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Progress

It being accepted that amateurs are those who indulge in some hobby or pursuit simply because they are interested in it for its own sake, it follows that their approach is individual and therefore possibly unorthodox.

In no instance is this truer than in the amateur approach to radio. It also happens that radio is one of those sciences to which amateurs have made a large, important and lasting contribution. Proving the facts as regards what we know as the HF communication bands, uncovering the possibilities on VHF, and showing what can be done in the field of transisitory are only a few of the accomplishments which will stand any investigation when it comes to evaluating the worth of the amateur contribution.

Progress is always the result of enquiring minds questioning existing theories, or refusing to be content with established doctrine or practices. Had Sir Oliver Lodge refused to accept the opinions and advice of the pundits of the Royal Society of his time, it is a fair certainty that he would have forestalled Marconi in proving the practicability of communication by electro-magnetic waves. That Lodge allowed the scorn of his colleagues to discourage his own further experiments along these lines merely makes the contribution of Marconi all the greater.

In our own context at the present time, it is true that much amateur effort is wasted effort because the individual is re-discovering facts that are already established. But this does not matter at all because it is in itself a valuable exercise. The books cannot possibly teach everything, and much must be found out by personal experience and, above all, by experiment.

In the field of Amateur Radio, there cannot be too much of this process of personal investigation along unorthodox lines, for it is the very essence of progress. Amateurs in the radio field are concerned mainly with getting a result, and it may be of great importance if the practical application of their ideas is not in accordance with current theory.
70 Watts of Audio

SPEECH AMPLIFIER / MODULATOR DESIGN FOR GOOD PERFORMANCE AND FULL OUTPUT

THIS article discusses the design and construction of a 70-watt modulator or audio amplifier, intended not so much for economy as for performance. There is only a difference in load impedance between the two applications. It is important, however, that in the former the pre-amplifier should be protected against RF pick-up in the early stages.

The firm suggestion is that if you are without test instruments, do not try short cuts, either by omitting components or using parts of unknown value—unless you want to spend a lot of time chasing faults. To build a sure-fire job, use standard components and do not cut corners. Evidence of indifferently designed, or constructed, modulators can be heard every day. One has only to listen on any band, any day, at any time, to hear plenty of poor signals, proving that some amateurs cannot build them. Good ones are a little more difficult, but well worth the extra trouble as a clean, distortion-free signal is more easily readable in the presence of noise and interference.

When it comes to the design of an amplifier the first thing to think about is the power output. This is usually settled very easily. If, for instance, we have a 150-watt transmitter, we require about 75 watts of audio. The next step is to look through a valve manual and pick a pair of valves that will give, say, 80 watts—or we can thumb through the magazines and find a design that says it will give 75 watts, and then copy it. Unless, however, you are using the stated HT voltage and a good modulation transformer giving the correct load it is a fair certainty that the thing will not give you the 75 watts you want. Output stages are very touchy about HT volts and unless you give them what they require they will not produce the expected output. They like to work into their correct load, too. So if you copy a design, copy it exactly, including the layout, unless you are prepared for trouble.

Evolving a Design

If you like to design and build your own amplifiers the first thing, then, is to consider the output stage and the HT voltage. If you are looking for a lot of audio power Class-AB2 operation with tetrodes is undoubtedly the most economical way to obtain it, but not necessarily the easiest. Class-AB2 requires a bias supply and a reasonably well-regulated driver stage. Zero bias triode valves can be used, saving on the bias supply, but the driving difficulties are increased, as much more...
input power is required. Tetrodes are never driven to heavy grid current like a triode operated under Class-B conditions.

With a pentode or beam tetrode Class-C final RF amplifier, slightly more audio power than half the DC input is required on account of the energy absorbed by the screen. To be more practical, assume we have a pair of 807's with 150 watts DC input. To modulate them fully we shall require about 80 watts of audio. Allowing for a modulation transformer efficiency of 90%, the audio power given by the modulator should be 90 watts.

Looking through valve data sheets discloses two types capable of giving nearly this power into the primary of the modulation transformer. These are a pair of 807's or a pair of EL34's. There are other valves which are just as capable of giving this output power, but as the experiments were carried out around Brimar 807's, only the valves actually used are listed, without giving alternatives.

It is just as well, here, to point out the apparent difference between American and English ratings. It is really a difference of meaning only in that the American figures are usually for Intermittent Commercial and Amateur Service (ICAS), whereas English figures are for Continuous Commercial Service (CCS). With the latter the valves have to be reliable and have a long life—somewhere in the region of 5000 hours or longer. Assume you operate 2 hours every day for 350 days a year. (The balance of 15 days you are away on holiday!) This will give you over 7 years of operating. If the valve is so overloaded that the life is reduced to 2000 hours it will still give nearly 3 years' service. No one would grumble at this.

In other words, it is often more economical slightly to over-run a small valve for intermittent use where 100% reliability is not required than to buy the next size up. To go from an 807 to an 813, for example, is quite a big jump! Incidentally, an 807 does not take kindly to RF overloading, particularly as regards grid drive and screen voltage. If overloaded in either way you will find the grid current decreases and the screen current increases until the valve destroys itself or the fuses blow. On the other hand, at audio frequencies, the 807 seems capable of taking quite a beating. The R.C.A. lists a pair of 807's with 750v. plate and 300v. screen as capable of giving 120 watts output. The Brimar data on the 807 gives the maximum output as 80 watts with 600 and 300 volts respectively. There is usually no guarantee of valve life when operated under ICAS conditions. The writer has obtained 120 watts from a pair of 807's with 850 volts HT and a well regulated 300v. on the screens without any breakdown or apparent damage to the valves.

The snag with AB2 output stages is the variation of anode current with speech level. The variation is at least 50 to 200 mA in anode current—that is, an increase of 4 times from quiescent to driven conditions, and a similar change in screen current. The difficulty is to hold the HT supply voltage constant. In passing, it should be mentioned that it is this variation in current that rules out automatic cathode bias. The maximum from a pair of 807's with cathode bias is about 35 watts audio with 600 and 300 volts on plate and screen. With the same plate and screen voltages but using fixed bias the valves are capable of double this output! The drop in HT plate and screen voltage under driven conditions is usually what limits the audio output, preventing one from obtaining the "book" figure. The Brimar figure of 80 watts for
600 and 300 volts on plate and screen with fixed bias is difficult to achieve with ordinary, reasonable sized, power units. With HT of 600v. under quiescent conditions, the plate voltage drops to about 550v. and the screen down to about 275v. (even with swinging choke input) when driven. With these actual voltages there is just about 50 watts available on the secondary. Do not misunderstand this statement. The valve manufacturers are not wrong. They are quoting what the valve is capable of doing if you treat it properly and give it the correct voltages under all conditions. That is to say, it must have its full 600v. when driven.

Hence, the easiest way to get this power output (80 watts) is to raise the HT voltage slightly so that it is still 600v. when the amplifier is on load. It means, of course, that in the quiescent state it will be up to about 650 or 700 volts. The screens must be held at 300 volts by means of two 150-volt stabilisers in series. The extra HT will not harm the valves.

**Power Pack**

Then there is the question of the rectifier. Few amateurs seem to use the dry-plate Westinghouse type of rectifier in high power circuits, so there is only the choice of the ordinary high vacuum type or the mercury vapour type. The latter are much the more suitable where Class AB2 output stages are involved, with their varying current, as the HT voltage is kept more nearly constant. They do not always, as some amateurs think, create RF interference ("hash") in the receiver if they are properly operated — even if unscreened. At least, that is the writer's experience over the years, with four 83's in a bridge circuit. On the other hand, they can be tricky if the plate AC voltage is applied before they have reached operating temperature and they will not, under any conditions, withstand overloading.

To review the position: A pair of 807's with 700 volts on the plates and 300 volts on the screen will give us about 80 watts. The currents

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<thead>
<tr>
<th>Component</th>
<th>Value</th>
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<tr>
<td>C1, C2, C5</td>
<td>50 µF, 50v.</td>
</tr>
<tr>
<td>C6</td>
<td>01 µF</td>
</tr>
<tr>
<td>C3</td>
<td>100 µF</td>
</tr>
<tr>
<td>C4</td>
<td>16 µF, 350v.</td>
</tr>
<tr>
<td>C7</td>
<td>2.2 megohms</td>
</tr>
<tr>
<td>R1</td>
<td>2,200 ohms</td>
</tr>
<tr>
<td>R2</td>
<td>560,000 ohms</td>
</tr>
<tr>
<td>R3, R11</td>
<td>470,000 ohms</td>
</tr>
<tr>
<td>R4, R12</td>
<td>100,000 ohms, 1-w.</td>
</tr>
<tr>
<td>R5, R10</td>
<td>22,000 ohms, 2 w</td>
</tr>
<tr>
<td>R6, R7</td>
<td>22,000 ohms</td>
</tr>
<tr>
<td>R8</td>
<td>22,000 ohms</td>
</tr>
<tr>
<td>R9, R10</td>
<td>10,000 ohms, 1-w.</td>
</tr>
<tr>
<td>R14</td>
<td>47 ohms, 1-w.</td>
</tr>
<tr>
<td>R15, R16</td>
<td>0.5 megohm gain control</td>
</tr>
<tr>
<td>R11</td>
<td>Woden UM2 matching xformer</td>
</tr>
</tbody>
</table>

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Fig. 3. Circuit of the modulator and driver section, discussed in detail in the text. With this arrangement, the full 70 watts of audio can be obtained from the 807's; by using a 6SN7 twin-triode, the driver transformer is eliminated. A suitable power pack for the speech amplifier/modulator complete is shown in Fig. 4.
will reach about 200 and 20 mA for plates and screens respectively on speech peaks. The anode-to-anode load should be about 6500 ohms and the grid driver stage capable of supplying about 35 volts peak to each grid with respect to earth. A fixed bias of about 30 volts on the grids is required and there is no way of avoiding it if you want this amount of power from a pair of 807's. (If you live in a district where the supply voltage tends to drop at night it is preferable to over bias slightly, otherwise the standing anode current will be too high when the mains voltage is low.)

**Driving the Amplifier**

There are two ways of driving the output stage—either by the usual driver transformer or by push-pull cathode-coupled triodes. The latter, with triode drivers, is probably the cheapest and easiest to feed with HT. The circuit is given in Fig. 3. It is the recommended Brimar arrangement. There is nothing special about it, except that it is sure-fire and works without any difficulty. One thing to watch is that the plates of the first 6SN7GT are well decoupled by a large RC filter, R8, C4. Whatever you do, do not make C4 less than 16 µF. If you do there is the possibility that the whole circuit will oscillate at about 2 cycles per second. This oscillation disappears when the amplifier is driven and takes 5 to 10 seconds to build up after the speech has gone off. It can be detected by putting an 0-100 mA meter in the cathode of one of the 807's, and will be shown by a slight waver.

### Table of Values

**Fig. 4.** Power Supply for the Speech Amplifier-Modulator

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>.01 µF, 400v.</td>
</tr>
<tr>
<td>C2, C3</td>
<td>40 µF, 450v.</td>
</tr>
<tr>
<td>C4, C5</td>
<td>40 µF, 450v.</td>
</tr>
<tr>
<td>R1, R2</td>
<td>10,000-ohm 20w., w/w</td>
</tr>
<tr>
<td>R3</td>
<td>250 mA or Woden PTF-14</td>
</tr>
<tr>
<td>R4, R5</td>
<td>1 meqohm, 1-w.</td>
</tr>
<tr>
<td>R6</td>
<td>1,000-ohm var., w/w</td>
</tr>
<tr>
<td>R7</td>
<td>5,000-ohm 20w., w/w</td>
</tr>
<tr>
<td>R8</td>
<td>1,000-ohm 5w., w/w</td>
</tr>
<tr>
<td>T1</td>
<td>230/6.3v., 3a.</td>
</tr>
<tr>
<td>T2</td>
<td>230/5v., 4a. or Woden PTF-14</td>
</tr>
<tr>
<td>T3</td>
<td>230/750-0-750v.</td>
</tr>
<tr>
<td>T4</td>
<td>230/6.3v, (see text)</td>
</tr>
<tr>
<td>RM2</td>
<td>Brimar RM2 metal rectifiers in series</td>
</tr>
<tr>
<td>RM3</td>
<td>Brimar 5R4GY</td>
</tr>
<tr>
<td>V1, V2</td>
<td>Brimar 5R4GY</td>
</tr>
<tr>
<td>V3, V4</td>
<td>Brimar OD3 stabilisers (VR 150/30)</td>
</tr>
</tbody>
</table>

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**Fig. 4.** Provided the main HT transformer T3 is properly rated, this power pack will run the 70-watt modulator comfortably. The stabilised supply is essential for the screens of the 807's; the necessary fixed bias is obtained by connecting a heater transformer T4 back-to-back with the main LT transformer T1.
or oscillation of the meter pointer. The 807 is prone to parasitic oscillation, but if 47-ohm resistors are connected to the plate caps and a VHF choke of about 24 turns of 22 SWG enamel wire, wound over a 1 watt resistor, is put in each grid, you will not have much trouble. No negative feedback is used because:

(a) NFB is tricky and can be a source of considerable trouble.
(b) A straight flat frequency response is not required; actually the response is more than adequate.

