE) is particularly suited to the job of matching a transmitter to a single-ended aerial, whether specially cut to some length or just a "piece of wire." However, given such an ATU, one can also deal efficiently with the many types of aerial requiring the use of tuned feeders, and it is mostly with the problems of tuned feeders that it is proposed to deal this time.

Let's clear away some fundamental errors to start with. An untuned feeder (for instance, a coax line feeding a dipole) is supposed to match the aerial at one end, and the transmitter output at the other. Hence, it carries little or no standing-wave and does not require tuning or fiddling in any way. If it is a perfect match at both ends (72 ohms at the centre of a correctly-cut dipole *at the right height*, and 72-ohm output from the transmitter) there will be *no* standing-wave — no radiation, no loss of power: a happy state indeed. But this state of affairs can only be achieved with a given rig and a given aerial for one part of one band. And that's that. If the aerial is cut for (say) either the HF end or the LF end of Twenty, then there *will* be a mismatch at the other end. Hence the habit (if you work both SSB and CW) of cutting a dipole for about the centre of the band (say 14200 kc), in which case it will be pretty efficient at both ends.

But what of a *doublet*—the same piece of wire hung aloft, but fed with open-wire feeder? Well, if your feeder is of (say) 600-ohm line and exactly half a wavelength long (electrically) you will still be able to match it at the bottom end from a 72-ohm source. Although the feeder is not tuned, it is possible for it to be nearly a perfect match at each end in these circumstances. This is because a length of feeder energised at one end and connected to a radiator at the other will offer the same impedance at successive distances of half a wavelength. (Consider the voltage and current distribution and you will at once see why.)

Thus, if you feed a dipole, cut for any band, with

600-ohm line, provided that the line is a half-wavelength long or an exact multiple of half a wavelength, you can feed the bottom end at 72 ohms and get away with it. For any other length the impedance will be some figure between 72 ohms and quite a high value, but you can still match into it by using an ATU. The two sides of the feeder are connected to the points occupied by the aerial and earth in Fig. 3, p.645, February.

Feeder Length

Now, of course, one cannot lay down fixed rules for length of feeder alone, because every alteration of conditions at the aerial end will have its effect. Imagine you are feeding a length of wire cut for Twenty—say 33 ft. 6 in. If your feeder is either 33 ft. 6 in. or 67 ft. long, you will have low impedance (72 ohms) at the bottom end. But there's no reason why you should not use the same wire on Fifteen or Ten metres. On Ten, the simpler case, you will now have two dipoles in phase, and the feeder will be voltage-feeding them at their inner ends. Thus, the impedance at that point will be high—and so will the impedance at the bottom end, since the feeder will still be a definite number of half waves. Cut roughly

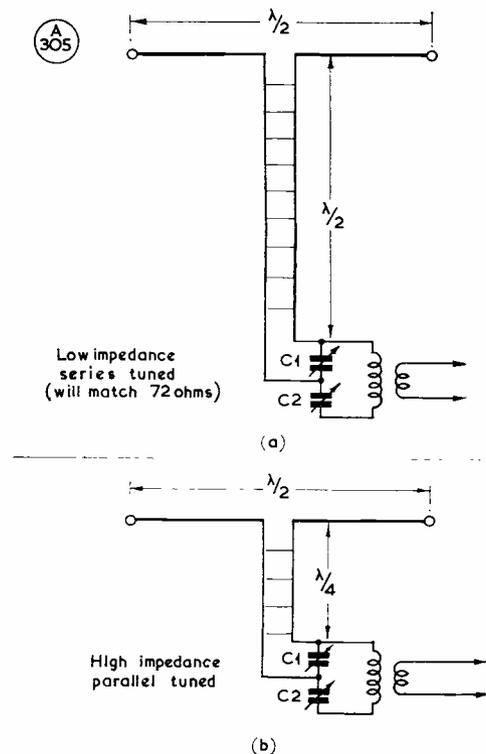


Fig. 1. Two extreme feeder conditions with a doublet are shown. In (a), the impedance at the bottom would probably match directly to 72 ohms; however, if the ATU is used, it should be series tuned, with C1 at minimum. In case (b), the impedance will be high, necessitating parallel tuning on C1 with C2 shorted out—Fig. 3, p. 645, February issue.

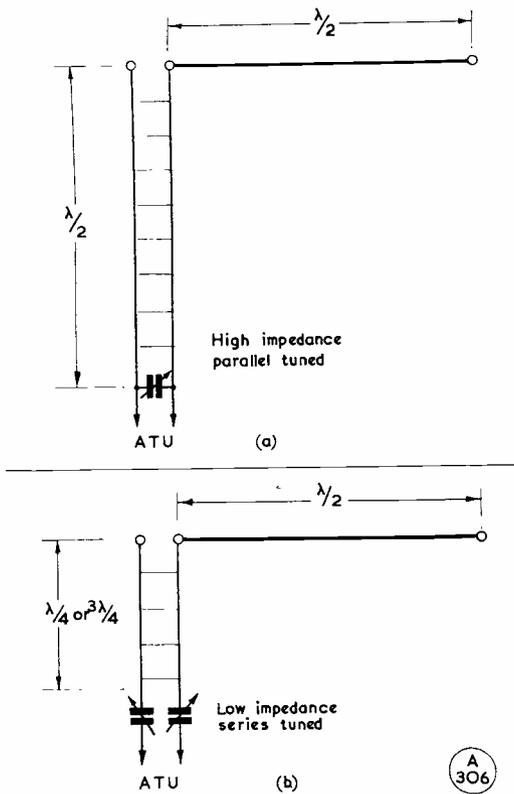


Fig. 2. Feeding the same length or wire as in Fig. 1, but Zepp-fashion, reverses the conditions. The example with the $\frac{1}{2}$ -wave feeder now requires parallel tuning, and the quarter-wave (or any odd number of quarter-waves) will give the low impedance which necessitates series tuning.

8 ft. off it, though (approximately a quarter-wave at Ten Metres) and you will have a *low* impedance down at the bottom. To find what the feeder will look like to the transmitter at the bottom end, all you want to know is the total length of feeder *plus* the length of one leg of the aerial. This was dealt with in a general way in Part I of this series (pp.517-519, December 1961 issue), and you will find there the necessary tables for planning a condition that will give you convenient feed impedances for more than one band.

With a doublet, so long as it is symmetrical about the centre, the *length of the top does not matter*—except for the choice of the direction in which you want maximum radiation. If you want an aerial for all bands from Eighty to Ten, perhaps you plan to put up a 136-ft. wire, centre fed, and then find that your garden is only 120 ft. long. Don't worry—put up 120 feet. The missing wire at the centre of the aerial merely becomes part of the feeder now, and apart from a small loss of efficiency on Eighty (which no-one's S-meter will record!) you are just as well off as if your garden had been the magic length.

The Zepp Configuration

This is one reason for preferring the doublet to other kinds of wires—when it is possible to instal one. If your shack is at one extreme end of the plot, rather than near the centre, you will probably think in terms of a Zepp. But in that case don't get any fancy ideas that the exact length won't matter! With a Zepp you can only compensate for incorrect length by making the feeders some arbitrary length which you will have to calculate, or find out by trial and error. If the top *is* correct for the frequencies that you want to use, then feeder length won't matter, and the feeders will show a reasonable balance. If the top length is too short, then part of the "live feeder" will have to act as part of the aerial, and the "dead feeder" will have to be that much shorter. If the top is too long, then part of it will be acting as feeder, and the "dead feeder" ought to be carried along parallel with it for that distance. In short, a doublet is not critical as to length, but a Zepp is. (Did someone mention a "double extended Zepp"? Well, look again, and you'll find that it's nothing but a doublet, anyway . . . the term "Zepp" implies an *end-fed* arrangement using open-wire feeder, and nothing else). Figs. 1 and 2 show the reversal of conditions that takes place as between a Doublet and a Zepp.

Consider what a Zepp really consists of (Fig. 3) and you will realise how it works. The one shown has feeders a quarter-wave long, implying an extra half-wave of aerial folded back on itself—but if it is of a different length, the tuned circuit from which it is fed automatically makes the necessary compensation. The example shown would, of course, be fed at *low* impedance.

[over

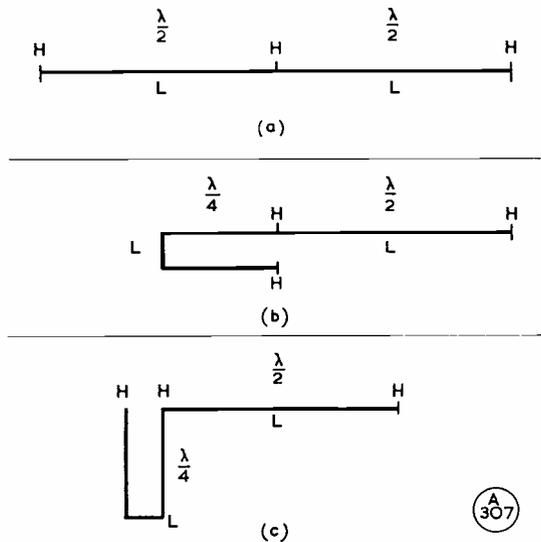


Fig. 3. Evolution of a "Zepp" aerial from a full wavelength of wire. The high- and low-impedance points are marked H and L. In practice, the feeders will not usually be an exact quarter-wave, but irregularities will be taken up by the tuned circuit to which they are connected.

Further tips about Zepps: Don't instal two thermo-ammeters in the feeders and spend sleepless nights trying to get the currents exactly equal. You never will—except, if you're very lucky, on one particular frequency. It doesn't matter all that much if there is a *slight* unbalance between them. After all, one of them does hitch on to the end of an aerial, while the other gropes hopelessly for the sky! So true balance is hardly possible and, even if attained at the bottom, is probably not there at the top.

Don't, if you can possibly avoid it, try to work a Zepp with feeders exactly a half-wave (or multiple thereof) in length. This gives the most awkward condition—very high impedance at the bottom end, necessitating parallel tuning, and as often as not you will find that the thing works just the same when you remove the "dead feeder" from the picture altogether, running as an end-fed long wire, a half wavelength longer than you meant it to be! This is what could give you a sleepless night!

Contriving a Vee-Beam

The transition from a doublet to a Vee-beam is very simple, and it may well happen that if your shack is at the apex of a plot which forms a fairly broad triangle, your best bet is to use two poles at the far end. In other words, put up that Zepp you thought you were fated to, anyway, but add a second wire, connecting it to the "dead feeder" and supporting it on another pole, and you have a Vee-beam, of sorts. If the legs are symmetrical, it is simply a particular form of doublet, as far as feed problems are concerned.

The true Vee, giving a high gain in two directions only, is a pretty long affair before the dB's begin to mount up—and the angle between the two wires must be correct. The theory of a Vee is that the main lobes radiated by each wire may be made to coincide in the direction down the centre of the thing. Thus, for two legs, each one wavelength long (radiating at 54° to the plane of the wire) the apex angle should be 108° , although in practice 90° seems even better in this case. If the legs are each two wavelengths long, the main lobe will be roughly 36° off the wire, and the apex angle must be 72° . And so on—the longer the legs, the more acute the angle and the higher the gain.

Now, it is obvious that you can't get the angle and the lengths exactly right for more than one band—but don't let that deter you. Even if the angle is wrong, your maximum radiation will still be down the line bisecting the angle of the Vee. There won't be so much of it, true, but this will also imply that there will be *more* radiation in certain other directions, which might even be a good thing, for few of us can afford to put up an aerial which is only going to be useful in one particular direction.