Building the Modulator

Regarding layout and construction: The diagram Fig. 3 shows a shield between the 807's and the earlier parts of the circuit. It is advisable to put a thin piece of aluminium right across the chassis so that the output stages are completely "blind" to the rest of the circuit. If the pre-amplifier (Fig. 1) is on the same deck or chassis not only is it preferable to have the screen—it is absolutely essential. The very small capacity formed between the 807 anodes and odd parts of the earlier stages is quite sufficient to cause self-oscillation. At audio frequencies one can take considerable liberties with wiring, except for high impedance circuits—usually grid circuits. These should not come near AC circuits carrying the heater current. The easiest and safest way for sure operation is to lay out the valve sequences in line as they are drawn in the diagrams. It may be a bit uneconomical as regards space, but it does prevent circuits doubling back on themselves and so avoids unwanted couplings between input and output sections.

Operating Data and Results

On the amplifier as built the main HT was 680 volts no-signal, which dropped to 630 when driven. The first 6SN7GT (in Fig. 3) draws 3-5 mA and the second 10 mA. These values increase slightly with drive. An input of 4 volts RMS is required fully to load the 807's, which gave 69 watts at 7% distortion on test. The response is flat from 200 to 15,000 c.p.s. which gave 69 watts at 7% distortion on test. The response is flat from 200 to 15,000 c.p.s.

The response of the amplifier has purposely been made good as it is preceded by a limiter to clip speech peaks—see curves Fig. 2. The flat response is necessary in order to preserve the output waveform of the clipper, V2b, V3a in Fig. 1, otherwise the phase shift (due to poor response) in the modulator can, and will, put peaks back on to the waveform. (The limiter itself will be described in detail in a subsequent article.)

The power unit may appear quite elaborate, and, in fact, it is — but unfortunately it is necessarily so in order to obtain a genuine 70 watts of audio. In the writer's case the two filament transformers are "surplus" 230/6-3v. items, one being rewound to give 5v. The main HT transformer is an ex-R.A.F. "surplus" component picked up at bargain price.

Hard rectifiers are used for the HT to avoid delayed switching and the associated thermal devices and relays. As previously stated, there is no way of avoiding the bias. With the 50-volt drop in the 10,000-ohm cathode resistors R13, R14 for the second 6SN7 valve, a negative supply of 80 volts is required; this has to be from a low-resistance source on account of the 10 mA taken by the second 6SN7. The easiest way to obtain this voltage is to connect a 6-3 volt heater transformer (T4 in Fig. 4) the "wrong way round," with the 6-3 side connected to the 6-3 winding of the transformer supplying the 807 heaters. Using a couple of RM2 metal rectifiers ensures that the bias supply comes up almost instantaneously when the heaters are switched on. Some form of protection against failure of the bias must be provided. This is done simply enough by a 250 mA cartridge fuse in the cathode circuits of the 807 valves, as shown in Fig. 3.

The course of the writer's professional work many amplifiers have been built exactly as described here; measured for power output all have given the same figures, behaved well and played no mean tricks. Switch on and you're in business!
Crystal Receiver with Self-Powered Transistor Amplifier

USING BC STATION CARRIER, RECTIFIED, TO PROVIDE HT

J. M. OSBORNE, M.A. (G3HMO)

Though this article describes what is no more than a simple BC receiver, the results it gives and the way in which it works will be fascinating reading to those interested in circuit design and the applications of transistors. For here we see another example of the versatility of the transistor and its extraordinary power-conversion capability—Editor.

THE normal A3 transmission from a broadcast station consists of a steady carrier and side bands containing the audio. With a conventional crystal set the audio energy ultimately powers the headphones, the steady carrier providing no information, for being steady, no audio results.

If the local station is strong enough this steady carrier can be rectified to provide enough DC to power a transistor audio amplifier. Some time ago Electronics (April, 1955) published such a crystal transistor set for working phones at increased strength on the local station and an English version,* using an OC71 or OC70, is shown in Fig. 1. This DC power is of the same nature as the AVC voltage in a normal valve receiver and varies with field strength and aerial layout. The success of the system depends entirely on the strength of the local broadcast carrier and the effectiveness of the aerial in picking it up.

Now, the requirements of such a receiving arrangement are twofold: It must be designed to provide the maximum DC power for the transistor, and also selective enough to avoid interference from any other strong BC stations. As is so often the case, these requirements are conflicting and a compromise has to be reached. In the receiver to be described these two functions are separated, with important advantages. The coupling to the aerial for DC power can be as tight as is needed for optimum HT input to the transistor, while the receiver tuned circuit can be made as selective as is consistent with reasonable audio output. The novel feature of the arrangement described here is that the receiver can be tuned to a station different from that which is providing the HT. It is thus possible to receive many Continentals at good headphone strength, because they are tuned by a selective circuit with low output and then amplified by a transistor audio stage. The power for this amplifier is provided by the local BBC station and the receiver thus remains a true crystal set with no batteries.

In the writer's case, it has been found possible to obtain loudspeaker results on several stations. It is difficult to give an exact idea of the audio output, but it is loud enough to follow all programmes without strain or effort while sitting in the same room as the speaker. It is not strong enough to talk down a loud conversation which would, in fact, reduce the intelligibility of the programme.

The Circuitry

To describe the circuit we will take the two parts separately. First the receiver proper is

shown in Fig. 2. The aerial winding is a Teletron crystal set coil and is designed to give good coupling into the crystal diode; it is slug-tuned and wound with Litz wire. For selectivity the aerial coupling has to be loosened a little and this can be done with a 100 µF trimmer in series. The primary of a midget step down transformer (actually designed for inter-stage coupling in transistor deaf aids) forms the load for the germanium diode and provides the input to a conventional grounded emitter transistor amplifier. The transistor is biased by a resistance R1, which should be adjusted for best results in each case and then left.

The power supply (Fig. 3) is provided by another crystal set, but here power transfer, not selectivity, is the watchword. The maximum RF power is collected in the tank circuit, which is tightly coupled into the rectifier circuit. This consists of a germanium diode with a 10 µF smoothing condenser. An 0-1 mA meter is almost essential for checking that the power is on, and in setting up. A dummy load of 5,000 ohms is also helpful in making the initial adjustments. A 10 µF capacity is needed to by-pass any audio component in the power supply. As far as RF is concerned, a condenser of 0.001 µF would have been adequate.

It has been suggested that full-wave rectification would provide more output. Results have been disappointing, though under some conditions increases of 10% have been observed. This is probably a matter of matching, which is very important, although not very critical. In other words, there is very little aerial power available and so it is important to get most of it where it is wanted. On the other hand, a 10% improvement is neither here nor there, as it makes no audible difference to the output.

To return to the subject of full-wave rectification: It would seem to the writer that there is a limited amount of energy circulating in the tank circuit and one cannot draw it off faster than it is being replenished by the aerial. The rectifier is a load or damping on the tuned circuit, and whether it happens to be full-wave or half is not going to make a startling difference. Certainly, the idea of collecting twice as much by collecting every half-cycle is quite false. However, for those who would like to try, two arrangements are shown in Fig. 4. The second is a bridge circuit which effectively doubles the rectifier loss, as in the conducting state two rectifiers are in series. The first circuit might therefore be a little better, but it does require a centre tap on the secondary.

Fig. 5 shows the complete circuit of the experimental receiver. The two parts are quite separate and can be tackled independently. The power unit should come first. Although tuning coils designed for crystal sets can be used for this section, much tighter coupling is needed for best results. The writer found that a good coil for his particular aerial system consisted of a 40-turn coupling coil of Litz wire on a 1-inch slugged former overwound with a 50-turn tuning coil of the same wire. The tuning coil is directly connected to the aerial and earth and is resonated by a fixed condenser and adjustment of the slug. Normally only one station need be tuned in on this circuit.

Table of Values
For Circuits Figs. 3 to 6 inclusive

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>100 µF Air Trimmer</td>
</tr>
<tr>
<td>C2</td>
<td>500 µF Tuning Condenser</td>
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<tr>
<td>C3</td>
<td>0.005 µF Capacitor</td>
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<tr>
<td>C4, C6</td>
<td>10 µF Electrolytic</td>
</tr>
<tr>
<td>C7, C8</td>
<td>Fixed pad for tuning local station</td>
</tr>
<tr>
<td>R1</td>
<td>100,000 ohms</td>
</tr>
<tr>
<td>R2</td>
<td>20,000 ohms</td>
</tr>
<tr>
<td>D1, D2</td>
<td>Germanium diode, GEX-34, etc.</td>
</tr>
<tr>
<td>T1, T2</td>
<td>Transistor Deaf Aid Transformer, Belclere type FM-4.5-41</td>
</tr>
<tr>
<td>G1, G2</td>
<td>Junction Transistor: Mullard OC70, OC71, Brimar TJ1, TJ2, TJ3</td>
</tr>
<tr>
<td>M</td>
<td>Meter, 0-1 mA</td>
</tr>
</tbody>
</table>

Fig. 3. If a circuit like this is tuned to a local BC station, appreciable DC power can be obtained from a germanium diode; this can be used to run a transistor. Experiments have shown that a good aerial is necessary to get the best results.

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Fig. 4. Broadcast power tuned circuits for the experimenter — these are two full-wave versions of Fig. 3 and are discussed in the text.
Fig. 5. By combining the circuits of Fig. 2 and Fig. 3 it is possible to have a multi-station receiver with its transistor amplifier working on radiated power. In this arrangement the power supply unit can be left set on the BC station giving the greatest DC output, the receiver itself being tuned round to any station that can be heard.

— the BC station giving the greatest rectified output.

Aerial Considerations

It must be emphasised that the success of the receiver depends on having a high field strength available and an aerial/earth system which can collect the power. The aerial should be high and long, with a good earth. In this connection the reader is reminded of the directional effect of the aerial, even on the medium wave BC band; aerials of comparable length and height can give very different results according to direction. This is a matter for individual experiment on site, and is worth spending time on to get maximum pick-up. It is also a most interesting and instructive exercise!

The initial current obtainable from the local "power station" — in the writer's case, the Third Programme transmitter at Daventry, 20 miles away — was at first 0.1 mA into a 5,000 ohm load, for which the aerial was 60 feet long and 35 feet high. By improved coupling 0.4 mA was obtained. A new aerial at right angles to the first, 120 feet long and 25-30 feet high, gave 1 mA into the same load, representing an overall improvement in power of 100 times (20 dB). This output is more than is needed to operate the transistor, and when the Light Programme is off the air, London Regional (330m.), 40 miles away, can provide 0.2 mA with appropriate adjustment of the tuning.

Taking relatively large power from the aerial into a rectifier can have disadvantages. If there is insufficient filtering in the power unit, speech from the local station can break through. Another phenomenon noticed is cross-modulation of a nearby BC receiver. A clearly audible background of Home Service was present when the set was tuned to the medium-wave Light Programme. This disappeared when the power for the receiver (shown in Fig. 5) was switched off by detuning. Second harmonic of the power-providing station is also very pronounced. For best results it is essential to have completely separate aerial/earth systems, one for power and the other for tuning the desired signals. Even so, using Third Programme power, a strong Third Programme signal (whose fundamental is 464m.) comes up on 232m. between Luxembourg (208m.) and the Light (247m.).

Receiver Design

The power may be accounted for roughly in this way. The Class-A audio amplifier cannot have an efficiency of greater than 50%. So it is clear that the audio output cannot be greater, in any circumstances, than half the...
total power available. There is not a great deal to be gained, theoretically, by using this set, transistor amplified, on the strongest local station except for the good selectivity. But with sufficient power gain in the audio stage every signal could theoretically be brought up to the level of the local, which is where the advantage lies. This implies that if one uses more than one stage of audio amplification, one should arrange that the earlier stage (or stages) draws a negligible fraction of the available power. In practice, it has been found worthwhile while using two stages of amplification where 3 or 4 mW can be made available from the “power supply” station. With less power, the set with one audio stage is more satisfactory and can still give good headphone reception of Continental as well as British broadcast stations.

To do justice to the power available at the writer’s site, a de luxe version of the set has been built (see Fig. 6). For reasons already given independent aerial/earth systems are used for power and signal. Better filtering has been incorporated. Two stages of audio are used, the first stage being allocated about 10% of the power. Band-pass tuning is used to get the maximum selectivity on the RF side. The set is obviously a straightforward development of Fig. 5, and this more complex circuit should not be attempted until the power facilities from local stations have been investigated and the simpler circuit of Fig. 5 proved satisfactory. With the more advanced set good loud-speaker results have been obtained on several Continental stations. A large and efficient speaker on a baffle should be used, as a small speaker does little better than a headset.

With two audio stages overloading occurs on local stations and the loudspeaker can be driven more effectively with one stage. The layout and building of these sets is not critical in any way and the only points which need watching are the electrolytics and the bias resistors. The electrolytics should have low leakage, as obviously one cannot afford to waste the major part of one’s power in this way. The bias resistors should be adjusted to suit the transistors and the values given are only a guide to the magnitudes involved. The best values usually lie between 20,000 and 200,000 ohms.

Some Further Ideas

One does not pretend that, in its present form, this receiver is more than a toy, even though it can be left running continuously and is switched on and off by the BC carrier! It has its difficulties and its limitations. On the other hand, the manner in which it works on radiated power opens up some interesting possibilities.

For instance, could one use a battery storage system to make more power available? Sealed low-voltage secondary cells are on the market. Could one power a transistor transmitter in this way? Perhaps G3CSZ/TTX would look into this! Have we here the basis of a new, simpler and more effective local-calling device, consuming only radiated power? (See SHORT WAVE MAGAZINE, December, 1954.)

Though it has been suggested that it is immoral to use the BBC’s Light Programme carrier to listen to Luxembourg (!), it cannot be illegal, since one is only drawing off the energy which cannot be prevented from reaching one’s aerial—nor is it possible, in any case, to get more than the BBC is putting down at one’s location.

No-Mains QRP

TWO-STAGE BATTERY TRANSMITTER

It would appear that many stations still use batteries for power supply—either for stand-by gear or simply because they are without mains. The small transmitter described here is, therefore, offered for those who are interested in these situations. Though the details as given are for 40 metres—a good band for QRP now that the LF end is being cleared—the general idea is applicable to 80 and 160 metres as well.

The transmitter follows conventional design and no snags should be met in construction and operation. The circuit consists of a crystal oscillator driving a Cossor 230XP in the PA. This valve is a “super” output triode, still available, and has been driven to 12 watts with 200 volts on the plate — although this, of course, is not advisable for any length of time!

In the model a permanent meter was included with suitable shunts and resistors, switched, for measuring the HT and LT voltage and PA grid and anode currents. But this is not necessary providing jacks are included in the respective leads and a suitable meter is available having ranges of 5 and 50 mA.

As both sides of the condensers are at HT potential, it is important to make sure that
Table of Values

Battery QRP Transmitter

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>C1</td>
<td>100 µF</td>
</tr>
<tr>
<td>C2</td>
<td>0.001 µF</td>
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<tr>
<td>C3</td>
<td>50 µµF</td>
</tr>
<tr>
<td>C4</td>
<td>Neutralising capacity</td>
</tr>
<tr>
<td>R1</td>
<td>20,000 ohms</td>
</tr>
<tr>
<td>C5</td>
<td>100 µµF</td>
</tr>
<tr>
<td>C6</td>
<td>0.01 µF</td>
</tr>
</tbody>
</table>

X = Alternative key positions

Coil Data — 7 mc Band

L1 = 14 turns 24 SWG enam. spaced over ½-in. on 1½-in. diam. former
L2 = 20 turns as above, spaced to tune with C5, and 2-turn link

they are well insulated from the panel. All supply leads are taken to a terminal strip at the rear of the chassis.

Adjustment

To set up the transmitter, the meter should first of all be inserted in the grid lead of the PA with HT applied to the CO only; when the crystal is oscillating a reading will be obtained—it might be 1-5-2.0 mA. Next, the PA should be neutralised, and the method is as follows: With the PA coil in rotate the PA tuning condenser. On passing through resonance a kick will be observed on the grid milliammeter. The neutralising condenser is then adjusted until no movement is observed when passing through resonance. It may be necessary to retune the CO slightly for maximum grid current during this operation.

When the PA has been neutralised it should be biased to twice cut-off value, and the HT applied. This biasing back should be done carefully, starting from a value which is too high for any reading to be obtained on the PA meter. The correct setting depends, of course, on the actual HT voltage used. With the meter in the PA HT lead, the PA should then be tuned for minimum current—which will be 3:5 mA, from approximately 40-50 mA when off resonance.

Operation

It will be observed that keying is by breaking the HT negative lead; with a condenser filter across the contacts, no trouble should be experienced with key-thump or chirp. Alternatively, the PA HT lead can be keyed.

This transmitter has been tried on the 7 mc band only; as regards results obtained, some excellent contacts were made with European stations using a maximum input of 5 watts, although mainly the input was in the region of 2-3 watts. The aerial was a 40-metre dipole, link coupled to the tank.

Though designed round what are nowadays regarded as “obsolescent” or “replacement” valve types for old battery receivers still doing duty in country districts, this transmitter circuit has merit in that it is simple and yet will give good results.

For those who are experimentally minded, and like the idea of a very small and really portable no-mains transmitter, there is the possibility of using the new 1·4v. battery miniatures, with a small HT/LT block such as the Ever Ready “Batrymax.” Indeed, there is great scope for the design of portable equipment of all sorts using the high-efficiency battery valves of modern type, for which Ever Ready battery units have been specially produced.

DX ZONE MAP

Readers interested in DX will be glad to know that they can still obtain our wall-mounting Zone Map. This is 35 ins. by 21 ins., in five colours, drawn to a great circle projection centred on the U.K., with time, distance and degree scales, and all chief place names marked. It also gives the 40 Zones into which the world is divided for amateur DX purposes, with a listing of the main prefixes under each Zone. The map is sent out well packed and rolled on a cardboard postal tube, and the cost is 3s. 9d. post free from stock, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.
We have to report another rather discouraging month, due to the seasonal conditions, rather than the overall level. In recent years, during the trough of the sunspot cycle, conditions have been so poor that one has almost forgotten the normal behaviour of the bands. Even at the peak of the cycle there is usually a notable falling-off of DX conditions during the height of the summer, and this is what we are now suffering from (without the compensation of summer weather). The first half of June showed us typical summer conditions in typical November weather!

Our prediction is that next autumn and winter will produce DX conditions better than anything experienced during the last twelve months, and most probably equal to anything remembered by any of us. Meanwhile we must make the best of a dull patch.

A fairly high MUF is somewhat masked by variable conditions and by inactivity on Ten, but the DX is certainly there nearly all the time, though weak. Incidentally, there is no shortage of world-wide DX for stations in or near the Tropics—it’s only in the Northern Hemisphere that this bad patch is holding things up. That, again, fits in with the normal pattern.

Reports are not quite so numerous this month, chiefly because of the uninteresting state of the bands, and partly because of holidays and other summer activities.

Ten Metres

The DX on Ten is somewhat scarce, especially to the casual operator who can only check the band when time allows. Even those who stick to it through all their spare moments haven’t extracted much.

G3HCU (Chiddingfold) collected CR7CO, VK6RU and VK6KW one morning (0850-0935), and another session at a similar time fetched in OQ5AJ and ZS6ZA—all on phone.

G2CDI (Stokenchurch) found four new ones during a period of short skip—F, HB, LA and EA—but didn’t notice any worthwhile openings.

GM2DBX (Methilhill) says “I’m happy to have a QSO with anyone I can hear—what a come-down!” G3GGS (Preston) reports little activity, but two new Europeans for the ladder.

G3GWO (Chelmsford) managed to winkle out QO0BH in Ruanda for an interesting one; others worked on Ten phone were VQ3 and 5, MP4KAC, CX, OD, ZD6RM and ZS3B.

Fifteen Metres

Apart from the mid-week lull, Fifteen has shown us some very nice DX. Daylight periods have often been dull, but by late afternoon the band wakes up and all sorts of things are liable to happen together.

New ones at G2CDI were SVØWE (Rhodes), TG9AZ, HH7YL, VP5RR, CT3AA, PJ2AN and VS4BO in Sarawak, as well as OZ, UA4, UB5 and UC2 (the latter on CW). A QSO with GC6FQ was believed to be the first GC/G phone contact on the band. Others raised on phone included KL7, VP4, 5, 6, 7 and 9, CO, VK (long path, 2230 GMT), ZD8SC, SVØWE (Crete), JA5, KR6 (1710), FM7 and PZ. Certainly not a bad month for CDI.

G3HCU has completed a new 4-element beam for 21 me and has it on a 25-ft. mast for trial. At that height it compares very well with the old one at 45 ft. New ones for G3HCU were ZM6AS (0805), ET2FM, ZD8SC, FB8BZ, SV6FP (Crete), VS4BO and BV1US (0836), among others. Also worked were quite a few interesting stations not new for the band, including VK1GU at 2210 GMT, with 5’s and 9’s both ways. (Last month G3HCU was inadvertently credited with his All-Time scores instead of 1956 figures; this has now been put right, and the raised eyebrows may be lowered again!).

G3ICH (Leighton Buzzard) has unfortunately had a spell in...
21-28mc MARATHON, 1956

<table>
<thead>
<tr>
<th>Station</th>
<th>21 mc</th>
<th>28 mc</th>
<th>Total</th>
</tr>
</thead>
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<td>74</td>
<td>140</td>
</tr>
<tr>
<td>G3HCU (Phone)</td>
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<td>41</td>
<td>113</td>
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<td>VQ4RF</td>
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<td>G3KHE (Phone)</td>
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</tr>
<tr>
<td>G3WZ</td>
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<td>14</td>
</tr>
</tbody>
</table>

San Maarten as PJ2MC. We shall be interested to hear how U.K. stations fared in the contests to work them.

Curtain Raised?

Slight pause to inform the uninformed that the Russian stations, in all USSR districts, are now working all and sundry with great gusto. Many of them follow a CW QSO for a phone contact, and most of them use the RSM scale (Modulation 1 to 5). Nothing as exotic as UA1 or UL7 or UM8 has yet been reported on 21 mc phone, but we shouldn't be surprised to see them turn up any time.

The keen country-chasing types are rejoicing in the fact that up to eighteen "new" prefixes are now available to them which have been taboo for some years. On the other hand, those who worked all the eighteen before the Russian closing-down order could hardly worry less.

DX on Twenty

There is not a great deal to report about Twenty, which has been performing just about normally, but with what still seems to be a great excess of short skip. (To greybeards like us it always seems like the pre-war Forty... and our distant memories of Twenty label it as a DX band on which one was seldom bothered by Europeans. Is it a case of rose-coloured spectacles, or does the fact that everyone uses so much more power nowadays explain it?)

Early morning is still the best time for an uninterrupted DX session, with Oceania, the Pacific, West Coast U.S.A., and sometimes Asia all liable to come through. Later in the day the Europeans take over, together with East Coast W's, but another good session can usually be organised in the late afternoon. It’s South and Central Americans you want, stay up late. This has been the pattern of the band from time immemorial—it is only the short-skip nuisance, with Europeans scratching one another, that seems to have shown such a change for the worse.

G3GGS raised some all-time new ones with 9S4AX, HZ1HZ and UA9FB, all on CW. But during sessions at 2200-2300 GMT h2 missed such interesting possi-
bilities as FE8AE, HH3DL, 3W5AA, ZS7C, H18FR, FG7XVB, CP3CA and BV1US (all CW, too).

G8PL (London, N.W.3) works the band in the early mornings, using his little indoor aerial, and has raised W's, VE's and an occasional VK. He has also been more successful with the South Americans, such as QA4AV, YV5HI and 5BJ, CX6CM, HC1FG, PZ1BS and the usual LU's and PY's.

CE0AD has been heard on CW, a very good signal around 14010 kc, 0500 GMT. But current information is that he is not interested in QSL'ing. Other interesting ones for the 'chasers are M1B, SV6FP (Crete) and BV1US, all on phone between 14100 and 14200 kc. VR1B has been around on 14080 kc, and has also been heard on Fifteen phone and CW; by the time you read this he will probably be active from Nauru as VK9TW, collecting his dollar-QSL's with the new "$600 receiver" with which he has just been presented by a well-known American firm. Unfortunately, Danny is credited (Christchurch Times, 24 Feb. '56) with the opinion: "I think my countrymen stink, with a capital S!" That means us! See "Letters to the Editor" for further comment on this rather disagreeable topic.

Forty and Eighty

These two bands are now really neglected by the DX types, and who are we to blame them? Only a few brief notes remind us of their existence this summer.

GM2DBX worked and received a QSL from his first British Maritime Mobile, having had a QSO with GM3HLQ/MM (in the Clyde!) He also raised GW3GRO/P, using four watts and 2500 ft. up in the Welsh mountains. Both of these on Eighty.

G3JHH (Hounslow) heard UA3BC on Eighty during the evening of June 13; the UA worked DL's and OK's and at least one G station.

Your commentator himself has had a few listening sessions on Forty (usually around midnight), and has been surprised at the number of the rarer Central and South American countries coming through—but they have always been swamped by W's and operating conditions have not been good in any case.

Top Band Topics

Even the Top Band is getting into its summer doldrums, but a certain number of the keen types continue to push their way through the static and keep things moving. Real DX work (meaning, at this time of year, long-haul GDX) is pretty difficult unless one has sessions at midnight and later. Even then the band seems slack.

Owing to a receiver breakdown, G2CZU (Bath) missed a contact with Nairn, which would have been a new one, but he raised GM3GZA on Lewis. On phone he has now worked 41 counties, of which 34 have QSL'd—he is still chasing that phone WABC. He also worked OK2KBA for his first OK, and ninth country on the band.

### FIVE BAND DX TABLE

**POST-WAR**

<table>
<thead>
<tr>
<th>Station</th>
<th>3.5 mc</th>
<th>7</th>
<th>14</th>
<th>21</th>
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<th>Station</th>
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<th>7</th>
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<td>13</td>
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</tr>
</tbody>
</table>
The very fine station of I1FA in Pavia, Lombardy, features an array of modern commercial equipment. All bands are worked and I1FA has been a well-known callsign for many years.

G3GGS found it a quiet month, but put his score up to 88 worked, 86 confirmed.

The hon. sec. of the Aldershot Club tells us that one of their members, G3AID, will be working from St. Mary’s, Scilly Isles, between August 6 and August 31, operating Top Band between 2200 and 2300 BST most nights if there is sufficient activity to warrant it. During the day he will also be on Twenty.

G2NJ (Peterborough) asks if no one will undertake a trip to Alderney this summer? Such an expedition would produce a lot of activity, especially from 'NJ himself, who has been standing at 97/97 and waiting for someone to put Alderney on the map for a very long time. He would also like another Top Band Daylight DX Test, on a Sunday afternoon. This we will organise as soon as the holiday season is over—probably for early September.