As an example of what can be worth while: If you are fortunate enough to have a garden about 135 ft. long and reasonably wide at the bottom end, but are disappointed because you can't get up a half-wave for Top Band, consider putting up two lengths of 135 (or 132) feet inclined to each other at

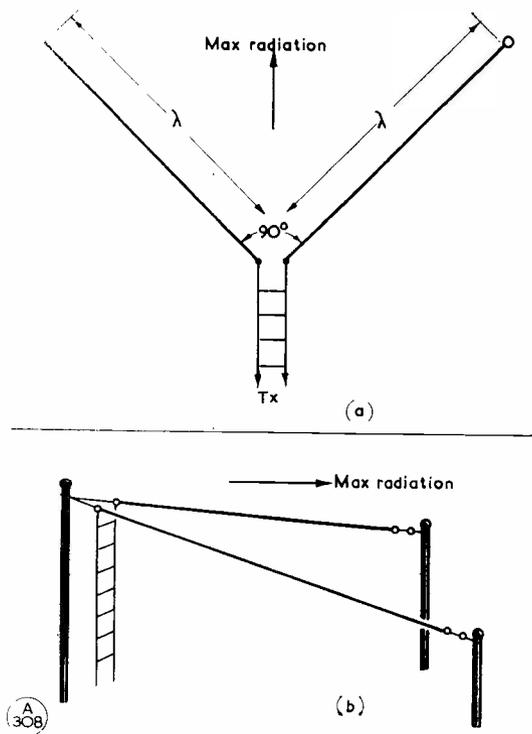


Fig. 4. The conventional Vee-beam, as shown at (a), is about the smallest effective example of this type. As the length of the legs is increased, so the optimum angle between them will narrow. The gain with legs one wavelength long is only slight, and this size of aerial may almost be regarded as a centre-fed long wire; however, maximum radiation will be in the direction shown instead of in the plane of either wire. The tilted Vee at (b) will give greater gain in the direction of the tilt and, of course, less in the opposite direction.

whatever angle the circumstances force on you. Feed them at the apex with 600-ohm line, and you will have a bent (in most cases *very* bent!) half-wave for One-Sixty . . . but you will also have an aerial which will assume true Vee characteristics and possibly go like a bomb on Forty. Twenty or Fifteen, according to the acuteness of the apex angle.

Splitting the Vee

Furthermore, you can tune the legs separately against earth or counterpoise to give different directional properties on different bands. Those who are left aghast at the thought of anyone having so much space may consider the whole thing divided by two! Two 67-ft. lengths at right-angles to each other make an extremely useful aerial; and so do even two 33-ft. lengths, assuming you don't want to work on Eighty or Top Band.

In short, if you feel you would like a doublet of some kind, but your shack is not well placed in the centre of the plot, give up the idea of running two halves in a straight line and experiment with two legs at whatever angle you can manage. The thing will still be symmetrical if you can keep the heights

more or less equal, and will present no tuning difficulties.

Even if the thought of three poles is considered a serious disadvantage, don't worry. I know of someone who does it with only *one!* The apex, in his case, is at about forty feet, held up by a pole on the roof of the house. The other ends are anchored to the fence on either side of his garden, at the far end, the actual length of "live" wire being such that the remote ends of the aerial are still some 20 feet high, despite anchorages which are only about six feet off the ground. A "tilted Vee" of this type will give increased radiation out in the direction of the tilt, at the expense, of course, of the radiation on the reciprocal.

If it seems to you that this discussion has made the assumption that you have a fair amount of space available, you are right. Loading coils and other methods of getting a quart into a pint pot have not yet been considered—these will follow in due course; but before we even get to that subject, let a hint be dropped that there are better ways of simulating a long wire than the use of loading coils . . . and it is some of these that will be dealt with in the next instalment.

NEW I.E.E. SECRETARY

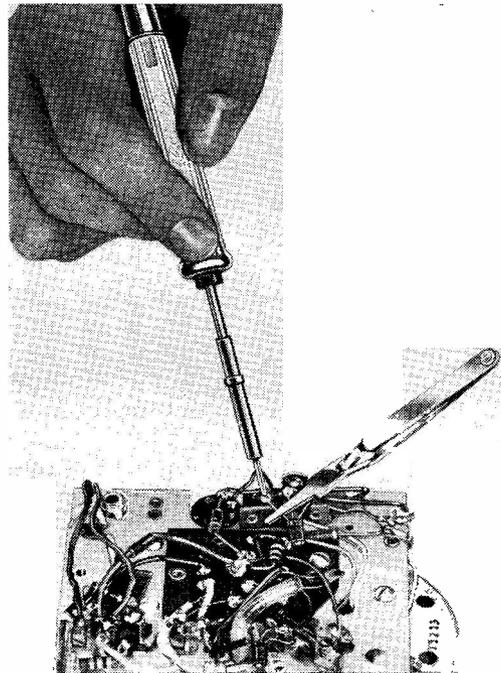
One of the most important and influential jobs in the world of electrical engineering is that of General Secretary of the Institution of Electrical Engineers—particularly as the I.E.E. also covers radio communication and electronics. The new General Secretary appointed is Dr. G. F. Gainsborough, B.Sc., Ph.D., M.I.E.E., at present an Asst. Secretary at the Ministry of Aviation, who is also a barrister of Gray's Inn. He will take over from the present secretary, Mr. W. K. Brasher, towards the end of the year.

INTERESTING AERIAL TUNING DEVICE

In modern high-speed aircraft it is essential to preserve the aerodynamic shape, without any bumps or excrescences, such as aeriels; it is also necessary that aircraft should be able to communicate by radio and, in the case of long-distance types (both civil and military), there is a requirement for transmission on the HF bands. The aerodynamic problem is overcome by the use of a notch let into the aircraft structure, the aerodynamic shape being preserved by the use of dielectric material. This notch is then tunable to the required frequency by means of an ATU. A new aerial tuning unit for this purpose, introduced by Marconi's Wireless Telegraph Co., Ltd., gives a tuning range of approximately 2-25 mc for HF notch aerial systems, with an SWR of not more than 1.3:1 within notch inductance limits of 1.1-1.3 μ H, and has a mean power rating of 200w. The tuning of the ATU itself is automatic and the notch aerial is kept matched in to the transmitter at whatever radiating frequency is required within the tuning range; the ATU will readjust itself to a frequency change in less than 10 seconds.

RUSSIAN "WINDOW" ON BERLIN

When it was announced that, on March 10, the Russians extended their skirmishing tactics round Berlin to the discharge of what was described as "chaff designed to confuse air control radar," what they were using was, in fact, what was known as *window* during Hitler's War. The method was simplicity itself, and the effect quite devastating. Having determined the frequency of the radar or radars it was required to jam or confuse, metallised strips, half-wave at that frequency, were made up into loose bundles. These were discharged by aircraft flying over the German defences, the result being that the radars received a multiplicity and a confusion of false echoes, which made it almost impossible to track individual aircraft. Towards the end of the War, there were considerable refinements of the technique, and many purely engineering problems were involved in the design, manufacture, packaging, and discharge of the metallic strips, as well as in the tactical use of *window*, not only to conceal and defend aircraft, but just as successfully to simulate air attacks, and even ships for decoy purposes. In fact, a great edifice of operational effort and research, with big issues at stake, was built up on that fundamental radio conception—a dipole resonant at the required frequency.



Many transistors are ruined by not having the proper tool for soldering them into circuit. A heat sink is essential, and Antex, Ltd. manufacturers of soldering irons, have placed on the market an automatic grip which holds itself on the work while soldering is being done.

Mention "Short Wave Magazine" when writing to Advertisers — It helps you, helps them and helps us

SINCE our last appearance, there has been very little in the way of "give" on the VHF bands. Conditions have been poor generally, with perhaps a slight lift during March 16-18, and in the main the picture is of rather desultory activity—with, however, new stations coming on constantly, even if the established VHF types have been spending more time on the bench than on the air.

But, by the time you read this, the VHF season will be starting to unfold, and from now until about mid-October we can expect such exciting events as widespread tropospheric openings, with the whole of Northern Europe workable; sporadic-E occurrences, when real VHF/EDX like I, OE, YO and YU will appear, as "targets of fleeting opportunity"; and there will be the occasional auroral manifestations, when almost anything can happen (and remember that SSB phone *can* be used under *Ar* conditions, but not AM). And don't forget that any two of them can happen at once!

The only thing we cannot tell you is just when these things are going to come off. If you are a watcher of Band I/TV—or, better still, a listener on Band II/FM—you can almost always get a clue to the development of EDX conditions, because either the sound and/or vision channels become heavily QRM'd, or all sorts of unexpected EU stations can be tuned in. Under these conditions, the BBC starts putting out cagey squibs to the effect that all this deviation from the norm is not their fault, but is due to anomalous propagation conditions over which they have no control. *Then* is the time to get cracking on two metres.

For real EDX working, sporadic-E (a densely ionised reflecting patch or cloud at low level) is the best condition—but the manifestation is very erratic, does not usually last more than a couple of hours, is unpredictable at long notice, and naturally demands that there should be stations available to take advantage of the effect. The most likely time for spor-E to occur is during the couple of hours around noon—and, in the odd way of things in Amateur Radio, is

VHF BANDS

A. J. DEVON

Conditions Remain Dull—

Report on Oscar—

VHFCC Elections, and

Coming Events—

Notes, News and The Tables—

always discovered only on a Sunday morning: the reason being, of course, that it is only on Sundays that there are VHF stations operating, all over Europe, to make contacts possible. The G3GOP/YU1CW two-metre contact of May last year is a perfect example of how spor-E works out in practice.

Of course, all these manifestations—good tropo conditions, *Ar* openings, and spor-E chances—do not occur only at week-ends! During the summer months, they happen at all sorts of times, but usually there is no one on to know about them.

March Contest

This was another good example of how things work out in practice! Held during March 3-4, the contest fell into a real slough of despond. The weather was awful, with frost and snow over most of the country, and the barometer dropped right back to the low 29's. There were few portables out compared with a normal occasion, and the end of it all was that the operators who made the scores were those near or in the active areas, e.g. London and Home Counties.

Some of the scores being mentioned during the last hour or so

were: G3GHI, Kenley, Sy., 132; G3PBV, Wolverton, Bucks., 68; G2HIF, Wantage, Berks., 77; G5MA, Gt. Bookham, Sy., 107; G3NNG, Harwell, Berks., 77; G5UM, Knebworth, Herts., 54; G3IAS, Waringham, Sy., 112; and a particularly smooth, well-modulated transmission from the direction of Upminster, Essex, turned out to be G4DC, making his contact No. 131 at 1845. Note that these "scores" mentioned are not points-totals, but stations worked—from which it can be deduced that there was a very fair level of activity, but everyone was fighting the conditions. Several northerly stations had over a hundred QSO's, but there was very little contact between north and south. Though conditions appeared to improve a little in the afternoon, one of the best GDY QSO's was G5MA/G3ILD, Co. Durham, made during the morning; this was on CW, and it was noticeable that quite a number of people were using the key, in desperation rather than hope!

Oscar Story

Last month's comment duly produced an answer, from several quarters, and here we are able to

70 CENTIMETRES

COUNTIES WORKED SINCE

SEPTEMBER 1, 1961

Starting Figure, 4

From Home QTH Only

| Worked | Station |
|--------|--------------|
| 18 | G3KEQ |
| 16 | G2FNW |
| 14 | G3KPT |
| 12 | G3HAZ, G3NNG |
| 11 | G2CIW |
| 10 | G3JHM/A |
| 9 | G3LHA |
| 8 | G5UM |
| 7 | G3HWR |
| 6 | GW3ATM |
| 4 | G5QA |

This Annual Counties Worked Table is reckoned from September 1st, 1961 and will close on August 31st, 1962. All operators who work four or more Counties on the 70-centimetre (430 mc) band are eligible for entry. Counties should be claimed as they accrue, and otherwise the rules are as for the Two-Metre Annual Table

show the temperature graph, finalised from the more than 4,000 observations received by the Project Oscar people at Sunnyvale, Calif. This temperature curve is of the package itself, *i.e.* of the container as launched into orbit, and the kink in the graph is regarded as most mysterious—at any rate, at the moment of writing, expert opinion is baffled. There can be no question of a “mistake” having been made, as this change of temperature, indicated by the hi-rate, is confirmed by the very large number of reports received.

Oscar II is due shortly, and will be a replica of the Oscar I operation—but when “shortly” actually is, it is impossible to say, because the blasting-off of rockets carrying this or that package is subject to security control. While it is most unlikely that we shall get advance information in time for publication, it seems that Oscar II should go off before the end of May. There will probably be a certain amount of newspaper and BBC coverage, so all we can do is to advise you to watch and listen. The frequency, 145.00 mc nominal, and the signalling procedure will be exactly as before. For those interested, the basic task will be to log date, time, signal level and the number of “hi’s” counted off in 10 secs.