The Overseas News

The hon. sec. of MARTS (Malaya) would be glad to know the present addresses of any former VS1, 2, 4, 5, 6 and 7 amateurs, as it is intended to compile a list for publication in an early issue of The Malayan Radio Amateur. Will anyone in this category please drop a card by airmail to VS2DB, P.O. Box 777, Kuala Lumpur, Malaya.

K2BZT (Summit, N.J.) was the first U.S.A. station to qualify for our WBC award; he now claims his FBA and makes his first entry in the Five-Band Table. He sent in the latter figures “to show what a 150-watt station could do,” and says that the high-powered boys over there have dominated the bands so much during the past years of poor conditions that one tends to forget that most W's don't use more power than most G's. K2BZT himself gets plenty of fun with 150 watts to a centre-fed 3.5 mc Zepp, with a 3-element 14 mc beam to help along. (Incidentally, we should tell him that “most” G's are found to be using 150 watts or less simply because that's the maximum we are allowed over here!).

G8PL forwards some interesting notes from ZB2R, who has a 150-watt CW rig and will be on phone next month. He is on Twenty most evenings, and sometimes makes it an all-night session; Forty is “deader than dead,” but he does sometimes work Eighty with about 20 watts. There's too much QRM and QRN on One-Sixty, so he is not active at all on that band.

MP4BBW (Bahrein) found a few good spots during the last month or so, with nice openings on Fifteen, and even Ten sometimes in really good shape. New ones on Fifteen were VP5FH, ZD8SC, TG9AD, TL2RC and HK4CO, all of whom came back to CQ's. A WAC in just under two hours was obtained with TI2RC, VK4HR, HK4CO, OE2HW, 4X4FF and ET3AH (June 7, 0200-0400). Heard but not worked on Fifteen were BV, HC, HP, VP1, VK1, UB5, UQ2, EA10 and VK9, to mention a few.

MP4BCA is a brand-new station on Bahrein, at present sharing BBW's rig until his own arrives.
He shakes us by talking of TVI troubles — " Bahrein! " (The USAAF in Arabia run a TV programme on Band III.) Noise level is also very troublesome out there, largely of the man-made variety, and no one seems to bother about suppressors. (Perhaps the TV will, indirectly, do the MP4's a good turn!).

CN8AF (Casablanca) also makes FBA, and tells us that he runs a home-built band-switched transmitter on all bands from Ten to Eighty—50 watts to an 807. An HRO mates up with a home-made crystal converter for Ten and Fifteen. CN8AF is a member of the Old Timers Club and is ex-FT4AD and FA3XA.

DL7AA (Berlin), still top of the Five-Band ladder, reports that 3W8AA is OK (Rudi knows him well); that he will be on Forty at week-ends, and on Eighty this winter; also that the WAE " substitute country list " is withdrawn from June 1, but applications with substitute cards will be accepted until May 31, 1957. G6BS is the first WAE II holder on Phone; only twelve WAE I certificates are issued as yet, but 80 WAE II and 400 WAE III.

Certificates and Awards

We are very pleased to announce another Magazine DX Award—probably still the toughest nut to crack out of all the hundreds of certificates available from scores of countries. MDXA No. 4 goes to Glenn Thayer, W8K1A, of Defiance, Ohio. (The first three are held by G2PL, G8KP and W2QHH). Glenn put in a total score (all confirmed) of 16 countries on 160, 49 on Eighty, 100 on Forty, 253 on Twenty and 90 on Ten, thereby qualifying handsomely for his MDXA. It's still that qualification of 15 countries on One-Sixty that weeds them out! Congratulations, W8K1A, and also on making second place in the Five-Band Table this month.

And, in response to many requests, we reprint here full details of all our Awards, with the conditions attaching to them.

DX Strays

A small but unusual DX-pedition will be in operation on July 14/15, when G13KYP/P will be on the air from the Copeland's —a group of three small islands off Donaghadee on the Co. Down coast. Operators will be G13HXV, GI3UR and G13G5B, and five watts of CW will be going out on 80, 40 and 20. (At the same time G12HML will be on 144.138 mc with 20 watts of CW.) Contacts and reports will be appreciated—1700 GMT on July 14 until 1700 GMT on July 15.

It seems that VKI's are not necessarily exotic DX any longer, as we gather that VK2 calls have been re-shuffled and a number of VKI's are now in the former

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**SHORT WAVE MAGAZINE DX CERTIFICATES**

**WNACA (Worked North American Call Areas)**

Twenty-two cards to be submitted, for contacts with stations in ten U.S. Districts (W1-6); nine Canadian (VE1-8 with one 8 in Yukon, one in North-West Territories); Alaska (KL7), Newfoundland (VO) and Labrador (VO). Contacts may have been on any bands, phone or CW. Operators in W, VE, VO or KL7 are not eligible for this Award. (98 WNACA Certificates issued to June, 1956).

**FBA (Four Band Award)**

Cards to be submitted with confirmation of contacts with 20 different countries, each country to have been worked on four different bands. Any bands will qualify e.g., 160-80-40-20, or 90-40-20-10, or 160-40-20-15 — and so on. Entrant's own country may count as one of the 20 countries. (60 FBA Certificates issued to June, 1956).

**WFE (Worked Far East)**

Eighteen cards to be submitted, for 18 different countries selected from among the following: C (China), C3 (Formosa), C9 (Manchuria), CR9 (Macao), CR10 (Timor), DU (Philippines), F1 (French Indo-China), H1 (Korea), H5 (Siem), JA-KA (Japan), KR8 (Ryukyu Is.), PK1-2-3 (Java), PK4 (Sumatra), PK5 (Dutch Borneo), PK6 (Moluccas), UA0 (USSR in Zone 19), VS1 (Singapore), VS2 (Malaya), VS4 (British North Borneo), VS5 (Brunei), VS6 (Sarawak), VS6 (Hong Kong) and XZ (Burma). All or any bands count. (22 WFE Certificates issued to June, 1956).

**WABC (Worked All British Counties)**

Sixty cards required, from sixty counties of the British Isles, all to have been worked on the 160-metre band since January 1, 1952. Counties to be as shown in any standard atlas, not " administrative counties " such as the three Ridings of Yorkshire, East and West Sussex, County of Bristol, and so on. Isle of Wight counts as any standard atlas, not " administrative counties " such as the three Ridings of Yorkshire, East and West Sussex, County of Bristol, and so on. Isle of Man does score separately, as do all the Channel Islands. Scilly Isles also count separately. For London, the L.C.C. area scores as one County. (129 WABC Certificates issued to June, 1956).

**WBC (Worked British Counties)**

Open only to claimants outside the United Kingdom and Eire. Cards required from 50 different counties of the British Isles, worked on any band 3.5 to 28 mc inclusive, phone or CW. Stickers will be issued to claimants showing proof of contact with 60, 70, 80 or 90 counties. The definition of U.K. counties is the same as for the WABC Certificate above. (Award instituted December 1955. 26 WBC Certificates issued to June, 1956).

**MDXA (Magazine DX Award)**

To qualify for this Award it is necessary to have worked 3 continents, 15 countries on 160 metres; 5 continents, 40 countries on 80 metres; 6 continents, 80 countries on 40 metres; 6 continents, 180 countries on 20 metres; and 6 continents, 90 countries on 10 metres. (Four Awards issued).

This involves a total of 405 QSL cards, which should not be sent. A list of all qualifying contacts should be given in the first instance when claiming the Award, after which certain selected cards will be requested for scrutiny.

*A full List of U.K. Counties appeared on p. 20 of the March, 1956 issue of SHORT WAVE MAGAZINE.*

Claims, enclosing return postage, for all the above-mentioned certificates should be addressed " DX Commentary," Short Wave Magazine, 55 Victoria Street, London, S.W.1.
second district. More of this when we get full details. (See later.)

YV0AA was on the air from Aves Island around mid-June... XE4A (Soccorro Island) was also on from June 10, besieged by thousands of W's... A group of ON4's will have been on from Luxembourg, signing ON4QX/Lux, by the time this reaches you. If you missed them, you will be glad to know that DL1CR, DL3AO, DL9CI and DJ1BP will be going to Luxembourg for a week on either August 5 or August 12. They will be active, CW only, on all bands from Ten to Eighty—no call-sign yet announced.

VS2DQ passes on the following via G3HCU: VS4BO active (QSL via VS2DQ, Box 600, Penang)... VU5MR is an ex-VSI and was due to be on from Nicobar Island, on Fifteen, from June 15... Active on Fifteen phone are ZK1BS, KM6AX, KJ6BN, KM6CA and KX6ZB... VR3D, on Christmas Island, Pacific, is on Ten... ZC3AC, from the other Christmas Island (Indian Ocean) will show up some time in July.

“Rare” Russians now known to be operating are UG6AL, UN1AA, UP2KBA, UJ8AF and UR2AK... QSL’s for 3W8AA can go via OK1FF... AC0AA is said to be in Unamchi, Mongolia... FF8BR is not likely to return to the Comoro Islands owing to licence difficulties... FF8BI is on the island of Juan de Nova in the Mozambique Channel... ZD9AE has been worked by W's, but we know nothing of his status or authenticity... “SV1SM” on CW is said to be a Maritime Mobile in the Caribbean... YK1AC, still a rare one for many, is active on 14100 kc phone... YK1AK also said to be active.

**Pirates**

Normally we prefer to ignore the activities of pirates, those Teddy Boys of Amateur Radio, but we have had several rather disturbing letters on the subject this month. DL2XS (who has also been G3ATH, XZ2HP, VS7PH and ZB2A) was working on Eighty when he was called by “MSCUK,” giving his QTH as Nil and his name as Wak. This specimen went QRT after suitable remarks, but started up again on the same frequency as G3ADH, which he changed, while sending, to FA8LP and later to OK1TN.

Then we are also notified by the Liverpool Club of considerable pirate activity up there, and are asked to warn readers of the following: “G2AVG” also uses the calls 3FOI, 3EOG, 3WAG and 3KES; “G2HHA” also calls himself 3KCP; “G3DKD” uses 3FRZ and 3FKD; and the calls G3ATX, 3BWB, 3JNA and 3KET are being used by unlicensed stations in the Liverpool area. Some of these work all bands—not always in the bands, and are liable to cause TVI and get law-abiding amateurs into all kinds of trouble. The matter is in the hands of the G.P.O., and we wish the authorities every success in getting rid of these pests. Pirates of this type usually show themselves up very quickly by their ignorance of procedure and how to behave on the bands, and also, very often, by poor signals and flabby operating. Don’t have anything to do with them—except, perhaps, to tell them what you think of them.

**Miscellany**

G5RV showed up during June as VP6RV on Fifteen phone and CW, and we have it from G6UT that we may expect to hear more of ‘RV from there from time to time; after a “residential qualification” in Caracas, where he is living, he hopes to obtain the call YV5RV.

ZL4AW (Otatara) very much wants to get in touch with AC4RF.
—to see if he can collect that all important card for his final WAZ qualification! ZL4AW worked Bob in 1949, just before he was captured by the Chinese; if anyone can put them in contact, ZL4AW would be very grateful.

The Army Wireless Reserve Amateur Radio Society was allotted the special call GB3AWR for the latter half of June, when it operated a station near Chester on all bands from One-Sixty to Ten. In addition, individual members roamed over North Wales and Westmorland, using their own calls on the Top Band and making a few rare counties available. Unfortunately, this information was received several days too late for the June issue, but we hope their efforts were duly noted and appreciated.

A few DX notes from SWL V. Kelly (Betws-y-Coed): AC4NCB was heard on Twenty (1840), but labelled "probably phoney"; UQ2AN active most mornings around 0630; SV0WE often heard on Twenty phone, 0730; JZ0PS heard working several G stations (this one, we think, is genuine); and (general comment) so much phone DX migrating to Fifteen and Ten that it leaves Twenty sounding like an inter-European band.

More DX Strays

W6OYD worked AC3SQ on phone, short path ... ZD9AE, it now appears, is the replacement party for ZD9AD; 9AE will be there for one year (on Gough Island) and runs 100 watts to a rhombic aimed on South Africa ... ZS7H is on CW (14053 kc) and ZS7C on Twenty phone ...

W1NWO has received QSL's from U40AA, 8KFD, U7KAA and UA1KAC—all very nice except for the fact that he didn't work them! Some new racket seems to be developing ... VK9TW (Nauru) will be on CW on 14075 kc, and on phone on 14130 and 21315 kc, but if requested on the latter frequency to operate CW he will do so ... CR10AA may often be heard around 14080 kc with a T7 signal (1200 to 1500 GMT); believed to be OK ... MP4QAL about to QRT but MP4QAP will soon be on to keep the flag flying ... YJ1AA still active around 14090 kc, 1130 GMT ... FU8AA on 21 mc, week-ends, and FU8AC on phone, 14 and 7 mc.

From Antarctica there is activity at KC4USA (Little America) and KC4USV (McMurdo Sound). Towards the end of the year we may expect KC4USB (Marie Byrd Land) and KC4USN at the geographical South Pole. No mail will be forthcoming until the ships return in 1957.

VK Call Changes

We understand that w.e.f. June 1st amateur calls in the Australian capital territory of Canberra, about 40 in all, were changed from VK2 to VK1. The VK1's in the outpost areas, e.g. the Antarctic, become VK0, this to take effect by the end of the year. Simultaneously, the VK3's in the Northern Territory of Australia will become VK8.

Another Island

A brand-new one was put on the map by GM5WW/P, when he operated from the lonely, uninhabited island of St. Kilda (get out those atlases!) from June 11 to June 14, with a QRP rig on Eighty only. Paul did not have much time for amateur contacts, as he was there on strictly official business and could only be on as opportunity offered. However, he tried the 80-metre band in the early mornings, going off the air before 0700. He heard very few amateur signals (some GI's and GM's only), but did work G3FAS (High Wycombe) on sked for his one amateur QSO. This is the first time an amateur signal has been radiated from St. Kilda. Before the 1914 War, there used to be a radio station there, and in his exploration G5WW found its site, also what was apparently the armature of the generator used for power—a solitary and somewhat unexpected relic!

Late Flash

In spite of all that we have said in the foregoing paragraphs about murky conditions, it is very pleasing to be able to record that they showed a tremendous improvement over the week-end of June 16/17. June 16 will long be remembered for the worst June weather on record (especially by holiday-makers), but with the appalling weather came a rapid change in radio conditions, until by the afternoon of the 17th the Fifteen and Ten-metre bands
were really wide open. By the time we know whether this was a flash-in-the-pan or a real build-up to better conditions, we shall have gone to press, so further comment must wait until next month.

Country List

Our last complete list of Countries by Prefixes was published on p.282 of the July 1952 issue. The bulk of that list still stands as correct, but we feel that there have been sufficient alterations and additions to warrant the publication of a complete and up-to-date list this season. This is at present being worked on, and will appear as soon as we are satisfied that agreement has been reached between the various parties concerned with the issue of certificates, diplomas and so forth. We hear rumours of a few new prefixes to be issued and some old ones to be changed, but it is hoped that our new list will be complete and ready in time for the opening of the DX season this coming autumn.

That concludes this month’s offering, for which contributions have been rather slender. We hope to see all the regulars back in circulation next month, together with as many newcomers as possible. The deadline will be first post on Friday, July 13. (For overseas readers’ benefit, the one after that will be August 17). Send your news and views, reports, grousers and general outpourings to “DX Commentary,” Short Wave Magazine, 55 Victoria Street, London, S.W.1. Until then, Good Hunting, 73, and—may you hear all you work!

CORRECTION

In the note on p.161 of the May issue, it should have been stated that R. W. Addie, G8LT, had been appointed assistant commercial manager of the Radio and Television Division of Philips Electrical, Ltd.

CHANGES OF ADDRESS

When notifying a change of address, with a QTH for publication, it helps considerably if we are also told whether the reader concerned is a direct subscriber; this is to ensure his card being changed in the circulation index. If the month of expiry can also be quoted, that helps, too.

CHRISTMAS ISLAND

It is reported that in connection with the forthcoming British hydrogen bomb tests, 300 Signals personnel are already installed on Christmas Island, from which “certain observations” are to be made on the tests. This is resulting in some amateur activity, in the meantime. Christmas Island, just north of the Equator and about 158°W., is a British possession.

QSL BUREAU for GREECE

We are asked to announce that the QSL Bureau address for Greece is now Box 564, Athens.

On May 30, the Radio Industries Club held its 25th anniversary luncheon, at which 600 members were present, with the toast of the Club and the Radio Industry proposed by Alderman Sir Cuthbert Ackroyd, Lord Mayor of London. The response for the guests was by the Marchese Guilio Marconi (at left in this photograph) son of the great pioneer who proved the practicability of radio communication. The toast of the guests was proposed by Mr. H. de A. Donisthorpe (right) of the General Electric Co., Ltd., who knew Senator Marconi personally and fitted certain equipment in the yacht “Elektra,” which in the early days was used by Marconi for much of his experimental work. His son, the present Marchese, came over from Rome specially to attend the celebrations. It will be remembered that Mr. Donisthorpe himself is one of the amateurs of the pre-1914 era, when he held the call DKX.
Initial Amps. for Mobile Working

Limitations of the Car Electrical Installation

J. H. Jones (G3GBH)

It is widely supposed that the dynamo can put back all the amps. taken from the car battery by the /M equipment. Our contributor, who is professionally concerned with auto-electrical installations, shows that in the modern car the battery and its charging dynamo are already being operated near their limits. This means that before any further load is imposed upon the system, certain precautions need to be taken and adjustments made if expensive failures are to be avoided.—Editor.

If the reader hopes for detailed instructions for building "the last word in mobile rigs" or how to make a "super centre loaded whip aerial with 20dB gain over a dipole," then let him turn to other pages, for here he wastes his time. But if a word or two about the source of power to rumble his mobile rig is of interest, then may he read on and, one hopes, derive some benefit.

The source of power supply for most of the mobile equipment seen by the writer is that poor old maid of all work—the car battery.

Over the last twenty years or so two important things have happened which react unfavourably on the car battery. First, the load placed upon it has increased enormously. A little over twenty years ago this consisted of a starter motor, one tail and two side lights, head lights, a single low-current horn and a light-duty screen wiper.

The modern car now has a starter, two side and three tail lights, two head lights (the power of which has increased from 24w. to 36w. or over for each light), a 48w. pass or long range driving light, a 48w. fog light, twin wind-tone horns, twin heavy-duty screen wipers, electric fan for interior heater and windscreen dimister. Add to this list the possibility of car radio, electric screen washer, electric free-wheel control, electric cigarette light, with other gadgets, and it can be shown that the battery's lot is not a happy one.

But that is not all. The car manufacturers now demand an even smaller and lighter battery; the battery makers can only comply with a battery having a lower amp/hour capacity.

On this scene comes the /M amateur with still further demands. Small wonder that, "unless precautions are taken," the car battery may very soon refuse to start the engine at all.

To understand the whys and wherefores of these precautions a little of how the car electrical system functions needs to be understood.

Basic Facts

The modern car dynamo is a plain shunt machine (Fig. 1). If terminal F is joined to terminal D and a battery placed across the junction D and earth (dynamo carcass) the battery would receive a charging current from the dynamo when the armature was rotated in the correct direction and at the right speed.

Because the field coils are fed from the armature brushes the current flowing in it will rise as the speed of the machine increases. As the field current rises so will the output of the dynamo go up, because the armature revolves in a denser magnetic field.

If the speed goes too high a point will be reached where the output of the dynamo is so great as to cause overheating, failure of insulation, melting of solder at the armature commutator and then complete breakdown of the machine—all quite quickly.

In the motor vehicle one cannot, for obvious reasons, have constant dynamo speed; therefore, it has become common practice to control the voltage supplied to the field windings and thus to keep the field current and consequently the dynamo output to safe limits.

To achieve this a resistor of suitable value is placed between terminal D and terminal F of the dynamo, which at rest is shorted out by a pair of contacts (C). These contacts are held closed by a spring (S), the tension of which is capable of adjustment.

A solenoid (VS), energised from the output terminals of the dynamo, is so arranged as to cause a relay armature to open points (C) as soon as the output voltage of the dynamo attains a preset figure (approximately 8 volts for 6 volt equipment and 16 volts for a 12 volt system). This places the resistor in series with the field circuit and brings down the field current, and as a result, the output voltage of the dynamo. This drop in output voltage causes the solenoid to release the relay holding the contacts open. The contacts close, shorting out the resistor, and the output voltage again builds up to the preset voltage, when the cycle is repeated. This sequence is very rapid and continuous so long as the speed of the dynamo...
is such that the output voltage available is at or above the preset voltage of the regulator relay. Adjustment of the relay preset voltage is carried out by means of varying the tension of spring (S).

A second relay, again energised from the dynamo terminals, connects the battery to the machine when 12 volts appear at the dynamo terminals; when the dynamo volts drop below that figure, the battery is disconnected. This is to prevent the battery discharging via the dynamo windings.

Several other refinements appear in the modern auto-electric system, such as series windings on the voltage regulator solenoid to assist opening the points (C) if the current passing to the battery is too heavy due to dead flat batteries, or excessive load being placed on the system; spring (S) may be a bi-metal leaf which reacts to temperature changes and assists in opening the points if the rise in temperature is likely to be dangerous to the system. These variations can be ignored for the purpose of this article, as they do not affect the main argument.

The result of this control system is constant voltage at the dynamo output at all engine speeds greater than that speed required to produce the preset voltage.

Taking a 12-volt system for example, this is how things are arranged: The dynamo voltage is fixed at 16 volts. Therefore, the potential difference between the battery and the dynamo will be greatest when the battery is fully discharged.

A battery right up and on charge will have a terminal voltage of around 15 volts; with the one volt potential difference between it and the dynamo only a very small charging current can flow.

A fully discharged battery, however, will have a terminal voltage of as low as 9 or 10 volts; the potential difference between it and the dynamo will be around 8 volts and a much larger charging current will flow. Thirty amps would not be an unusual charging rate under these conditions. A proportionate charge rate will exist between these two extremes.

The Dynamo

The dynamo fitted to the modern car has been designed round certain exacting requirements. It must supply a heavy charge rate for short periods when the battery is very flat. It must give a medium charge rate for long periods, e.g., when head lights are in use. It must operate at high and continually varying speeds. It must be mechanically robust and be efficient amid oil, road dirt and water.

But it must also be as small and as light as possible and available at a price to be economical to the car manufacturer.

It is not designed to operate continually at high charging rates, because under normal conditions the terminal voltage of a flat battery rises quickly when charging commences, with the rate of rise tapering off as the state of charge in the battery increases.

Load Factors

If then we add load in the form of a transmitter and receiver to the system the dynamo will automatically adjust itself to that extra load as far as it is safely capable of so doing.

The final state of charge in the battery after a lengthy period of radio operating will depend on how heavy the load is and how often it comes on. Loads of 5 to 10 amperes used intermittently can nearly always be handled by the system. On the other hand, loads of 10 to 15 amps call for a certain amount of intelligent use if flat batteries are to be avoided.

Equipments involving big rotary converters and large numbers of valves may draw considerably more than 15 amps and require special measures, to be detailed later.

If, having installed your mobile gear, you find that the car battery is always flat, do not blame dynamo or battery before carrying out certain tests.

Maintenance

Carefully measure the total load imposed by the additional gear. (It may be far in excess of what you thought!) If nothing untoward

Fig. 1. Simplified circuit of the constant voltage control system in a modern auto-electric installation. Under normal running conditions, the contacts C are working rapidly all the time; when they are opened by the pull of the solenoid, the resistor Fr is put in series with the dynamo field coil and its output is reduced.
is found next check the dynamo drive belt. Over half the cars taken to garages and electrical service workshops with complaints of low state of charge in the battery turn out to be due to dynamo drive belts that are slipping or are worn out. With the engine switched off try to turn the dynamo pulley. If you can turn the pulley whilst the belt does not move then the dynamo is not getting its necessary amount of drive when a load is placed upon it.

Examine the dynamo pulley. If the pulley is worn bright in the Vee the belt drives in, then the pulley and/or the belt is badly worn and needs replacing.

If examination shows that the belt is not riding in the bottom of the pulley, tighten the belt until turning the dynamo pulley results in turning the engine—or the resistance of the engine stops you turning at all.

Do not be tempted to alter the regulator voltage adjustment in an endeavour to obtain more output! You may get that output, but it will be at the expense of a new dynamo or battery. If you doubt the present setting of the regulator, take the car to a reliable electrical service workshop and ask them to check the regulator voltage for you. At the same time tell them you have added to the load on the system and would like them to set the regulator voltage at the highest value permitted by the makers.

The reason for this being necessary is that new cars are turned out with a setting to give average charge rates, though in practice cars are used under varying conditions requiring varying regulator settings.

For instance, local running with many stops and starts requires the maximum charge rate permitted because a very small mileage is being done with frequent use of the self-starter; a traveller, on the other hand, may do 100-200 miles of fast driving a day with very few stops, so that his battery would be overcharged if the regulator were set at maximum.

Let us see what tampering with the regulator setting can do. If you increase the voltage at the dynamo terminals you also increase the potential difference between the dynamo and the battery, and of course increase the charge rate. But that increase in charge rate is on at all times and not just when your mobile gear is switched on. As stated earlier, the dynamo is not designed to give a continuous high charge rate and will in time be severely damaged. The battery electrically can accept very high charge rates, but will break down mechanically for the following reason: When a heavy charge is passed through a battery for an extended period, the internal temperature of the battery rises; this causes the lead grids, which are the foundation of the plates, to expand. In this expansion the active paste of the plates is loosened and falls to the bottom of the battery case. The battery loses its capacity and becomes useless.

Another result of prolonged high charging of a battery is the breaking up of water in the electrolyte into gases, which are driven out via the filler caps. This results in lowering of the acid level and unless constant topping up is carried out the plates so exposed get dry, hard and useless. Sulphate forms on the surface of the plates and again the battery is scrap.

The Safe Limit

If your mobile gear takes 15 amps or over, or if your car is fitted with a small dynamo and battery and the system cannot keep the
battery reasonably charged, then two suggestions are offered.

Your auto-electrical service depot can fit a larger battery and a dynamo with a higher wattage rating. They will be pleased to advise you—but the expense may well be considerable.

The second suggestion is to obtain another car battery fully charged. Connect this in parallel with the car’s own battery, but with a limiting resistor in one of the connecting conductors, and take your mobile supply from this second battery (See Fig. 2). The limiting resistor could well be an ordinary head-lamp bulb (a 12v. 36w. bulb passes 3 amps.). Thus, the car battery is trickle charging the radio battery; full radio load does not appear across the car battery, and the car electrical system will function normally. Of course, one does not get anything for nothing and the radio battery will need removing for a separate charge from time to time.