Reports, covering one or more passes, can be sent to us; or to G2UJ (*QTHR*); or to: Project Oscar, P.O. Box 183, Sunnyvale, California, U.S.A. In any event, all reporting is correlated by the Sunnyvale boys, and, as we are in airmail contact, readers can send their reports in to us for onward transmission, as this would enable us to comment and, perhaps, draw a few conclusions, in “VHF Bands.”

VHFCC Elections

It is back in December that the last were reported, and since then the following VHF Century Club Certificates have been issued: No. 317, to Josef Cincura, OK1BVN, of Ceske Budejovice, whose 100 cards include DJ/DL, DM, HG, OE, OZ, SM and SP, as well as 75 OK's.

R. G. Holland, G3BPE, Bexley, Kent, gets Certificate No. 318, his

lot being mainly G's, with a few near-EU's. G3BPE runs a QQV03-20A at 32w. in the PA, his receiver is an ECC84 cascode with a nuvistor pre-amp., tuning 28-30 mc on a Minimitter MR-44/11, and the beam is a 4-ele Yagi.

VHFCC Certificate No. 319 goes to Erwin Falk, DL6WA. Bad/Nauheim, all whose cards are DJ/DL/DM. No. 320 is awarded to Bretislav Slavicek, OK2BBS, Olomouc, who likewise shows no U.K. contacts, but several SP's, and OE3SE.

E. M. Davies, GW2HIY, Holyhead, Anglesey, gains Certificate No. 321, his cards including DJ/DL, OK, ON, OZ and PA, as well as GI and GM. The Tx runs 90w. to a QQV06-40A, and the beam is a slot-fed 6/6. GW2HIY says that he has worked about 220 different stations since starting up in 1958, the hardest part of the job being collecting the cards!

Finally, in this batch, VHF Century Club Certificate No. 322 is entered for W. B. Capstick, G3JYP, Appleby, Westmorland, who is rare DX to so many VHF operators. Having started with a pair of 5763's, and then to two 6146's, in the PA, he now has a QQV06-40A running about 90w., the receiver being a CC converter with a nuvistor pre-amp., into an

Eddystone S.504 as main Rx. The beam is a slot-fed 6/6 at 45 ft., and the total of different stations worked is well over 140.

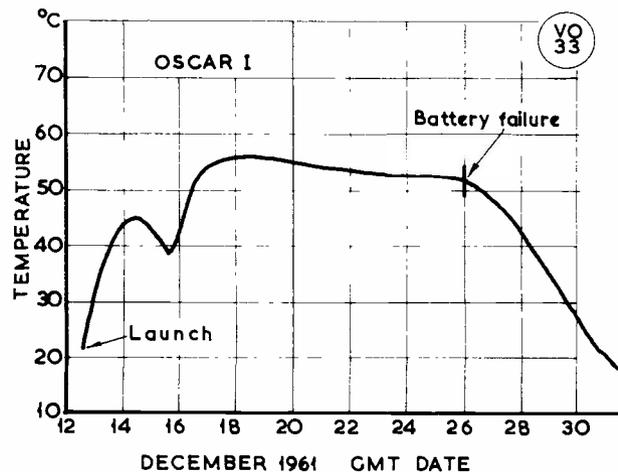
Special Events to Come

The annual Scottish VHF convention will be held on Saturday, April 28, at the Brabloch Hotel, Paisley, Renfrewshire; tickets and arrangements for accommodation through: L. F. Benzies, GM3DDE, 83 Hillview Road, Corstorphine, Edinburgh, 12. Any further information from W. C. Bradford, GM3DIQ (*QTHR*). This Scottish meeting is always a very good show, and well worth the trip, even if only for the excuse of a week-end in Glasgow!

The EI boys will be running EI0AB, at Kilonan on Inishmore off the Galway coast, during June 9-11, using an 8/8 J-Beam and two-metre gear to be provided by GI3KYP; they will be equipped for CW and phone working.

Some 4-Metre News

We are glad to be able to record that there is a distinct improvement in the level of 4-metre activity, and every month there are more stations getting themselves organised. G3HWR (London, N.W.3), with G5FK (Wembley), is on every Wednesday evening, running 18w. to a



The temperature-variation curve obtained after all the Oscar observations had been smoothed out. The drop between December 14 and 16, followed by the steep rise over the next two days, is at present inexplicable. For the next eight days the temperature remained fairly constant, and after the battery failure observations became erratic and unreliable. It is now intended that Oscar II should be launched some time before the end of May, to follow out the same programme as Oscar I. It will be interesting to see how the temperature curves compare.

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Home QTH Only

| Worked | Station |
|--------|---|
| 82 | G5YV |
| 81 | G6NB |
| 80 | EI2W, G3CCH |
| 77 | G5MA |
| 74 | G3KEQ |
| 72 | G2CIW (373), G6XM |
| 71 | GM3EGW (310) |
| 70 | G3HBW |
| 69 | G3EHY |
| 68 | G3BA, G3BLP (967), G3BW, G3GHO |
| 66 | G2OI (585), G3IUD (302), G3KPT*, G5BD |
| 65 | G6XA (333) |
| 63 | G2FJR (542), G3FAN (1,000) |
| 61 | G2HIF, G3HAZ, G6RH |
| 60 | G3DMU, G3IOO, G3JWQ (548) |
| 59 | G4SA, G8VZ |
| 58 | G5DS (827), G8OU |
| 57 | G3DKF, G8SB |
| 56 | G3WW (770) |
| 55 | G2HDZ (495), G5BM, GW5MQ |
| 53 | G2AJ (519), G3LHA (387), G4CI |
| 52 | G2NH, G3FZL, G6XX, GM3DIQ, GW2ADZ |
| 51 | G5ML |
| 50 | G3ABA, G3GSE (518), G3NAQ |
| 49 | G3CO (467) |
| 48 | G3AYC, G3FIH, G3LAR, G6TA (487), GW3ATM |
| 47 | G3JYP, G5WP |
| 46 | G3MTI (242), G4HT (476), G5BY, G6YU |
| 45 | G2AHP (647), G2DVD (362), G2XC, G3BJQ, G3GFD, G3MPS, G5JU, G6GN, GW3MFY |
| 44 | G3BK, G3DVK (282), G3LTN, G3NBQ (218), G8DA |
| 43 | G2DDD, G2FCL (322), G3BNC, G3COJ, G3DLU*, G3GSO, G3HWJ, G3KHA (262), G3KQF, G3KUH, G3NNG, G3OJY, G3WS, G4RO, G5DF |
| 42 | G2AXI, G2HOP, G3DO, G3IER, G6CI (220) |
| 41 | G2CZS (282), G2FQP, G3JAM (481), G3PBV |

| Worked | Station |
|--------|---|
| 40 | EI2A, G2BHN (159), G3CGQ, G3FUR, G5MR (366), G8KL |
| 39 | G2IQ, G3GBO (434), G3LTF, G3OSS, G3VM, G8IL (325), GC2FZC |
| 38 | G3APY, G3CKQ, G3HTY, G3OHD, G8VN (190) |
| 37 | G3FNW, G2FZU (180), G3DLU, G3MAX, G5UM (808), G8DR (482), GC3EBK (260) |
| 36 | G2DCI (155), G3CXD, G3DLU*, G3IT, G3JHM/A, G3OBD, G6CB (312), G8IP |
| 35 | G3FYY (235), G3HCU (224), G3IOE, G4LX, G5TN, G3ONF |
| 34 | G3AEP, G3HWR (506), G8IC |
| 33 | G3FIJ (392), G3HHY (125), G3ICO, G4JJ/A |
| 32 | G3HIL, G3OBB, G8QY, G8VR |
| 31 | G3HXO, G3KPT (180), G5RP |
| 30 | G2AHY, G3FRY, G3GOP (208), G3GVF (129), G3IRA, G3KEF (110), G5NF, G8NM, GW8UH |
| 29 | G2CVV, G3AGS, G3AKU, GM3LDU |
| 28 | G3ITF, G8DL, GM3BDA |
| 27 | G3CVO (231), G3DAH, G3ISA (160), G3JGY, G3LTF/A, G6GR, G3GQB, GW3GWA |
| 26 | G2BRR, G3CFR (125), G3MED, G3NNK, G3SM (211), G3YH, G4MR (189) |
| 25 | G3JHM, G3JMA, G3JXN (220), G5SK, G6PJ |
| 24 | G3FD, G3FEX (226), G3FXG, G3FXR |
| 23 | G2DHV, G3BDQ, G3CWW (260), G3HSD (168), G3OPR (144), G5PY, G8VN (125)* |
| 22 | G2DRA, G3AGR (135), G3ASG (150), G3BPM, G5AM |
| 21 | G2AOL (110), G3DVQ, G3IWI, G6XY |
| 20 | G3EYV |
| 19 | G2HDR, G3GCX, G5LQ (176) |
| 18 | G3DBP, GC2CNC |
| 17 | G3EGG, G3MHD (195) |
| 16 | G3FRE, G3MLS, F3XY (200) |
| 15 | G3IWA |
| 14 | G3CYY |

Note: Figures in brackets after call are number of different stations worked on Two Metres; starting figure for this classification, 100 stations worked. QSL cards are not required to verify for entry into this Table. On working 14C or more, a list showing stations and counties should be sent, and thereafter added to as more counties accrue.

* New QTH

DET-19, the receiver feeding into a BC-342 as tunable IF section; for "continuous monitoring for locals," the receiver can be used with a broad-band IF amplifier covering the full 200 kc of the band. So far this season, G3HWR has worked five 4-metre counties, with 8C for the all-time in this category. The figures for G5FK are 12C all-time, and 5C for this year.

G5JU (Birmingham) is changing to a bi-square, and mentions G3CCM as a new station heard; Jerry has got into 11 counties on 4 metres, and is one of the regular Sunday-morning operators on the band.

From Banwell, Som., Louis, G3EHY, remarks: "There are many new additions to this somewhat exclusive band of enquiring-minded VHF enthusiasts" — he mentions Sunday morning, March 18, as a good session for him, when G3OHH (Macclesfield), G5PW (Leeds) and G8DT (Cheltenham) were worked. G3EHY has knocked off 24C so far, runs a regular schedule with G13HXV, and is on 70 mc every Sunday, 0930-1230 clock time, irrespective of conditions.

We are getting near the point at which it would be feasible to start a 4-metre annual counties ladder—so will all interested please let us have their latest scores and, all being well, the first entry will be shown next time.

Notes on Seventycems

The new annual table shows healthy progress, and there were several new claims for this month. G3NNG (A.E.R.E., Harwell) mentions GB3GEC as a very consistent 430 mc signal up there, averaging RST-569; but few London stations are heard. G3KEQ (Sanderstead, Sy.) says that recently he has been spending most of his time on 70 cm., "where there is growing interest and population." G3KEQ himself is on 432.58 mc, running 30w. to a QQV03-20A PA, a beam consisting of four stacked skeleton slots with reflectors, and an A.2521 g.g.t. RF pre-amp. into the G3BKQ-type converter, as originally described in SHORT WAVE MAGAZINE. On March 16, he had

QSO's with five Midlands stations, and has also worked G3IOO (Oswestry) and G3KZV (Oxford)—so evidently the 430 mc gear at G3KEQ is going pretty well. And he is now in the hot-seat in the Annual.

G3LTF (Galleywood, Essex) has gone real QRO on 70 cm, with a 4X250B in the PA, running just the 150w., into a 72-ele stack, his frequency being 432.98 mc. This is an altogether "gainy" set-up, and G3LTF should be making himself heard on the 430 mc band

TWO METRES
COUNTIES WORKED SINCE
SEPTEMBER 1, 1961
 Starting Figure, 14
 From Home QTH Only

| Worked | Station |
|--------|---------------------|
| 55 | G2CIW, G5MA |
| 50 | G3BA, G3NNG |
| 43 | G3KPT, G3LTF |
| 40 | G2AXI, G8VZ |
| 39 | EI2A, G3BNL |
| 38 | G3OJY |
| 36 | G3PBV |
| 35 | G3CO |
| 34 | G5DW |
| 32 | G3JYP |
| 31 | G3FUR, G13ONF |
| 29 | G2BHN |
| 24 | G5QA |
| 21 | GW3MFY |
| 20 | G3GSO, G5DS, GW3ATM |
| 19 | G3JWQ |
| 18 | G3HWR, G8VN |
| 17 | G3ICO, G3OBD, G5UM |
| 15 | G3FIJ, G3OSA |

This Annual Counties Worked Table opened on September 1st, 1961, and will close on August 31st, 1962. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. QSL cards or other proofs are not required when making claims. The first claim should be a list of counties with the stations worked for them. Thereafter, counties may be claimed as they accrue. Note: While new claims can be made at any time in the period from now to end-June 1962, all operators are asked to send in amended scores as often as possible, in order to keep the Table running up-to-date. After June 30, 1962 (with two months still to run to the end of the 12-month season), only amended scores from those already standing in the Table at that date will be accepted, unless they are new claims from operators licensed w.e.f. June 1962.

in no ordinary fashion. And just to keep himself occupied, he has got a DET-22 tripling to 23 cm. to be followed by a 2C39 PA.

G3HWR is able to claim a footing in the annual table, with 7C worked, including G3MPS for Hants. G2CIW (Birmingham) made several over-100-mile contacts during March 16-18.

Two-Metre Round-up

As a comment on conditions, G3EHY points out that since starting their sked in August last, he and EI2A have had more than 150 two-metre QSO's; contact has been maintained, almost always on phone, all through the winter months, and this 5-night-a-week marathon has very rarely failed—the path distance is about 220 miles. The January gales brought down the three-band beam system at Banwell, and Louis was forced to revert to an indoor 5-ele Yagi to keep his two-metre skeds going; even on this, EI2A remained workable and, in fact, G13GXP was also worked on the indoor system.

GM3DIQ (Kilbarchan) has just completed a ten-transistor two-metre converter, using Brush transfilters (see November, 1961, SHORT WAVE MAGAZINE) and Mullard AFZ12 transistors; it is a CC job, with a NF of about 5 dB—which seems fair enough with transistors. This Rx is intended for /M working and, to go with it, Clarke has a transmitter running 20w. and using Brimar 7558's.

G3BA (Sutton Coldfield) puts in a claim for the Annual, with 50C worked so far this year, and G3NNG is on the same rung. G2CIW reports things as quiet during the period, though one evening during March, EI2W was heard testing with an S9+ signal, but could not be raised.

From Keyworth, Notts., G3BNL is able to claim 39C for the Annual, with some good GDY recorded, including EI, GI and GC. G3OHC (Birmingham) mentions having worked "105 stations in 26 hours"—this was during the March contest. Harold, G5YV (Leeds) puts us right on his 19 countries worked on two metres—which, of course, puts him in the

SEVENTY CENTIMETRES
ALL-TIME COUNTIES WORKED
 Starting Figure, 4

| Worked | Station |
|--------|----------------------------------|
| 37 | G2XV |
| 30 | G3KEQ, G6NF |
| 28 | G3HAZ, G3HBW, G3JMA, G3NNG |
| 27 | G3JWQ, G5YV |
| 26 | G2CIW, GW2ADZ |
| 25 | G3KPT, G3LHA |
| 23 | G3BKQ, G6NB |
| 21 | G3IOO |
| 20 | G3LTF |
| 17 | G3JHM/A, G3MPS |
| 16 | G2DDD, G3MED |
| 15 | G2OI, G4RO |
| 14 | G2HDZ, G3FAN, G3LQR |
| 13 | G3BA, G6XA |
| 12 | G5BD |
| 11 | G3AYC, G5UM |
| 10 | G3IRW |
| 9 | G5DS, GW3ATM |
| 8 | G3HWR |
| 7 | G2HDY, G3JHM |
| 6 | G3KHA, G3WW, G5QA |
| 5 | G3FUL, G3IRA, G3IUD, G3JHM, G5ML |
| 4 | G3JGY |

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

upper bracket for the Countries Worked table. G3XC (St. Columb, Cornwall) reports that two-metre activity is on the increase down there, with about six stations either equipped or building for the band.

The Tabular Matter

With the exception of the "Firsts" list (which takes up a lot of room), A.J.D. has managed to talk the Ed. into allowing enough space for all the current tables to be shown this time. In total, a large number of movements is recorded, and we hope everybody is in the right niche. The Two-Metre All-Time, though it only appears infrequently, is kept up-to-date as claims are received.

[over

The general intention is to run the Annuals—to which it is hoped to add a 4-metre panel—every month; the all-time tables as opportunity offers; and Countries Worked as the movements demand. Likewise, the "Firsts" table, which is always interesting for reference, will appear the next time we can make the space for it. And note the one showing you which zone you should be in!

It is also probable that the barograph trace will be restored, as there have been a fair number of requests for it; however, we would still like opinions on this—and if you've forgotten what it was about, have a look back to the issues of last year ending November, 1961.

Incidental Information

After a certain amount of research, we have found that one of the VHF channels the Russians

are fond of using for spacecraft control is 143.63 mc; this is brought in mainly for "local" working—that is to say, when the vehicle is within VHF range of USSR territory. As for some of the passes it would also be in U.K. range, it would be worth trying on this frequency when a big shot is announced. (Other frequencies are 9.019 and 20.006 mc, all these being pilot talking channels.)

Also in the space communication context, the Americans announced on March 12 that they are going to carry out another "needles" experiment—it will be remembered that the first test was abortive, because the bundles of dipoles failed to disperse in the manner expected. The idea is to form a reflecting belt round the earth, with the dipoles resonant at a frequency near 8000 mc. The radio astronomers are very angry about this, contending that it could cause serious interference with their researches. The Americans reject this argument, on the ground mainly that the density will not be enough to have much effect on frequencies off the fundamental, while the belt itself will be so narrow (about 5 miles wide, by 25 miles deep) as only to be within the aperture of a radio telescope for a comparatively short time.

When the first British satellite goes up (named Ionosphere Satellite S-51, or U.K. No. 1) on an American rocket, later this year, the control and operating frequencies will be in the band 136-137 mc. This is one of the internationally agreed bands for radio astronomical research.

At Jodrell Bank, they have been busy with Venus, making distance measurements by radar reflection, to get a new and more accurate value for the solar parallax, the fundamental unit of distance in astronomy. There are now three values—British, American and Russian—for the Sun's distance from the earth, respectively 92.956, 92.9555 and 92.868 million miles. It seems that it is impossible to reconcile these figures without much more information from the Russians.

The Telstar operation—space

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. |

satellite relay—is now nearing the stage at which tests might be commenced. The Telstar equipment will consist essentially of a transponder operating on 4170 mc, i.e., it will re-transmit signals (speech and, horror of horrors, American TV) on command from the ground on the U.S. side. Reception will be at Goonhilly, Cornwall, on an 85-ft. dish now nearing completion. If the American signals come in all right, the process will be reversed, and we will be treated (on the ordinary Band I BBC) to some such delectable item as a face-to-face actuality discussion between politicians, across the Atlantic. In such ways are the great achievements of science prostituted.

To Conclude —

On a happier note: Let us revert to our own channels of communication and modes of propagation, and look forward to the season's EDX/GDX openings. For the next issue, the closing date is **Wednesday, April 18**, with everything addressed to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Have a good Easter, go carefully, and join us again on May 4. 73 de A.J.D.

TWO METRES COUNTRIES WORKED

Starting Figure, 8

- | | |
|----|--|
| 20 | G3HBW (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP) |
| 19 | G5YV (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OE, OK, ON, OZ, PA, SM, SP) |
| 19 | G3CCH (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, OE, OH, OK, ON, OZ, PA, SM, SP) |
| 18 | G3LTF, G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OK, ON, OZ, PA, SM, SP), ON4BZ |
| 16 | G3GHO, G3KEQ, G5MA, G6RH, G6XM, PA0FB |
| 15 | G2XV, G3AYC, G3FZL, G4MW, GM3EGW |
| 14 | G2CIW, G2FJR, G2HDZ, G3BLP, G3FAN, G3HAZ, G3IOO, G3JWQ, G3KPT, G3WS, G3BD, G6LI, G8OU, OK2VCG |
| 13 | G2HIF, G3BA, G3CO, G3DKF, G3DMU, G3DVK, G3GPT, G3NNG, G5DS, G6XX, G8VZ |
| 12 | EI2W, F8MX, G3EHY, G3GFD, G3GHI, G3JAM, G3OBD, G3PBV, G3WW, G5CP, G5ML, G8DR, GW2HIY |
| 11 | G2AJ, G2CZS, G3ABA, G3BDQ, G3GSO, G3JZN, G3KUH, G3LHA, G4RO, G4SA, G5UD, G6XA, OK1VR |
| 10 | G2AHP, G2AXI, G2FQP, G2HOP, G3BK, G3BNC, G3DLU, G3GSE, G3KQF, G3LAR, G3MED, G5MR, G5TN, G8IC, GC2FZC, GW3ATM, GW5MQ |
| 9 | G2DVD, G2FCL, G3FIJ, G3FUR, G3IUD, G3LTN, G4LX, G8GP, GC3EBK, GM3DIQ |
| 8 | G2DDD, G2XC, G3AEP, G3AGS, G3BOC, G3EKX, G3GBO, G3HCU, G3HWJ, G3JHM/A, G3KHA, G3MPS, G3OHD, G3VM, G5BM, G5BY, G8SB, GW3MPY |

AMATEUR MICROWAVE EQUIPMENT

ACTION OF 3 dB COUPLER — POWER RELATIONSHIPS — CONCLUSION

Part III

D. CLIFT (G3BAK)

The previous parts of this article were published in our February and March issues. The object has been to deal in a general way with the practicalities of amateur two-way communication on the centimetric bands, so that those who wish to explore this field will know in what direction to extend their reading, and what experimental work to undertake. The firm of W. H. Sanders (Electronics), Ltd., Gunnels Wood Road, Stevenage, Herts., are manufacturers of centimetric apparatus, and also publish at 10s. 6d. a very useful practical manual entitled "Experimental Microwaves," the scope of which is well expressed by its title.—Editor.

THE waveguide pieces necessary are simple and, except that the sizes get larger as we come down in frequency, are basically the same. The circuit diagram on p.42 of the March issue shows how the waveguide bits are connected up, and the photographs indicate representative assemblies for 5,600 and 10,000 mc, arranged so as to show the variations in components which may take place, whilst retaining the same basic method of operation. The essential difference between the units described, and previous ones used, is in the application of the 3 dB coupler. This offers the amateur a system which can be made with the simplest of tools, can be "tuned" so that it works, as opposed to methods which require the use of test gear (often not available) or on "cut-and-try" methods, and can even be made without the use of flanges. (The latter is not really as big an advantage

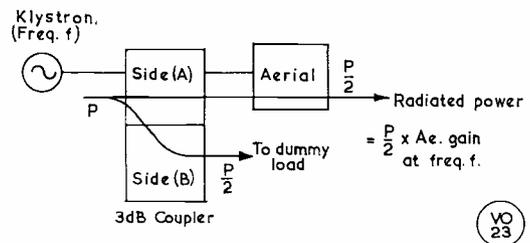


Fig. 4(A). Action of the 3 dB coupler during transmission — and see text.

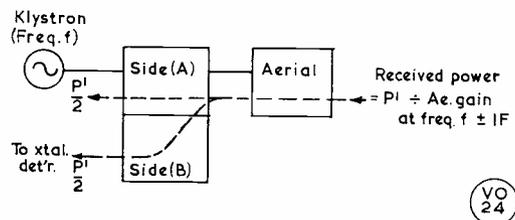


Fig. 4(B). This shows how the 3 dB coupler works on reception.

as it may appear, since often the bits are required separate for other jobs.)

As used in the systems shown, the operation of the 3 dB coupler is as follows:

Fig. 4 (a) shows the action when considered as a transmitting device. The power output of the klystron (P) is split into two halves, the used half passing through side (A) and on to the aerial. The unused half passes into side (B) and on to a dissipative load, i.e. we use only one half of the available klystron power, $P/2$.