It is recommended that the radio battery be disconnected from the car battery (remove the bulb mentioned above) when parked for long periods, and each night, otherwise the car battery may be considerably discharged due to the current supplied to the radio battery, and therefore unable to turn the starter when required to do so.

In Conclusion

Batteries should be kept clean and topped up regularly with distilled water. When checking for state of charge the only reliable instrument is the hydrometer. A fully charged battery should show a reading around 12.80 to 13.00 SG, but different makers have different SG readings, and reference to their data should be made.

Batteries should never be stored in a discharged condition. If not in use, give a full charge at low charge rate every six or eight weeks whilst in store, checking at frequent intervals with the hydrometer. A neglected, unused battery can be ruined in a few weeks. A working battery well maintained will give good service for years.

GW2BG, MAYOR of ABERGAVENNY

On May 23, the new Mayor of Abergavenny, in Monmouthshire, was installed with all the ancient ritual attending on that office. He is Councillor G. R. Silverthorne, GW2BG, who was first licensed in 1923 at Abertridder, Mon. Until about three years ago, he will be remembered as a very active phone station on the 160-metre band, with a particularly potent signal. His early transmissions were made on 440 metres (until 1926 a permitted amateur channel) and later on 180 metres, long before the bands as we know them today had been allocated. During the last war, GW2BG was in charge of radio interception and anti-espionage work in the South Wales area. He is in business in Abergavenny as a radio and television dealer.

OBITUARY

It is with deep regret that we record the death, on June 9, of Roy McGregor Sutherland, G5RO, at the age of 59, after a long illness in hospital. “Suthy” was well known all over the country, both for his own cheerful personality on the air and for his sterling work for the Hastings Amateur Radio Club. He was, indeed, responsible for the formation of the Club before the war, when the call G6HH was allocated. Roy Sutherland was first licensed as 2AYN in June, 1933, and became G5RO in July, 1935; thereafter, he was a real enthusiast on all bands.

He was the personification of a genuine amateur in the sense that he loved his hobby, and would extend unlimited help to any fellow-enthusiast. On field days, at Club exhibitions, or any other event for which there was work to be done, he would shoulder most of it and build or lend most of the gear. He will be very sadly missed in Hastings and St. Leonards.

He leaves a widow and two daughters, to whom we offer our sincere sympathy in their great loss.

* * *

We also very much regret to have to report the death, on May 14 at the age of 45, after a long illness, of William Kenneth Whiteoak, G2WU, of Colne, Lancashire. He had been licensed for nearly 30 years, since schooldays, and though recently inactive on the air, always maintained the keenest interest in radio.

He was connected with the textile and aviation engineering industries and will be much missed by a wide circle of friends. He leaves a widow and young son, who will also have the sympathy of all who knew him as G2WU.
Calculation of Circuit Values

USING SIMPLE TEST APPARATUS

F. W. V. BUCKLAND, A.M.Brit.I.R.E. (G3DIR)

Our contributor discusses an easy way in which required circuit values can be arrived at, taking as an example a circuit of his own described in a recent issue. Details of a useful and interesting item of simple bench test equipment are also given.—Editor.

ON many occasions it has been found that, in wishing to reproduce a circuit as it is described, the components to hand are not exactly the value stated in the diagram, but are sufficiently close to justify their use, or at least to justify not having to buy them specially. Results cannot be exactly the same as were obtained in the original circuit, and frequently, where very close tolerance values are necessary, the results can be most disappointing. In this article the writer seeks to show, more especially to those with limited apparatus and experience, how to use simple test gear to ensure that a replica of the original—in results if not in actual value—can be obtained. Alternatively, it is shown how a circuit can be modified to suit a particular need.

After the appearance of an article by the author in a recent issue of SHORT WAVE MAGAZINE (1) several letters were received asking for values of the coil and condenser used in the variable frequency circuit, in order to cover a given frequency range. The writer has replied to all of these to the best of his ability, and as the circuit described in that article was not on the frequency range, nor using the particular valve which appeared in the final design, the various stages of designing, constructing and testing the final oscillator are described here. This is being done not so much to "sell" the circuit, as to show how simple apparatus, and ABAC's, can be used in order to obtain similar results with different values. It is hoped that this may be of some interest to those who come across a similar problem in some other context.

The Low-C Colpitt's oscillator had been selected as the circuit to use for the frequency controlling part of the oscillator, and now came the choosing of the valve, frequency range, and so forth. A 6BE6 was the choice—the circuit was required for a mixer—and the range to be covered was from 2 to 3 mc, as near as possible.

Apparatus Used

Two pieces of equipment were needed to meet these requirements, and a few ABAC's, as well as the station receiver. ABAC's are available in most of the popular radio handbooks, and a comprehensive book containing nothing but these useful aids is available for a few shillings from one of the well-known technical publishing houses. (Those used were in a handbook.) The usual home-made test meter was one piece of equipment, and this one has a meter with a 1 mA movement, giving readings in mA, volts, and ohms—a most unpretentious piece of apparatus which surely must be found in the shack of all experimenters. But the second unit may not be found so frequently, though with so much "surplus" equipment about it is a very useful instrument. It is a simple means of measuring capacity; the circuit diagram is given in Fig. 1, in case it is thought worth while making one up. Perhaps a little explanation on its use and capabilities might not be out of place.

It consists of a grid-dip oscillator, operating in this particular case on about 7 mc—but it can use any frequency at all, preferably somewhat lower than this. In the diagram it will be seen that no values are given for the tuned circuit, for as just mentioned, it is immaterial to the working of the instrument, within reason. As the frequency is adjustable, it was set on 7010 kc (using a crystal) for one measurement when constructing the circuit to be described, but this is merely incidental as regards the unit itself. To construct this capacity measuring set, a condenser with an SLC (straight-line capacity) characteristic, i.e., having semicircular plates, was "adjusted" until its swing was exactly 100 µµF, and as a scale with 100 divisions is fitted, each division reads 1 µµF, and can be read off directly. It thus became a calibrated condenser, and is used across a coil so positioned that it absorbs power from the oscillatory circuit when it is at resonance, causing the grid current to drop and thus make the meter an indicator of resonance. With no capacity across the measuring terminals, the calibrated condenser is set at zero (maximum capacity) and after the unknown capacity has

---

Fig. 1. Circuit of the capacity measuring unit used in developing the oscillator shown in Fig. 3. C1 is a calibrated condenser with a 100 \( \mu \text{F} \) swing, the method of doing the calibration being explained in Appendix 2. The instrument will also measure resistance and the switching is shown as in this position.

**Table of Values**

<table>
<thead>
<tr>
<th>C1</th>
<th>100 ( \mu \text{F} ) swing, calibrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2, C3</td>
<td>As required</td>
</tr>
<tr>
<td>C4, C5, C6, C7</td>
<td>50 ( \mu \text{F} ), mica</td>
</tr>
<tr>
<td>C8</td>
<td>0.1 ( \mu \text{F} )</td>
</tr>
<tr>
<td>Rp</td>
<td>Preset trimmer</td>
</tr>
<tr>
<td>R1</td>
<td>10,000 ohms, 1-w.</td>
</tr>
<tr>
<td>R2</td>
<td>15,000 ohms, 1-w.</td>
</tr>
<tr>
<td>R3</td>
<td>500,000 ohms variable (for meter adjustment)</td>
</tr>
<tr>
<td>R4</td>
<td>5,000 ohms, smoothing</td>
</tr>
<tr>
<td>S1</td>
<td>4-position, double-pole</td>
</tr>
<tr>
<td>V1</td>
<td>Any small triode, or triode connected pentode</td>
</tr>
<tr>
<td>V2</td>
<td>Rectifier</td>
</tr>
</tbody>
</table>

been connected to the terminals, capacity is removed from the calibrated condenser until resonance is restored. The amount of capacity indicated on the scale as being removed from the calibrated condenser is equal to that added by the unknown condenser, all strays being included in the original calibration of the zero point. Thus, the value of the unknown can be read off.

The device only measures directly up to 100 \( \mu \text{F} \) (the maximum of the calibrated condenser) but it is almost as simple to measure higher values. Simply take a condenser of value less than 100 \( \mu \text{F} \)—say, 50 \( \mu \text{F} \). Measure it, and then add the unknown value which is larger than 100 \( \mu \text{F} \) in series with this 50 \( \mu \text{F} \), and check the combination. The resultant will be less than 50 \( \mu \text{F} \), and to calculate the value of the unknown, merely divide the product of the two readings by their difference. The result gives the value of the unknown in \( \mu \text{F} \). (See Appendix I.)

For the instrument itself, it is not easy to calibrate a condenser without having some sort of standard available. But though tedious, it is not impossible. (See Appendix II.)

**APPENDIX I**

To prove the formula for finding an unknown value of capacity when in series with a known value, and when the total series capacity is known.

Given C as the total series capacity, C1 as one condenser and C2 as the other:

\[
C = \frac{C_1C_2}{C_1 + C_2}
\]

Assuming C1 is 50 \( \mu \text{F} \) and C2 is 200 \( \mu \text{F} \), then

\[
C = \frac{50 \times 200}{50 + 200} \mu \text{F} = \frac{10,000}{250} \mu \text{F} = 40 \mu \text{F}
\]

Assuming C1 is 50 \( \mu \text{F} \) and C is measured as 40 \( \mu \text{F} \), then

\[
C_1C_2 = \frac{C}{C_1 - C_2}
\]

Substituting,

\[
C_2 = \frac{40 \times 50}{50 - 40} \mu \text{F} = \frac{2,000}{10} \mu \text{F} = \frac{200 \mu \text{F}}{}\]

over
Measuring Inductance

One can also measure inductance on the instrument, aided by ABAC’s. First set the oscillator of the measuring unit to a known frequency. In this case 7010 kc was used, but any frequency will do, it being necessary only to know what it is. Next, ensure that the calibrated condenser indicates resonance when set at zero. Having set it there, leave it. Connect a small variable condenser across the unknown inductance, put this tuned circuit across the measuring terminals, and adjust the capacity of this small variable until a dip is found on the meter. It is important that the calibrated condenser is not touched when doing this, the idea being to resonate the unknown coil to the known frequency. Carefully, taking care not to disturb the setting of the small variable, disconnect it from the coil, and measure it in the usual way. Knowing the value of the condenser to tune to the known frequency, it is easy to find the inductance of the coil from the ABAC.

In the diagram, Fig. 1, it will be seen that advantage was taken of the available high voltage to fit a switch whereby very high resistances could be measured. This is useful, as the test meter does not indicate high value resistances without the addition of an external high voltage supply, and here is one right to hand.

The Example

Now to the design of the circuit, originally under consideration. The tuning condenser to be used was an SLF (straight-line frequency) type, with a minimum of 9 µµF and a maximum of 120 µµF — both measured on the aforementioned instrument. This gave a swing of 111 µµF, and by inspection of the ABAC it was determined that a coil of 31 µH would tune over a range of 2 to 3 mc with a capacity which could be swung from 90 to 200 µµF, i.e., a range of 110 µµF. This was just inside the range of the condenser to be used, and so a coil of 31 µH was constructed, again using details obtained from the ABAC. It was measured, required slight adjustment, and then finally found to be just 31 µH, as required.

But there would be a further 81 µµF or so to be included in the tuned circuit as well as the variable already chosen, and as the circuit was to be a Low-C Colpitts type, this capacity would have to be made up by the three condensers C1, C2, and C3, indicated in Fig. 2.

It would also have to include any strays in the wiring, for which 10 µµF was allowed. As will be seen in the diagram, the input capacity of the valve (Cv in Fig. 2) would be across a very large condenser, and so could be ignored. The total to be added would therefore be about 71 µµF and this being so, the grid condenser must be larger than this value, and was made 100 µµF. (It actually measured 102 µµF.) With the 100 µµF in this position, the total of 71 µµF could be made up with two 480 µµF condensers in positions C2 and C3. The values were checked, and although both were nominally 500 µµF, they actually measured 490 and 485 µµF respectively. There is no doubt that using ABAC’s is certainly not such hard work as calculation using inverted reciprocals, as would be required when dealing with condensers in series.

In addition to this, the makers state that the 6BE6 should not have more than 100 volts on the screen grid, i.e., the oscillator anode, the grid resistance to be 22,000 ohms, and that the grid current, for efficient mixing, should be 500 microamps. These requirements further influenced the design, as will be seen later. From ABAC’s, the necessary dropping resistor and its wattage were found, to apply 100 volts to the screen grid from a 250-volt supply.

Using the 31 µH coil, the 9-120 µµF tuning condenser, and fixed condensers as determined above, the circuit was wired up and power applied. The voltage on the screen grid was 100 volts, and the resistor did not run hot. All well so far. Checking the frequency coverage on the station receiver indicated that it was from 1.9 mc to 2.95 mc—not a bad result on the original requirement of 2-3 mc. One turn was removed from the coil; the frequency range moved, and was now 2.1 mc to 3.05 mc. For the moment, it was left as it was, and the grid current checked. The test meter showed a reading of 100 microamps when connected between the grid resistor and earth. This would have to be increased, and to do this meant lifting the cathode tap to a position up the tuned circuit nearer the grid. In the circuit used, this...
Having constructed the capacity measuring instrument, the condenser C1 used for measuring can be calibrated quite accurately and readily by the following method:

Take two pieces of brass or other non-ferrous metal exactly 1½ inches square. When these two plates are fitted exactly square and parallel they make a two-plate condenser; the capacitance of such a condenser is extremely close to 1 µµF if the plates are accurately spaced half an inch apart. \( C = \frac{A}{d} \)

where \( A \) is the area of one plate and \( d \) is the spacing, measured in inches.) Making the spacing between the plates one-tenth of an inch increases the capacity to 5 µµF. Here, then is the “standard” by which the condenser C1 can be calibrated.