Fig. 4 (b) shows the reverse action taking place when an incoming signal enters the aerial. This signal (P') also splits into two halves and, in this case, the used one passes through into side (B) and to the crystal detector. The unused half passes through side (A) and is either dissipated in, or reflected from, the klystron mount, i.e. we use only half of the incoming signal power, $P'/2$.

[over

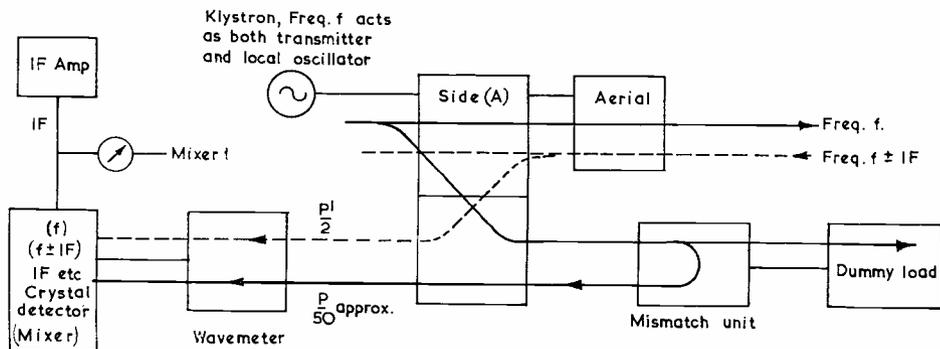


Fig. 4 (C). The combined action of Fig. 4(A) and Fig. 4(B), showing the function of the "3 dB coupler." It is this that simplifies the problem of two-way microwave working, in that it gives transmit-receive separation while using the same aerial (or horn) — see Fig. 3, p.42, March. This coupler can be made for any band within the amateur microwave range.

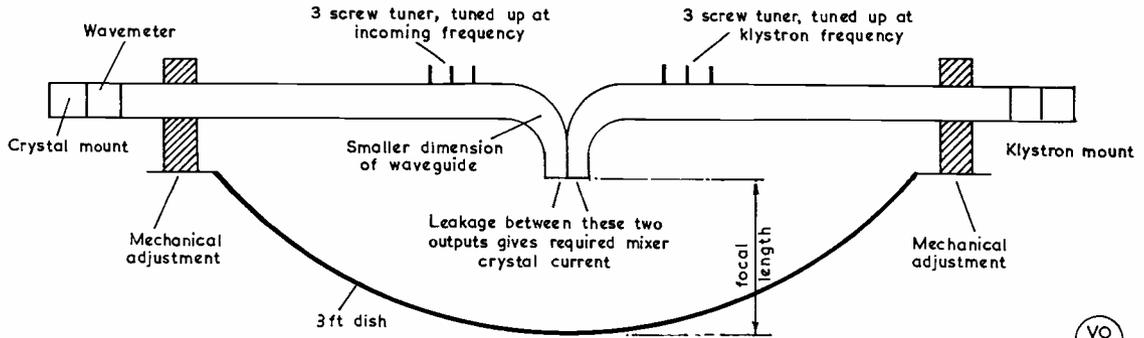


Fig. 5. The single 3 ft. dish system is advocated by G3BAK because it gives easy setting up, both mechanically and radio-wise. As over a long distance microwave path accurate aiming is involved, this is obviously easier to achieve with one dish rather than with two. In exposed locations, wind pressures can distort the aiming of the dish.

Fig 4 (c) shows the action in practice when both these events take place simultaneously. This diagram brings in the additional elements added to the system to make it practical. Interposed between the coupler (side B) and the load is a mis-matching unit, consisting simply of one or two 6 BA screws which can be made to protrude into the guide. By means of this, a small amount of the power $P/2$ in side (B) is reflected and feeds back into the crystal, to produce the necessary amount of DC current for mixing to take place. A wavemeter is also interposed between the coupler and the crystal and, at resonance, takes a small amount of the power passing towards the crystal and produces a dip in the indicated current. This indication is, of course, the klystron frequency.

The nett result is that there is a total loss of 6 dB

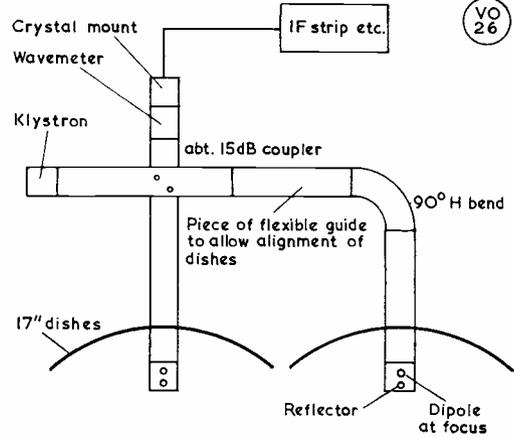
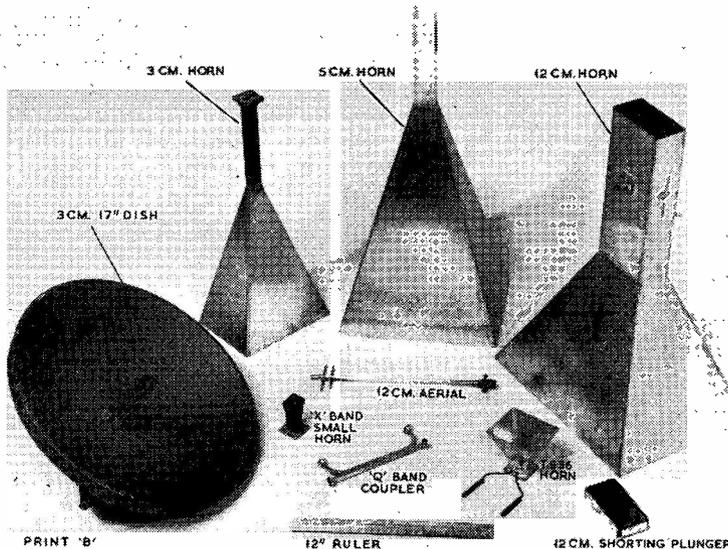


Fig. 5(A). It is possible, in amateur microwave working, to use a twin-dish system, as shown here. In this case, the dishes are 17 ins. in diameter and a directional coupler is incorporated.

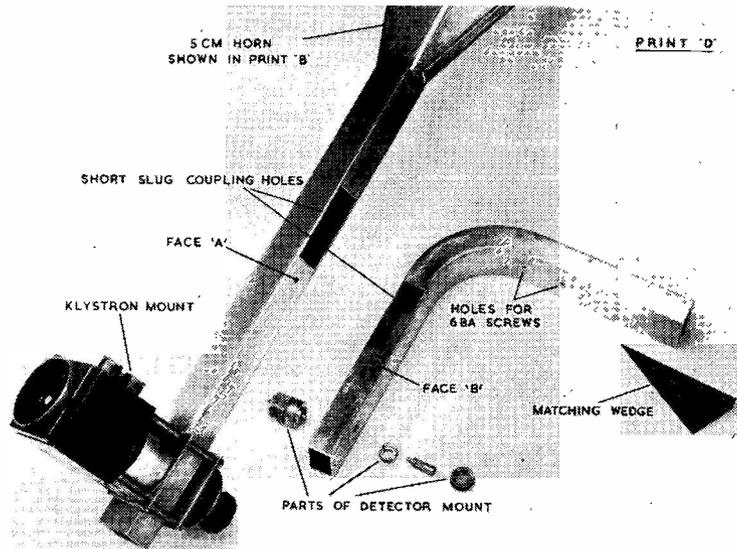


Some microwave transmitting aerials. The horn for the 12 cm band (2400 mc) is to the dimensions of WG8 (see Table I, p.657, February) and gives a gain of 17 dB; it is made from thin tin-plate. The 5 cm band horn fits waveguide WG14 and shows a gain of 21 dB. Similarly, the 3 cm horn, made in brass to fit a WG16 section, has a gain of 22 dB. The 3 cm paraboloid is a surplus item with a home-made feed and shows a gain of 31 dB on the 10,000 mc band. The Q-band double coupler (by W. H. Sanders, Ltd., Stevenage, who can supply all these parts) is used as a reflectometer for tuning-up purposes. The small X-band surplus and are for 3 cm.

(2 × 3 dB) compared with, say, the twin-aerial system. The advantage, however, in this respect is that we can now use one larger dish, and get back the 6 dB lost. At G3BAK, this is, in fact, done by changing from a 17 in. to a 3 ft. dish, which is still far easier to set up and handle than two of the smaller ones. Other important advantages are that the klystron is now looking into a good load all the time (provided that the aerial is matched, of course), and this results in easier tuning and better modulation.

The layout of the two-dish system is Fig. 5 (a), and that of a single dish (even higher gain) system is shown in Fig. 5. The latter has been dropped temporarily, since it requires access at each side of the dish, as opposed to the single entry 3 dB coupler system.

The photographs show the general arrangement of the parts in a 3 cm. (10,000 mc) and a 5 cm. (6,000 mc) set-up. The Riblet hybrid junction (the 3 dB coupler type described above) is shown before assembly, and the hole in the thin side of the waveguide should be made 0.66 of the waveguide wavelength in all cases. In the 5,600 mc model, the length of the cut-out is 2.12 inches. Care should be taken during assembly to align the two waveguides carefully, and also to prevent excess solder forming blobs inside the tube. All the components of the 3 cm. assembly have been



A 5-centimetre amateur band assembly before coupling up, where faces "A" and "B" join together. The klystron and crystal mounts are ex-Govt. salvage (TS35 X-band Test Set), and the klystron probe depth is variable. The bend is not essential and was only included to shorten the distance from the coupling hole to the horn.

home-made, and have worked quite well. The commercial components shown in the assembly [by permission of W. H. Sanders (Electronics) Ltd.] give a much smaller assembly than the home-made ones and, hence, can be shown in greater detail.

The variation in the size of the components for the different frequency bands is well illustrated in the photographs, which also give details of the various components.



On the left, the new (American) National NC-155, an amateur-band double conversion superhet with full spreading over the bands 80-6 metres (3.5 to 50 mc); variable IF selectivity from 0.6-5.0 kc; a sensitivity claimed to be better than 1 μ V for a 10 dB signal-noise ratio; and what is described as "planetary 60:1 tuning." For SSB reception, there is a separate product detector, sideband AGC, and a BFO calibrated for USB/LSB. Other features are band-edge calibration, automatic noise limiter and an edge-reading S-meter which follows on all reception modes. The receiver on the right is the National NC-105, a general-coverage design in the same category, having a frequency range of 550 kc to 30 mc in four bands. It also has a Q-multiplier, a product detector and a series gate type noise limiter. Calibration charts are supplied for the amateur and broadcast short-wave bands.

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. call signs, 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.