First, connect an additional known 100 µµF (or larger) variable condenser across the measuring terminals of the unit, and set it at minimum capacity. This remains connected to the terminals throughout the calibrating operation, and can be called the compensating condenser. Then, with C1 (Fig. 1) set at maximum capacity, adjust the pre-set condenser so that the meter shows a dip. The dial reading of C1 will be zero, and should be marked accordingly. Now connect the 5 µµF “standard” across the measuring terminals (in addition to the compensating condenser), and adjust C1 until the dip again occurs. Carefully mark the indicated position of C1 on the dial; this is the 5 µµF point. Remove the “standard,” restore the dip using the compensating condenser this time, taking care not to move C1. Again connect the “standard,” and again adjust C1 to the dip. A second point is now indicated on the dial of C1, and should be carefully marked 10 µµF. Remove the “standard,” restore the dip using the compensating condenser, replace the “standard” and find the dip using C1. The third point, to be marked 15 µµF, has been calibrated. Continue until the full condenser has been calibrated, after which the compensating condenser can be removed, having served its purpose. The 1 µµF points can be inserted by interpolation between the 5 µµF points already found, but this is very tedious, and liable to errors. It is thought, however, that the 5 µµF calibrated points would be sufficient to make the unit of considerable use to the experimenter who has no other means of calibration available.

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**APPENDIX II**

**CALIBRATING THE CONDENSER**  
*(C1 in Fig I)*

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**Table of Values**

<table>
<thead>
<tr>
<th>( C )</th>
<th>( R )</th>
<th>( L )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 µµF</td>
<td>22,000 ohms</td>
<td>31 µH</td>
</tr>
<tr>
<td>5 µµF</td>
<td>22,000 ohms</td>
<td>31 µH</td>
</tr>
<tr>
<td>10 µµF</td>
<td>22,000 ohms</td>
<td>31 µH</td>
</tr>
<tr>
<td>15 µµF</td>
<td>22,000 ohms</td>
<td>31 µH</td>
</tr>
</tbody>
</table>

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**THE CALL BOOK**

There has been an unusually heavy run on the Spring issue of the *Radio Amateur Call Book*, and we are now out of stock of the full edition. The abridged edition can still be supplied (at the time of writing) at 15s. post free. The next (Summer) issue of the *Call Book* is now in proof, and will be announced as soon as it is available.
Station Remote Control

RELAY ARRANGEMENT AND CIRCUITRY

G. WHITBY

Easy switching from "send" to "receive" is of great importance, and a control unit permitting single switch change-over offers brisk, efficient operation which is particularly appreciated during contest sessions and long night watches, when any extra movement is not only a waste of time but also an added fatigue.

Nowadays most amateurs have a variety of relays removed from ex-Service equipment; those specified for this control unit are, in any case, readily obtainable in the surplus market, because the arrangement of their springsets—the combination of fixed and travelling contacts on the relays—is quite standard.

Minor modifications may be necessary to both receiver and transmitter control circuits if they have not already been carried out for station change-over purposes. Where this has been done, it only remains to replace any manual switching with the relay springsets in order to effect the required operations.

Operation

The primary purpose of the control unit as sketched here is to change the aerial from receiver to transmitter, to ensure that the transmitter is out of action when the station is receiving, and, when radiation is taking place, that the HT supply is removed from the first RF stage of the receiver. It is not sufficient merely to change the aerial from receiver to transmitter, leaving the former working, because the first stage may be damaged by the proximity of the radiated RF.

It should also be possible to bring the station to a stand-by condition, with both receiver and transmitter ready to function, on a second control switch.

Finally, indicator lamps showing whether the station is on stand-by, or is receiving or transmitting, are an asset, and a mains lamp (it might well be a 15-watt neon) should indicate when the equipment is powered.

The Circuit

It will be seen from the diagram that five relays are employed, only one of which—the aerial change-over Relay C—has a complex springset.

The circuit is shown in the "receive" condition, and it will be noted that only Relays A and B are working when the transmitter is not in use.

Switching S1 from "Off" to "Standby" illuminates indicator lamp S and energises Relay A, which closes to apply mains to the station power units and the mains indicator lamp—already mentioned—which is wired on the equipment side of the springset.

Bringing the station to stand-by applies LT to all filaments, but, until Relay B is closed, HT is held off both receiver and transmitter. Moving switch S1 to the "Operate" position will close this relay and bring the "Send/Receive" switch S2 into circuit by applying the relay operating potential to it.

In the "Receive" position shown, no relays are operated by S2 and the only change is that the receiver is powered, lamp S extinguished and lamp G illuminated. The receiver will, therefore, be working normally, whilst the transmitter is out of action.

When S2 is depressed to "Send," Relays C, D and E operate, Relay D opening the HT line to the receiver RF stage and Relay C closing to change the aerial from the receiver input to the transmitter output, whilst the second springset on this relay closes to apply operating voltage to Relay E, thus ensuring that the transmitter is not radiating before the aerial is changed over—a minor consideration which prevents sparking and burnt relay contacts. Lamp R is also illuminated in place of G, to indicate the transmission condition.

Components

Although any relay may be used which functions on the voltage provided by the power unit, it is recommended that the P.O. Type 3000 relays, with 2000-ohm windings, be employed. These relays draw an operating current of about 10 mA, and so will function satisfactorily on a potential of 25 volts.

Relays with a lower winding resistance will function on this voltage, but the current will probably be greater; windings with a resistance of more than 2000 ohms will demand a higher operating potential, which can be obtained by reducing the value of R1. Relays with differing coil resistances can be mixed successfully on the same potential by inserting resistors in series with the winding; the exact value must be found experimentally.

The springsets on Relays B, D and C need only light contacts, but the springsets on Relay
Circuit for the remote control system described in the text. When S1A-S1B is set as shown, the whole change-over operation is controlled by S2. Lamps S, G, R, are coloured, indicating the operating condition, and are brought into circuit on "stand-by," "receive," "transmit." When S1A-S1B goes to "off," relay A is released, and all power to the station is cut.

A must be well-insulated, with heavy contacts: the aerial relay C should have heavy contacts on the aerial change-over springset, which should be well insulated and set apart from the second springset.

Switch S2 is preferably a Kellogg-type key, but if this is not available a single-pole, single-way toggle-switch will suffice. The rotary switch S1 should be of the twin-pole, three-way Yaxley type, mounted alongside S2 on the control panel.

**Relay Power Unit**

Half-wave rectification is quite adequate, the transformer providing 100 volts at 100 milliamps and being reduced to the operating potential by the smoothing resistor R1. The rectifier is a Brimar RM2, and C1 and C2 are 4 µF 200 volt, such as Micropack CE32G.

The indicator bulbs are 6.5 volt 0.05 amp, and are placed in series with 370-ohm voltage dropping resistors. The total current on "Standby" is 60 mA, 70 mA on "Receive" and 100 mA on "Send," much of this consumption being due to the indicator lamps, which were deliberately introduced to prevent an undue voltage rise across Relays A and B when the unit was supplying current for these relays alone.

Higher winding resistances may require proportionally higher operating voltages, but relays are seldom critical and will withstand wide variations without appreciably affecting their performance.

**Distribution of Components**

Although the components are shown grouped in the circuit, it will be appreciated that they are best mounted in their related equipment. Relay D should be mounted within the receiver, whilst Relays A, B, C and E could be placed inside the transmitter cabinet. Relay C should be mounted where the transmitter output joins the aerial feeder. Relays A and B can be adjacent to the power units, and if the receiver has its own power supply then extensions must be run from the relays.

The control cabinet can be any size or shape to fit in with the station design and need house only the "Send-Receive" key switch, the rotary selector switch S1 and the indicator lamps—the relay power unit preferably being mounted on the equipment rack, or, alternatively, fitted inside the control cabinet. However, when the mains unit is separate from the control unit, only five connecting leads are necessary between this unit and the rest of the circuit, none of them carrying mains voltage. Actual layout and disposition of the relays will depend, of course, on the equipment it is desired to control and its arrangement, both physically and electrically.


COIL WINDING DATA

CHARTS FOR QUICK REFERENCE

The curves herewith enable coils to be selected for four bands 3.5 to 28 mc with the minimum of calculation. They are virtually self-explanatory. In Fig. 1 the data refer to coils having a length equal to the diameter, and in Fig. 2 the length is 1½ times the diameter.

There are several points to be borne in mind when using the charts for design purposes. In the first place, the gauge has very little effect on the inductance when the coil is space wound—but the inductance increases considerably with close-wound coils as the gauge decreases. In using these particular charts, the gauge is only important in so far as the coil may be required either for receiving or transmitting purposes. In the former case, light wire can be used—anything from 28 gauge upwards.

For transmitting, on the other hand, gauge is very important in regard to RF current-carrying capacity, and, in a 150-watt transmitter, 14 or 16g. would have to be used. This would make the impossible to get, say, the number of turns required for a 3.7 mc tank on to a ½-in. diam. former ½-in. long! For a well-formed transmitting coil to give a reasonable Q-factor at this frequency, the right shape to choose would be 2 in. diameter by 2 in. long, requiring (with the capacity given) about 18 turns of wire. This could be 20g. for a low-power transmitter, but should be 16g. at least for a 150-watt tank. As 16g. enamelled wire 15 turns per inch, not only is the winding easily accommodated in the 2-in. length, but the turns would have to be spaced out evenly to take up that length. Such a coil could either be on a suitable former or wound up on insulating strips by the method suggested on pp.434-435 of the October 1955 issue of SHORT WAVE MAGAZINE.

Conversely, it would be foolish to use a coil of such dimensions for a receiver, and even more so to make the wire gauge smaller simply because the coil was for a receiver! On the other hand, at the HF end of the range, coils for both receiving and transmitting purposes in the 10-metre band can be made of wire heavy enough in gauge for them to be air-spaced and self-supporting, while still keeping the physical size small.

Having chosen the coil size and wire gauge, the winding must be formed to the given diameter and spaced out evenly to the required length if the correct inductance value is to be obtained.

Radical departures from the parallel capacities given for the coils will, of course, alter the figures, and the turns will have to be adjusted in proportion. The capacities selected will tune the band with coils of the dimensions shown.

The sole purpose of these charts is to give the quick answer for making up coils, bearing in mind the necessity for discriminating between receiver and transmitter applications and allowing for capacity variations.

CHANGE of NAME

We are informed that, with effect from April 27, RCA Photophone, Ltd., became RCA Great Britain Limited. An associate company of the Radio Corporation of America, the address of RCA Great Britain Limited is Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex. (Phone: Sunbury-on-Thames 3101/3107). Information on all RCA products can be obtained from them.

Can you Shut Down with One Switch?
IN spite of the rather low level of correspondence, suggesting that nothing much had been happening on VHF for the last couple of months, the fact is that in gathering in the loose ends your A.J.D. has been struck by how much—due to enforced absence for a few weeks—he has missed.

Since our March Contest—the season's curtain-raiser, reported in the May issue—the VHF bands have been behaving in a most unusual fashion. The pattern of conditions has in no way followed the weather—there has been GDX working when the signs have been all against it, while when the “glass has been high, with a warm day followed by a cool evening,” the expected DX conditions have not always materialised.

At the same time, it is also true to say that activity generally has been disappointing from the point of view of those who show up on two metres most evenings and every week-end. It is very difficult to put a finger on this activity factor. It is certain that far more people listen than transmit, unless there is a contest on or something out of the usual work. The result is that those wanting ordinary, easy contacts at the semi-local distances (up to 60 miles or so), are either ignored when they call CQ—even by those listening their QRK is carefully evaluated and compared with previous occasions—or they themselves feel doubtful about answering or calling a station known to be on the look-out for DX. The nett result is that nothing much happens, in the sense that contacts which would please both ends just do not take place.

This phenomenon, peculiar to the two-metre band, can be noted during any listening session. You hear G2X working a long-haul contact on schedule with his particular buddy G4Z. You can just about get both ends of the QSO, which you follow with interest. From where you sit it is a distance of 50-60 miles or so either way, though for them it is a 100-mile plus path. There is a good deal of rather casual chat about “usual R5, S9 with an occasional fade to S7” (you are just about making S4 on G4Z), and you feel that after that any call to either of them would be banal! In any case, it is clear from the tenor of the conversation that both want to be away doing something else—digging the garden or catching up on the TV—so you forbear to call either, feeling that in any case neither of them is likely to tune across your frequency.

All this comes about by reason of the fact that VHF operators are essentially specialists. They are happy to work anybody when there is a contest on or the band is wide open. But under run-of-the-mill conditions, the tendency is for pairs, or groups, of stations to hang together and work mainly one another. On the other hand, in some cases this only seems so because nobody else will call them! What we want on two metres is more many operators who come on prepared to work not only GDX, or their schedule contacts, but anyone else, at any distance, who cares to give them a call. This would make for much more activity, and would be a great encouragement to those more recently-joined brethren who at the moment feel that when they have once worked an established semi-local for “a new contact,” any further attempt to QSO is not of any particular interest to him.