- G3DKJ**, P. Edwards, Northside, Hightown Road, Ringwood, Hants. (*Re-issue.*) (*Tel.: Ringwood 243.*)
- GW3TID**, M. R. Davies, 5 Hillfield Place, Parclyn. Aberporth, Cards.
- G3OWR**, I. A. Brown, 21 Beechcroft Road, Grantham, Lincs.
- G3OXJ**, Cadets Amateur Radio Society, R.A.F. Technical College, Henlow, Beds.
- G3PJD**, T. A. Doncaster, 30 Compton Drive, Grimsby, Lincs.
- G3PMZ**, Amateur Radio Club, Royal Signals (T.A.), Signal House, Score Lane, Liverpool, 16.
- G3PNB**, E. G. Mason, 154 White Lion Road, Amersham, Bucks.
- G3PPQ**, N. MacKinnon, 13 Newington Road, Ramsgate, Kent.
- G3PPU**, P. J. Smith, The Cottage, Little London, Basingstoke, Hants.
- G3PQM**, M. Thorp, 1 Coppins Road, Clacton-on-Sea, Essex.
- G3PRI/T**, D. Quigley, 142 Belle Vue Road, Cowes, Isle of Wight.
- G3PRM**, J. Forsyth, 11 Church Street, Alvaston, Derby.
- G3PRW**, J. C. Dolan, 108 Bodley Road, New Malden, Surrey. (*Tel.: MALden 4281.*)
- G3PSA**, J. M. Bowman, Apple Trees, Swaffham Bulbeck, Cambridgeshire.
- GM3PSP**, A. J. Masson, 20a Merchiston Park, Edinburgh, 10. (*Tel.: FOU 5617.*)
- G3PTA**, F. F. Pullin, 15 Longway, Barrow-in-Furness, Lancs.
- G3PTN**, Z. Chowanec, 3 Toronto Place, Leeds 7, Yorkshire.
- G3PTO**, J. A. Reynolds, 2 Ashfield Road, Wobaston Estate, Fordhouses, Wolverhampton, Staffs.
- G3PTQ**, T. J. Chapman, 25 Desmond Avenue, Cherry Hinton, Cambridge.
- G3PTS**, G. M. Holt, 21 Manor Road, Eastwood, Notts.
- G3PTU**, D. J. Long, 11 Wetherby Road, Acomb, York.
- G3PTV**, D. Critchlow, 63 Gattison Lane, Rossington, Doncaster, Yorkshire.
- G3PUA**, C. W. Timmins, 4 Tarnway Avenue, Thornton Cleveleys, Blackpool, Lancs.
- G3PUI**, J. C. Pellatt, 14 Broom Mead, Bexleyheath, Kent. (*Tel.: Crayford 22077.*)
- G3PUQ**, N. Semmens, 5 Treruffe Terrace, Redruth, Cornwall.
- G3PUX**, I. S. Champion, Mill Bungalow, Wisborough Green, Billingshurst, Sussex. (*Tel.: Wisborough Green 322.*)
- G3PVA**, P. J. King, 10 Holne Chase, Morden, Surrey.
- G3PVI**, D. J. Gibbs, Orchard Way, Steyning, Sussex. (*Tel.: Steyning 2287.*)
- G3PVJ**, H. D. Coltman, 301 Micklefield Road, High Wycombe, Bucks.
- G3PVN**, C. J. Holladay, Maryland, Spicer Road, Exeter, Devon.

CHANGE OF ADDRESS

- G2DWN**, S. Hibbert, 112 Bramhall Lane, Davenport, Stockport, Cheshire. (*Tel.: STE 6325.*)
- GM3BST**, J. B. Tuke (*ex-G3BST*), Felsberg, Fetler Road, Bridge-of-Weir, Renfrewshire.
- G3BX**, C. J. Sanders, Twineham Grange, nr. Bolney, Sussex. (*Tel.: Bolney 394.*)
- G3GWI**, N. Spivey, 80 Melton Avenue, Clifton, York.
- G3IDR**, R. D. Raby, 35 Caldbeck Drive, Woodley, Berkshire.
- G3IGJ**, G. T. Brown, 16 Wingfield Road, Trowbridge, Wilts.
- G3IOE**, A. H. Edgar, 10 Western Avenue, West Denton, Newcastle-on-Tyne, 5.

- G3JYA**, E. A. Smith, No. 265 W.O.M.Qs., R.A.F. Station, Marham, Kings Lynn, Norfolk.
- G3LQX**, M. A. Nicolaides (*ex-ZC4MM*), c/o Signals Office, R.A.F. Station, St. Mawgan, Newquay, Cornwall.
- G3LYK/A**, W. McLardy, c/o Officers' Mess, R.A.F. Station, Waddington, Lincoln.
- G3MEJ**, P. J. Tew, 60 Fieldend Road, London, S.W.16.
- G3MGI**, D. Binns, 80 Gipton Wood Road, Leeds 8, Yorkshire.
- G3MWZ**, P. Casling, 31 Fiskerton Road, Cherry Willingham, Lincoln. (*Tel.: Reepham 243.*)
- GM3MXN**, T. Sorbie, 60 Mabel Street, Motherwell, Lanarkshire.
- G3MXZ**, R. Wesson, 58 Rochester Road, Linthorpe, Middlesbrough, Yorkshire.
- G3NNP**, M. L. Luff, Imperial College Field Station, Silwood Park, Sunninghill, Ascot, Berks.
- G3NRW**, A. I. H. Wade, 20 Upper Pines, Woodmansterne, Banstead, Surrey.
- G3NSY**, F. J. Hall, 2 Ashford Drive, Sedgley, Dudley, Worcs.
- G3OAZ**, J. Akehurst (*ex-DL2VM/5A4TZ/DL2BC/GW3OAZ*), 1 Stevens Cottage, Bridge Street, Ipplepen, Newton Abbot, S. Devon.
- G3OCX**, J. Boulter (*ex-GW3OCX*), 175 West Drive, Cleveleys, Blackpool, Lancs.
- G3OGY**, S. H. Andrews, 16 Latham Road, Blackrod, Chorley, Lancs.
- G3OUF**, D. A. Evans, 80 Argyle Road, Ealing, London, W.13.
- G3OUL**, University of Liverpool Amateur Radio Society, c/o 2 Bedford Street North, Liverpool, 7. (*Tel.: ROYal 4744.*)
- G3PQF**, D. H. Dell, 40 Field Way, Aldershot, Hants.

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THE MONTH WITH THE CLUBS

By "*Club Secretary*"

(Deadline for May Issue : April 13)

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

EVER since the echoes of the last MCC died down, we have been receiving requests and suggestions from Clubs for more competitive events designed to keep Club stations on their toes. These have been carefully considered, always with the feeling that it would be impossible to organise another full scale Contest on the lines of MCC, since most week-ends throughout the year are occupied by at least one event of some kind.

Accordingly, it has now been decided to run a kind of "League Table" for Clubs by initiating a small, short-duration competitive event every month. This monthly "task" will be set well in advance, and the points-scoring system clearly set out. Clubs will then be able to send in their claimed scores with the usual report each month, and we will publish a Table or Ladder showing the monthly competition result, and a running total, throughout the year.

The whole idea is to provide a standing monthly competition for Club stations operated by members, which can be entered either regularly each month, or whenever desired. Those who are familiar with what are known as postal matches in other forms of inter-club competition, e.g., small-bore rifle shooting, will see the analogy. Logs will not be required—simply a signed statement that all has been above-board.

These events will be for *Club stations only* (not members' private stations) and will accordingly be set on weekdays, since many Clubs do not have access to their clubrooms at week-ends. The first event is scheduled for the latter part of April and the first ladder will appear in the June issue. Details of the April event appear in the panel on p.103, from which it will be seen that clubs, for their convenience, may choose whichever one of three dates suits them best. Total operation—three hours; but of course clubs may (if they find it possible to do so) operate on all three days and choose the best log for entry. A new event will be announced each month, always for about a fortnight after current publication date, which gives time to prepare and to get the log in by the following deadline date.

Burnham-on-Sea hold their monthly meeting on April 10, when G5DW will talk on Two Metres; this will be at 8 p.m. in the Crown Hotel. **Bury** met the Eccles Club for an inter-Club Quiz during March; plans are now on hand for them to run an R.A.E. Course, and Morse lessons are already under way at the home of one of their members.

Cannock Chase meet on the first Thursday of the month at the White Lion Inn, Bridgtown, 7.30 p.m.; their annual dinner will be in April (date not yet announced). A social evening will be held in the Clubroom on April 12.

The last two **Cornish** meetings were held at Falmouth and at Redruth; subjects covered included Erection of Aerial Masts and G3OCB's SSB transmitter; their AGM will be at the Ambulance Hall, Redruth, on April 4.

Exeter, at recent meetings, had a talk and demonstration on G2FCI's Top Band Transmitter/Receiver and his VHF receiver; and an SWL evening. The March meeting took the form of "Ask Me Another"—a competitive event between the Torquay and Exeter clubs; April 3 was booked for a talk on Tape Recorders.

Greenford report that they have a "young and healthy look," with an average of 18 being maintained (but they don't say whether they mean age or numbers!). New calls within the Club are G3PJQ, 3POZ, 3PSC and 3PRU; meetings are at Room 1, Greenford Community Centre, Oldfield Lane, on alternate Fridays at 8 p.m. On April 13 there is a Junk Sale, and on the 27th a Construction Contest.

Grimsbey meet fortnightly at the Abbey (RAFA), Abbey Drive West, next dates being April 12 and 26; they held their Annual Dinner on March 22 at Darley's Hotel, Cleethorpes. **Halifax** will hear about Surplus Conversions from G3MAX on April 17, and at the following meeting, May 8, G5YV will talk on "Life on Two Metres."

Harrow meet on April 13 for a talk on Transistor Applications; on the 27th a member's rig will be dissected in a "spontaneous discussion on members' shacks." May 11 is the date for a Junk Sale; alternative dates are Practical Evenings, and R.A.E. and Morse instruction are provided every week; a comprehensive kit of tools is now available for members' use on their own equipment on the Practical Evenings.

[over

NEW CONTEST EVENT FOR CLUBS

Starting this month, a new Club competition is inaugurated, shorn of all complication and devised to give Club stations an interesting operational exercise every month. See discussion on this page and rules for Round 1 on p.103.

**Names and Addresses of Club Secretaries
reporting in this issue**

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FLINTSHIRE: H. T. Jones, GW3NQP, Bedwyn, Queens Walk, Rhyl.
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HARROW: A. C. Butcher, 95 Norval Road, North Wembley.
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I.R.T.S.: T. O'Connor, E19U, 280 Collins Avenue, Whitehall, Dublin.
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NORTH NOTTS: E. N. Badger, G3OZN, 20 Tennyson Drive, Worksop.
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PURLEY: E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.
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ROTHERHAM: S. J. Scarbrough, 25 Crawshaw Avenue, Sheffield 8.
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SOUTH HANTS: G. J. Meikle, G3NIM, 34 Victoria Road, Netley Abbey.
SOUTH MANCHESTER: M. Barnsley, G3HZM, 11 Cemetery Road, Denton, Manchester.
SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
SUTTON & CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
THAMES VALLEY: K. A. H. Rogers, G3AIU, 21 Links Road, Epsom.
TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.
WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington.
WOLVERHAMPTON: J. Rickwood, 738 Stafford Road, Fordhouses, Wolverhampton.
YORK: N. Spivey, G3GWI, 80 Melton Avenue, Clifton, York.

Hastings report consistently good attendances, and their fortnightly meetings are programmed for some months ahead; on April 10 G3MME will talk about Electricity Distribution, and on April 24 G6QB will present "Radio Miscellany." Hull recently held their AGM and re-elected their chairman and treasurer; G3OMO is the new secretary (see panel for QTH). They meet on the second and last Tuesdays at the Royal Oak Hotel, Ferensway, and the April 10 meeting will cover Workshop Practice.

Liverpool University have obtained some equipment and are now active (Ten metres to One-Sixty) with about a dozen operators available; the hon. secretary would be pleased to hear from his "opposite numbers" in other Universities and Technical Colleges. Recent activities have included visits to Granada TV and the Dock Radar installations, talks on RTTY, Two Metres and Colour TV.

Manchester will meet on April 11 (Practical Night), 18th (Morse and R.A.E.) and 25th (Lecture, subject unknown). They have arranged a trip to Lake Windermere and Morecambe for Sunday, May 20, when they hope to operate from the coaches, signing G3HOX/M, and also to have G3HOX/P on from Westmorland, using kite aerials on Top Band. Details of this trip from the hon. secretary.

Northern Heights have recently heard a talk by G6BX on his Interlaken holiday, and one by G3GJV on his mobile activities; on May 2 they are visiting Leeds and Bradford Airport, and on May 16 G3OGV will be discussing Converters for Two and Four. A visit will be paid to Holme Moss TV station on May 30. North Kent will be addressed on "Getting Mobile," by members of the A.R.M.S., on April 12; they meet again on the 26th (to be arranged) and May 10 is the date for their AGM. Peterborough, for their March meeting, visited the local automatic telephone exchange.

Purley are holding a Junk Sale on April 6 and a ragchew session on the 20th, both at the Railwayman's Hall, Whytecliffe Road; visitors welcome, and asked to note that access is by the side entrance. Rotherham have recently met for their AGM and for a lecture by G3GJF on the G2DAF Receiver; a full programme has been arranged for the coming season, including a Beginner's Course, Morse classes and many interesting lectures.

Slade will be hearing about Aerials from G3HHD

CLUB PUBLICATIONS RECEIVED

We acknowledge, with thanks, receipt of the following Club Publications: A.R.M.S. (*Mobile News*, February); South Birmingham (*QSP*, February); I.R.T.S. (*IRTS News*, February); Wolverhampton (*Newsletter*, March); Southgate (*Newsletter*, March); Reigate (*Newsletter*, February); Purley (*Splatter*, March); Hastings (*Natter-Net Notes*, March); North Kent (*Newsletter*, February and March); Mitcham (*Newsletter*, February); Midland (*News Letter*, February, March); East Kent (*The Carrier*, January/February); Crystal Palace (*Newsletter*, February and March); A.W.R.A.R.S. (*Broadcast*, Winter 1961/62); R.A.I.B.C. (*Radial*, March); South Hants (*QUA*, March); Nottingham (*News Letter*, February/March); Surrey (*SRCC News*, March); Wirral (*News Letter*, Vol. 15, No. 4); Enfield (*Newsletter*, No. 9, Vol. 13); and I.H.H.A. (*Newsletter*, January).

on April 6, and April 20 is the date for their Evening D/F Contest. **Sutton and Cheam** recently held their annual construction contest and the Annual Dinner.

Wolverhampton have a Ragchew on April 9; on the 23rd (Easter Monday) there will be no meeting. Then on the 29th they are much taken up with the Trentham Gardens Mobile Rally. **Southampton** will meet on April 14 (7 p.m.) in the lecture theatre of Lanchester Building, Southampton University, for a talk on SSB by G3HLW. Their D/F Hunt has been provisionally fixed for May 20—further details next month. Attendances have been good, but more members and visitors will always be welcome.

Rhondda Valley held their Annual Dinner in March despite conditions which included a blizzard and the disruption caused by the smallpox outbreak. However, it turned out to be a cheerful and successful night.

York are now meeting fortnightly at their Hq. in Fetter Lane; intervening weeks there will be meetings when the Club Tx is on the air, CW practice will be held, and technical or topical discussions will be arranged. Formal nights for April are the 12th and 26th, the former possibly taking the form of a visit to the local Electricity Works.

Midland meet on April 17 for a lecture-demonstration (by IBM) on Electronic Data Processing. This will be at Norfolk House, Birmingham Ringway. Normal meetings are on the first Thursday and third Tuesday, at the Midland Institute.

Reigate held a very successful Annual Dinner, attended by thirty-nine members, wives and visitors, including a large party from Crawley, continuing a close association between the two Clubs. On April 14 G6QB will be talking on Forty Years of Amateur Radio—at The Tower, Redhill, 7.30 p.m.

Crystal Palace held their AGM and elected G3BCM chairman, G2LW treasurer and G3FZL secretary. Tuesday meetings are discontinued, in view of the possibility of finding a more suitable meeting place, but the usual meeting on the third Saturday at Windermere House Annexe, Westow Street, Crystal Palace (8 p.m.) will be continued until June. On April 21 they will be holding the second round of the Quiz Contest.

Silverthorn meet at 8 p.m. on the first and third

"LEAGUE TABLE" CONTEST FOR CLUBS

Round 1—April 24, 25, 26

RULES

1. Club stations located in Clubrooms or Headquarters premises may compete, but *not* members' private stations.
2. The event will take place between the hours of 1800 and 2100 GMT on the three days April 24, 25 and 26, but an entry for scoring is restricted to any *one* of these days.
3. Operation for Round 1 will be on 14 and 21 mc, CW or Phone, the object being to make contacts *outside Europe* with as many Zones and Countries as possible. No country or Zone within Europe will count for points.
4. Scoring will be on the basis of *one* point for each country or prefix area worked and *five* points for each Zone worked. Only one station in each country or prefix area will count for scoring purposes. The Zones are as defined in the *DX Zone Map*, obtainable from our Publications Department.
5. No detailed logs need be submitted, but we require, for each monthly event, a claim showing (a) Stations worked; (b) Frequency Band; (c) Phone or CW; (d) Points scored for each country and Zone, with total. Claimed score to be submitted at same time as Club report—by *May 11* for *June* issue.
6. This claim must be accompanied by a declaration, signed by two members of the Club committee, to this effect: "We hereby certify that our Club station G was operated in accordance with the licence conditions at all times, and that this list is a true record of stations worked."

NOTE: The claim may be submitted for any *one* of the days April 24, 25 or 26, between the times of 1800 and 2100 GMT. The day chosen must be indicated.



Fridays, at the South Chingford Community Centre. On the second Friday members form a Top Band net, during which the unlicensed members of the Club divide themselves up among the seven transmitting members' shacks.

Thames Valley will be meeting on April 7 to hear G5WP give a talk on a subject of his own choice.

Taken at a recent meeting in the club-room of the Reigate Amateur Transmitting Society, when the hon. treasurer, G3KAX, was prising their subs. out of G3BBR, G3NKS (pipe), G3PNA, and SWL's Seaman and Eldridge. Reigate is one of the more active local groups in the London area, and they publish their own monthly news-sheet, "Feedback."

On May 2, G4ZU will be talking to them about his FB5 Multiband aerial, and this meeting will be at Thames Valley's headquarters, but combined with other local clubs.

Torbay held their Annual Dinner and Prizegiving in March at the Abbey Lawn Hotel, with the Corporation's publicity officer as guest of honour. The April meeting is their AGM. All meetings on the second Saturday, YMCA, Castle Road, Torquay.

Crawley report a very successful Annual Dinner on February 24, with 46 members and friends, including a large party from the Reigate club, assembled at The Apple Tree. On April 25 G2UJ will be discussing "Project Oscar."

The first meeting and official founding of a new club at **Hounslow** will take place on April 9 at Flat 3, 270 Twickenham Road, Isleworth, at 7.30 p.m. All interested amateurs, SWL's, YL's and XYL's are invited to attend, and refreshments will be available next door at The Jolly Gardeners. Those who propose to turn up are asked to contact G3PJG (12 Downs View, Isleworth, or ISL 5727).

Nottingham report a fair level of activity, and now publish a news letter. Recent events have included a visit to the Derby Club's junk sale, a Film Show and their AGM; see panel for new secretary's QTH.

Barnsley are looking for a QTH for a permanent club station. Meanwhile, at the King George Hotel, Peel Street, they will meet on April 13 for an Open Night and on the 27th for a lecture by G6LZ on VFO/CO mixers.

North Notts are taking part in the Workshop

CLUB NEWS IN BRIEF

- Bradford:** April 10 and 25, at 66 Little Horton Lane, 7.30 p.m.
- Derby:** April 11 and 25, at Room No. 4, 119 Green Lane, Derby.
- Dorking:** April 10, Informal Meeting at Wheatsheaf; April 24, Demonstration (G3LHC) at Star and Garter.
- I.R.T.S.:** April 27, at Standard Hotel, Harcourt Street, Dublin.
- Plymouth:** May 8, AGM, at the Guild of Social Service, New Marlborough House.
- South Birmingham:** April 19, Film Show; May 17, SSB Lecture by G5BJ, at Friends' Institute, 220 Moseley Road, Birmingham 12.
- Acton, Brentford and Chiswick:** April 17, at AEU Club, 66 High Road, Chiswick, 7.30 p.m.
- Chiltern:** Last Thursday of month, at British Legion Hall, St. Mary Street, High Wycombe.
- Flintshire:** April 30, Film Show at the Railway Hotel, Prestatyn.
- Wirral:** April 18, Lecture by local TA Unit (Sigs): May 2, Constructional Techniques, by G2AMV and G3CSG.

Rotary Club Exhibition, at the Bentinck School, Workop, April 26-May 2. An HF-band station and a separate Top Band outfit will be signing GB3RCW on Phone and CW. Recent lectures, on TVI Suppression, Mobile Operating and the 888A receiver have all been well attended.

South Manchester meet on April 6 (Simple Transmitters and Modulation, by G3HZM), April 13 (SSB Techniques, by G3GRO) and April 27 (Junk Sale). On May 4 there will be an Open Night, with the Club Tx, G3FVA, on 160 and 80 metres.

Surrey (Croydon) met on March 13 for a Mullard lecture on Practical Applications of Transmitting Valves; April 10 is the date for their 21st AGM.

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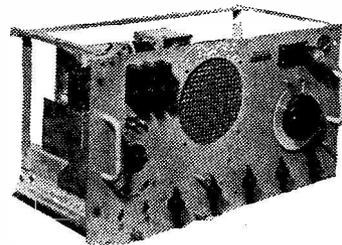
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SALE: HRO-MX, good appearance, four coils covering all amateur bands; two HRO 6-volt power units, suitable 230v. AC power unit, £9 the lot. Hallicrafter 5/10, £4. All complete and working, but some attention necessary; carriage extra.—G5WW, Dovecote, Hunts Hill, Naphill, High Wycombe, Bucks.

PANDA EXPLORER, £50; Taylor valve-tester 45A, £6; unused Eimac 4X150, £11 pair; S.T.C., £8 pair. Carr. extra.—Box No. 2592, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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FOR SALE: AR88D. £40 o.n.o.? Or would exchange for Brenell Mark 5 Tape Deck.—L. Carrier, 47 Green Street, Eastbourne, Sussex.

SALE: Hallicrafters Receiver S-38C, 540 kc-32 mc, 110 volts, £17 10s. o.n.o.?—Alderton, 18 Lyndhurst Road, Coulsdon, Surrey.

WANTED: Marconi CR-150 Receiver; also scrap set for spares.—Price and details to: Joslin, 13 Talbot Road, Skegness, Lincs. (All letters answered.)

WINDSOR Meter 88A, £10. Four-gang 318 μ F, matching set "Stabquoils," 100 kc-30 mc IFT's, crystals, RFC, £10. Eddystone Bug Key, £3. Eddystone 898 S/M Drive, £2 10s. Q.C.C. 10x 1 mc crystal, £2. Transformers, valves, books; details sent.—Box No. 2596, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CW TRANSMITTER, pair 6146, Geloaso VFO, PSU, £10 o.n.o.? FB QRO ATU, includes SWR relays, variable coil, etc., £3 10s. Two Wave-meters, Type C, fair condition, 1340/7510 kc, £3 each. Large commercial 'scope, untested, £6 10s.—G3LST, 31 Ingrave Road, Brentwood, Essex.

A MATEUR selling out: Complete station, 25w., all band, AM/CW, comprising R.107, £9; xtal conv., £2; modified TCS-12 Tx, £7; PSU, £3. Air tests; delivery 25m.—G3NRK, The Rectory, Sanderstead, Surrey. (Sanderstead 1366.)

MARCONI 390G Signal Generator for sale; excellent condition, with packing case, manual and calibration charts, as new; offers? Or would exchange for Top or all-band transmitter, or tape recorder.—O. Cairns, 35 Meadow Road, Sutton, Surrey.

PANDA CUB, 10-160m., 25w. phone, 40w. CW. excellent condition, £30 o.n.o.? (carriage extra). (Surrey.) Owner going Hi-Fi and needs cash.—Box No. 2597, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

OFFERS invited for American Pierson KE-93 Mobile Receiver, for disposal due enforced abandonment of mobile plans; 12-valve double super (xtal 2nd osc.), amateur bands 10 to 160 metres, plus MW/BC; specially imported last year, cost £95; virtually unused, in original packing with manual, speaker, spare valves; beautifully made, very small. Jason "Monitor" Tuner Unit for VHF/BC, plus BBC and ITV Sound; factory-built and aligned, with power-pack, very neat; £10 (cost £22). Labgear low-pass filter, E5034 (OK 150 watts), 42s. (cost £6).—Box No. 2598, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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SMALL ADVERTISEMENTS, READERS—continued

HEATHKIT Xmitter DX-40U and VF1U VFO. FB condition, £24.—(Phone Nottingham 76133), Merriman, 556 Berridge Road, West, Nottingham.

FOR SALE: Labgear LG.50 Tx, little used, excellent condition, £30. Present owner is restricted to 160m. at new QTH (Government establishment).—Box No. 2599, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Heathkit Mohican with batteries and manual, first-class condition, £35, inc. postage.—Farrar, Photo Section, R.A.F. Waddington, Lincs.

EDDYSTONE 840A, perfect condition, as new, £32 10s. Also R.107, little used, £8 10s.—Bumstead, 89 Udimore Road, Rye, Sussex. (Tel.: Rye 2342.)

R. 1132 RECEIVER, converted to cover 77 to 96 mc, modified 3-ohm output, guaranteed excellent FM reception; price £7, carriage paid. Also 12 Set, full working order, £10.—Wuille, 82 Nutley Crescent, Worthing, Sussex.

BC-348Q, internal power pack, modified front end, £9 or haggle; prefer buyer inspects; North London area. — Box No. 2600, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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FOR SALE: KW-160, Series II, Transmitter, as new, hardly used, for quick sale, £20.—G3PGL. 305 Lordship Lane, Tottenham, London, N.17. (Phone: TOT 8243.)

COLLINS 32V3 or B & W 5100-B Transmitter wanted.—Price and particulars to: Box No. 2602, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Geloso or KW Tx for /A QTH.—Write, giving details and price, to: G3LMX. 7 Burlish Crossing, Stourport-on-Severn, Worcs.

FOR SALE: New and unused valves: QQV06-40A's, 17s. 6d.; 829B's, 10s.; TT15's, 7s. 6d.; 5763's, 5s.; 6L6M's, 3s.—Box No. 2603, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MINIMITTER Table-top Tx, 120 watts, AM/CW. factory-built, excellent condition; delivery considered; £45.—G3EIX, 6 Mildmays, Danbury, Chelmsford, Essex (Tel.: Dunbury 720.)

BOLEX H16 Ciné Camera, three lenses in turret; exchange for good commercial amateur gear.—G3COI, 43 Mount Road, Penn, Wolverhampton.

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FOR SALE: HRO Senior, 9 coils, PSU, £15 complete; delivered free, London area.—Box No. 2605, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: "Griffin-Andec" GDO, 1.8-210 mc. self-contained and portable with batteries, mint condition, £7 10s. o.n.o.—Box No. 2606, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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WANTED: Army 12 Set, also handbook for same; will buy, or offer two Rx's in exchange; also 829's and 832's.—Box No. 2607, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Hallicrafters S20R or similar size Receiver.—Mahan, 28 Bayview Road, Stranraer, Scotland.

WANTED: 2-metre mobile rig Tx and/or Rx and/or transistor PSU.—Offers, with details and price, to: G3OHC, 24 Wood Green Road, Winson Green, Birmingham, 18.

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HRO SENIOR, rack mounting, rebuilt front end (5 miniatures), 6 coils (4 B/S), PSU, spkr., handbook, a hot Rx. £25 or offer?—G3RB, 12 Atkinson Terrace, Benwell, Newcastle-on-Tyne, 4.

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AR 88D, brand-new, mint and unused, complete in RCA transit case with S-meter, manual, trimming tools, inspection labels, etc., £56. Brand-new Withers TW-2 Tx, nuvistor converter with matching mains supply and control unit for both; few hours' use only at /A QTH; excellent performance; £43 complete. SX-28, very good and original condition, complete with manual, £30 o.n.o.? All plus carriage, or collect Lancs. area. **WANTED:** Hallicrafters 5-10 Rx, Simpson 1-166 and 260 multimeters, QQV03-20A, QQV06-40A, FT243-8 mc xtals; details and prices, please.—Box No. 2609, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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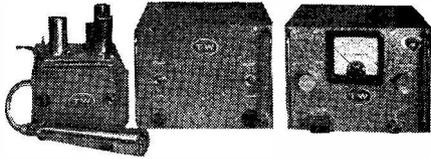
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EDDYSTONE S358 with PSU and 5 coils, excellent condition, £10. Buyer collects/or part carriage.—T. Smith, 2 Morris Cottages, Ladymead, Guildford, Surrey.

SALE: Eddystone S.750 with matching S-meter. Immaculate condition, £45. 80w. Tx, Geloso plus TT21 PA, with high-level mod. EL37's, UM2, etc.. with all power supplies, £35. Mohican Receiver (professionally constructed), £30. Taylor Sig. Gen.. 100 kc-160 mc, new condition, but requires mains transformer, £5. Prefer buyer collects.—GM3OBC. Star, Markinch, Fife.

R.107 Receiver, good condition, with manual and phones, £10. R.208, mint condition, with manual, £9. ZC1, Mk. 1, converted Top Band, with crystal mike, £9. "Radio City" test meter, £2 10s. BC-454 3-6 mc Command Rx, £3. Manuals for 19. R.107 and 21 Sets, 5s. each. — Hardcastle, Rigton Grange, East Keswick, Nr. Leeds. (Tel.: *Rollingham Bridge 78.*)

FOR SALE: K.W. "Valiant" Transmitter, excellent condition, with notes, circuit, etc., £25. Eddystone S.640 receiver, good condition, with S-meter, circuit and manual, £19.—Box No. 2610. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CR-300, £6; CR-150, £12; R.1475, £6. Tx No. 9, 2-5 mc, 813 final, £6; Tx 5AH, 1-5-13 mc, with AC supply, £12. All good cond.; buyer must inspect.—Austin, 75 Snowden Avenue, Long Lane, Hillingdon, Middx.

NATIONAL 1-10 Receiver, complete, 27 mc-300 mc. £16 10s. HRO dial, 50s.; crystal filter, 20s.; power unit, 50s. B.T.H. F/S Meter, 250 mc-850 mc. £5. CR-300, £8 10s. U.S.A.F. receiver, 160m.-3,000m., 10 gns. Hallicrafters receivers: S.27CA. S-36A. S-37; s.a.e. — Wright, 4a Nepal Avenue, Atherton, Manchester. (Tel. 991.)

TRANSMITTER for sale: Author's prototype *Bulletin*, July 1960, 120w. A1, 14-21-28 mc. crystal mixer VFO, keyed, QV06-40A PA, excellent performance and condition, price £20; or £25 with PSU for quick sale.—Gearing, 21 Rastell Avenue, London, S.W.2.

SALE: 1958 ARRL *Handbook*, 10s.; ARRL *Antenna Book*, 7s. 6d.; *Beam Antenna Handbook*, 12s.; 90 copies *Short Wave Magazine*; 20 *CQ's*: 140 *QST's*; 32 *Bulletins*. — Offers to: Young, 1 Rugby Avenue, Neath, Glamorgan.

HRO SENIOR, PSU, 7 coils (3 b/s), spkr., N/Wim. HV/Reg., S-meter, manual, £22 o.n.o.?—Gardner, 5 Wellington Street, Southbank, Middlesbrough, Yorks.

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SMALL ADVERTISEMENTS, READERS—continued

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MINI-MITTER FB5 aerial, double stack array, as new, £7.—Templer, Parsonage House, Woodbury, Nr. Exeter, Devon. (Woodbury 364.)

WANTED: 750 and 600v. 200 mA power packs, or transformers; and 3-6 mc Command Rx.—G3OXD, P.O. Box 3, Oldbury, Birmingham.

SALE: R.A.E. Course, mint condition, £5. **WANTED:** Radio-telephone, Hallicrafters HT-11, Collins TCS or similar, with or without DC power unit.—Box No. 2612, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: R.109 receiver, 1.8-8.5 mc; also 6v. battery (Oldham's), bought specially for same; both in good working order, 9 months old; £8 10s.—Fraser, 189 Market Street, Tottington, Bury, Lancs.

R.208, excellent condition, with manual and two-valve pre-amplifier, £10 o.n.o.? —Craggs, 57 Priorswood Road, Taunton, Somerset. (Phone 81253, evenings.)

SALE: Mosley 2-element Tribander and cowl gill rotor, £12.—G3NXX, 1 Gib Lane, Hoghton, Nr. Preston, Lancs.

SALE OR EXCHANGE TW2 and matching mains PSU, as new; TW nuvistor converter, 24-26 mc IF, built-in PSU. **WANTED:** Mobile or Eddystone Rx.—Box No. 2613, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED, for Bradford G.S. Radio Club: Lab-gear wide-band multiplier; pay £2.—Gregson, 64 Harbour Road, Bradford, 6, Yorks.

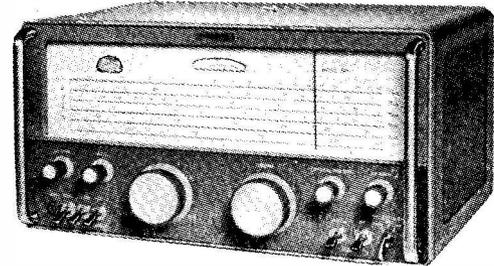
CHOKES, 2/250 mA 10 Henry, 18s.; 2/225 mA 5 Henry, 17s.; 1/250 mA 4.2 Henry, 16s. Transformer 400/0/400 115 mA + 330 at 10 mA, 5v. 2A + 5v. 3A, 230v. Pri, 25s. Pot meter, precision, 9K, w/w, 3 ins. by 2 ins. deep, continuous rotation, lab. style, by Colvern, 20s. Motor, 1-h.p., 230v. AC, offers? All except motor, post paid.—G3MHM, 168 Bordesley Green, Small Heath, Birmingham, 9.

FOR SALE: AR88D, with manual; good condition, £35.—The Vale, South Road, Horndean, Portsmouth, Hants.

FOR SALE: Q-Fiver, 6v., perfect working order; Command Tx, 4-5.3 mc, less valves; 3/813's; Class-D Wavemeter, perfect, unmodified; Blaupunkt 6v. car radio, complete, fully tunable, over MW and VHF (FM) band. The lot, £20. No offers.—G3NJM, 12 Rawlinson Road, Catterick Camp, Yorks.

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COMPLETE Teleprinter rig, Creed page printer 7B, silence cover, two governors, GPO table fitted power units, "W2JAV" Terminal Unit, works from speaker sockets of Rx; audio tone keying unit plugs in mike socket of SSB Tx; also Type 44 perforator. Sell as complete outfit only; can be seen working; buyer must collect; £40.—G3BDH (*Crescent 4139 after 8 p.m.*).

FOR SALE: Genuine AR88 dB tuning meter, brand-new and boxed, 62s., inclusive of postage. Spares also available for AR88D/LF; send s.a.e. for list. Avominor Meter, DC volts, DC current and ohms ranges, brand-new, in leather case, 55s. WANTED: Manuals for AR88D and AR88LF, and also on other Receivers, etc.—A. J. Reynolds, 139 Waller Road, New Cross, London, S.E.14. (*Telephone New Cross 1443 after 7.30 p.m.*)

FOR SALE: Advance J2 signal generator, £30. Grundig TK5 tape recorder, £35. GEC crystal calibrator, RF chokes, etc.—Please send s.a.e. to: G3NFT, 45 Mincinglake Road, Stoke Hill, Exeter, Devon.

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MINIMITTER MR44-II, 6 months old, £41.—Burns, Mews Lane, Kirkcudbright.

EDDYSTONE 680 Communications Receiver, excellent condition, panel finished in attractive hammertone, £25.—Please write to arrange inspection: R. Ives, 30 Blossom Way, Heston, Middlesex.

SELLING UP: 90 miniature valves, £12 (will separate); coils, tubes, spares; s.a.e. for list. Don't hesitate; write for your needs now.—Box No. 2614, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

GIFT: Minimitter Tx, mike, LP filter, spare valves, mint condition. Offers over £35.—G8PO, Hill Head, Fareham, Hants.

WANTED: One CR-100 Receiver, good condition, BFO.—Full details and price to: R. Rowsell, 21 St. Peter's Road, Harborne, Birmingham, 17.

EDDYSTONE 680X 5-band Short-wave Rx, little used, speaker and manual, £75.—Box No. 2615, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Hallicrafters S-38C Receiver, 550 kc-30 mc, with bandspeed, £15 o.n.o.? —Box No. 2616, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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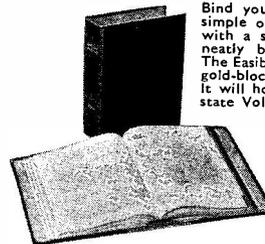
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