The foregoing is, of course, a generalisation, and by no means applies to all regular two-metre stations; some schedule-keepers not only announce at the end of their QSO that they are “looking over the band,” but actually do so. G2HCG goes even further than this: He has a panoramic receiver, and when he is in QSO any local can attract his attention by “flashing the carrier” (switching it on and off a few times), thus producing an unmistakable blip on the receiver. (Anyone who has seen a radar trace will know exactly what happens.) Since the base-line is a frequency scale, G2HCG also knows who it is.

Some EDX Results

From various sources, we have it that the nearer Europeans have quite frequently been workable from the south-eastern part of the country—likewise, there have been many good contacts amongst the DL’s, F’s, ON’s and PA’s. The G calls most often “mentioned in Continental circles” are G2HCG, G5KW and G6NB. The former still keeps up his daily lunch-time schedule with PE1PL (signal level has been very variable), while it seems the Bill of G6NB can work F’s and PA’s whenever the spirit moves him.

It would be tedious to attempt to fill all the gaps over the last two months—in any even, we are without some of the details—and it is sufficient to say that though activity has been low, there was nearly always somebody on to catch whatever openings did occur. Between them, G3GPT, G3JWQ, G3KHA, G5KW, G5MA and G5YV do not mind much...

Coming down to the immediate past, there was a particularly interesting EDX opening over the week-end June 23-24, when conditions were good to Scandinavia. On the Sunday morning, G5YV found himself embroiled in a contest taking place across the North Sea— he had the satisfaction...
of working about six Scandinavians before lunch, including SM7BE and SM7BR (who will be remembered as having been active and effective Swedish two-metre men for many years), which must have given them a considerable lift. It also shows, yet again, what can be done by keeping open on the band and watching for opportunities. (There may well have been other G's who were in on this particular opening, but at the moment of writing we have not got full details.)

About the middle of June, conditions were good on several evenings for working between the London area and Lancashire—indeed, the two-metre stations in Lancashire are maintaining a very creditable level of activity. On the evening of June 23, when they were strong in the south-east, the DL's were also being heard and called from the London area. That this opening was pretty widespread is shown by the fact that West Country stations and the Channel Islands (GC3EBK) were getting into the Home Counties at the same time.

During the month, there have been some good long-haul QSO's. For instance, G5MA from his new QTH in Surrey has had several contacts with G3BW up in Cumberland, and G5YV has worked GM2FHH in Aberdeen. It appears that the Scots have had, after a long and barren interval, another sample of good conditions, and there is a fair level of GM activity. It is some time since we have heard anything of the GM's in the southern part of the country; there are several G's, putting out potent signals and with good receivers, who are searching anxiously for GM's, and it is to be hoped that things will open up sufficiently for that lift over the Pennines and the Cheviots which alone can make a 400-mile G/GM contact possible.

All-European Contest

It seems that if conditions are anything like reasonable for EDX working, we shall have good Continental support for this. The first section is over the week-end July 14/15, and the second section (which is, in effect, an entirely separate affair, unless you want to enter for both) takes place during the following week-end, July 21/22.

Rules in full appeared on pp.148-149 of the May issue of Short Wave Magazine. The suggestion is that you get ready now with ruled log sheets; a map marked with 30-mile circles with your own QTH as centre would also be helpful, but is not actually necessary till after the Contest is over, when it comes to the "office work." This has been made as simple as possible, and is a good deal easier than it looks—it is only a matter of getting the system of scoring clear. Your A.J.D. hopes very much that this is quite
clear to everybody, taking it as a good omen that we have not had a single query on these rules from anybody, at home or from the Continent.

Whatever you are doing, spare one weekend for this Contest; it should be interesting and we have done everything possible to ensure its success. The only factor over which we have no control is the obvious one, and even if conditions are not good, there should be a high level of U.K. activity.

And, having taken part, do send in an entry. There are few things more discouraging to operators who are taking it seriously (as well as to the organisers) than to hear the lofty line, “I’m only on to give the others a point and don’t think I’ll put in a score”!

Of course, you don’t have to come on, nor must you enter the Contest if you do—but if you are keen on VHF and want to see more activity on the band, you will help a lot by doing both those things, and so making it a good party for everybody.

**TWO METRES**

**COUNTIES WORKED SINCE SEPTEMBER 1, 1955**

Starting Figure. 14

From Home QTH only

<table>
<thead>
<tr>
<th>Worked</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>G3GPT</td>
</tr>
<tr>
<td>32</td>
<td>G3HOO, G3JZG</td>
</tr>
<tr>
<td>31</td>
<td>G3WW, G5DS</td>
</tr>
<tr>
<td>29</td>
<td>G3WS, G3BM</td>
</tr>
<tr>
<td>28</td>
<td>G3JRA, G3JWQ</td>
</tr>
<tr>
<td>26</td>
<td>G3DVD, G3F1H</td>
</tr>
<tr>
<td>24</td>
<td>G3DLU</td>
</tr>
<tr>
<td>23</td>
<td>G3KHA, G4JUA, G8VN</td>
</tr>
<tr>
<td>21</td>
<td>G3CKQ, G3DO, G3JXN</td>
</tr>
<tr>
<td>20</td>
<td>G3BQ, G3HWJ</td>
</tr>
<tr>
<td>18</td>
<td>G3EX</td>
</tr>
<tr>
<td>17</td>
<td>G3ER, G3ITF</td>
</tr>
<tr>
<td>16</td>
<td>G3BW</td>
</tr>
</tbody>
</table>

**This Annual Counties Worked Table opened on September 1st, 1955 and will run for the 12 months to August 31st, 1956. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additional claims need show only counties worked as they accrue. QSL cards are not required for entry in this Table.**

The 1250 mc radiating system actually used by G3CGQ for his tests with G3FUL, on its camera tripod mounting. The 25 cm effort, on the highly successful outcome of which G3CGQ and G3FUL are to be congratulated, was run “in parallel” with the two-metre field day on May 6. In the photograph we see G3ERU (right) with G3JZG on the 1250 mc gear while G3CGQ (who built the equipment and inspired this GDX effort on 25 centimetres) took the picture. The actual distance covered on May 6 was about 16 miles, with G3FUL operating under portable-mobile conditions.

All being well, some preliminary notes on both sections of the Contest will appear in the August issue, but we do not anticipate being able to get out the full results before September at the earliest.

**Station Reports and Results**

For the three days, May 20-22, G3XC/P worked from various sites in Brecon. Radnor and Montgomery — thereby making himself a most attractive proposition to those wanting these counties. At any rate, from Brecon he worked 14 stations, from Radnor 18 and from Montgomery only two (it was by then Tuesday). As G3XC remarks in his report, “Providing there are stations of interest on the air, the activity is not as low as it might seem; I have heard since that there were more stations calling me than I worked.”

Several of the old hands write to say they have returned to the VHF fold. Brian G6CI (Kenilworth), who has held his licence since the early days, reports that after two years off VHF, he is “hasing away again on Two.” G2FVD has got himself organised at his new QTH in Kenton, and likewise reports back after two years’ absence. Yet another in much the same category is G2HOP, who has moved to Stamford, Lincs., and suggests a series
of 3-hour monthly contests to buck up activity: "something simple on the first Monday of each month and no prizes," is how he puts it. Well, it's an idea, certainly, and we can think about this again when the July events have been played off.

G3DLU, who used to be down in the West Country, is now in Sheffield with a good OTH, 700 ft. up and clear to the east and southeast; he is on 144.32 mc and fully operational. G3IER (Cheltenham) is shocked to hear two well-known two-metre operators chasing DX on 21 mc! G3MPSD is settled in Jedburgh ( Roxburghshire), perched 400 ft. a.s.l. but with higher ground all around, and is on 144.05/435.45 mc. G3H11 (Liverpool) keeps steadily at it and finds that most of his contacts are with higher ground all round, and suggests that at the same time, conditions might have been particularly good for real DX. Unfortunately, these phenomena are almost always "fleeting opportunities," and are lost unless they happen to occur when there is plenty of activity.

G3KHA (Bristol) is VHF-only, is on both bands, and has now had a year at it, with quite good scores standing for the Tables; but he says his QSL account is heavily debits, with only about half the cards wanted for VH FCC. G3GFD (Bradford) reports himself as a newcomer, and is making progress with 20w. into a 5-elle flat-top and cascode converter.

G3GPT (nr. Preston), whose very fine two-metre transmitter was featured in the June issue as a constructional article, also keeps a schedule with PEIPL, and on May 16 noticed a most unusual effect, when neither he nor PEIPL could heterodyne each other's signals, though they were arriving as MCW notes. This was most probably due to a high degree of scatter, akin to sporadic-E, and suggests that, at the same time, conditions might have been particularly good for real DX. Unfortunately, these phenomena are almost always "fleeting opportunities," and are lost unless they happen to occur when there is plenty of activity.

G3HHY (Bristol) reports regular Thursday evening (2215 clock time, 145.8 mc) activity on the part of G3FHI, G3FKO, G3KHA. G3KPT and himself and invites co-operation. G5MR (Hythe) confirms that HB1RD will be on (from Mt. Chasseral) for the July Contest, and will probably be at the LF end, though in fact they have crystals all through the band; having worked most of Europe from Mt. Chasseral. HB1RD will be concentrating on the U.K. during the Contest.

The Tabular Matter
All the tables have been brought up-to-date with our latest available information, some 30 movements being recorded since the last appearance. But there are undoubtedly many more claims, and new entries, yet to be put in. These we would like to have for our next.

VHFCC elections since May are as follows: A. D. Hawskworth, VK6DW, Bruce Rock, West Australia, No. 201; G. Martin, G3IER, Cheltenham, No. 202; H. Maycock, G3JWQ, Ripley, Derbs., No. 203; F. Voges, DL9LT, Espelkamp-Mittwald, No. 204; A. Wittmer, HB9RD, Zurich, No. 205; J. E. Tindle, G3JXN, London, N.6, No. 206; and J. Woudenberg, PA0IKS, Nijmegen, No. 207.

And Finally——
Your A.J.D. would like to thank most sincerely those who have kept up their reports in spite of a negative appearance, apologise to many of them who have not been mentioned here (though any claims made have been taken in), and emphasise that, being back in the business again, he would be very glad to have your report for August issue by July 18 certain. addressed: A. J. Devon. "VHF Bands," Short Wave Magazine, 55 Victoria Street, London, S.W.1. And do come on for the Contest!
METHODS OF CONSTRUCTION

SOME IDEAS FOR EQUIPMENT ASSEMBLY

As some amateur constructors have already found, there is no need to be tied to the familiar rack-panel, table top or open chassis methods of assembly and layout for home-built transmitter equipment.

The emphasis is on the transmitting side rather than receivers, because in the great majority of cases the receiver is a purchased item and in any case needs to be positioned for operating convenience. Usually, it takes up relatively little space and, with proper control and change-over methods, can be placed quite a distance from the transmitter, modulator and power pack sections of the station layout.

Where space is a factor and the gear must be housed in such a way as to take up as little room as possible but yet be accessible for adjustment and maintenance, consider the methods of assembly suggested here, applicable to low- or medium-powered amateur stations.

Hang It on the Wall——

A piece of board three feet long and a foot wide will easily accommodate four shelves 12 ins. square held to it by small metal brackets, spaced so that there is a full 9-inch clearance between each shelf.

The board is then hung (not fixed) in a convenient position on the wall, where there is a wooden upright or cross-piece behind the plaster. A strong hook is let into the wall at this point, registering with a hole or cross-piece behind the plaster. A strong hook is let into the wall at this point, registering with a hole or cross-piece behind the plaster. A strong hook is let into the wall at this point, registering with a hole or cross-piece behind the plaster. A strong hook is let into the wall at this point, registering with a hole or cross-piece behind the plaster. A strong hook is let into the wall at this point, registering with a hole or cross-piece behind the plaster. A strong hook is let into the wall at this point, registering with a hole or cross-piece behind the plaster.

The board is, of course, hung up on the hook with the shelves projecting outwards. The various items of what might be called the "static" transmitting equipment are then assembled on aluminium chassis in the usual way—with or without panels as may be preferred—these chassis being made, say, 11-ins. square to avoid overlap when on the shelves, which are used to accommodate them. Inter-connection between the units is by plug-socket on cable forms made up to carry the necessary circuits.

If desired, a dust cover made of hardboard (with an adequate number of ventilation holes) can be fitted, and painted some colour to harmonise with the room.

The result is a neat, space-saving layout, easily got at but out of the way, which in effect takes up no room at all because it is hung on the wall. The only points to watch are finding the right place to put in the hook (so that the plaster is not torn down) and avoiding too much weight on the shelves. If heavy power packs are involved, it would probably be necessary to box them away at floor level, running the HT supply in rubber-covered high tension cable.

——Or Put It on the Mantel-Piece!

If it can be cleared of the oddments with which it is usually littered, the mantel-piece is also worth considering as a "basis on which to build." Should it be flat and of reasonable width and length, say 5 to 6 ins. wide and 3 to 3½ ft. long, the thing is easy. One simply makes up chassis of the right width to sit on the mantel-piece without overlap, the gear then being built up on these chassis in convenient units.

The tidiness factor comes in by cutting a piece of hardboard of the correct length and depth to box in the gear, with wooden side-pieces at each end, resting on the mantel-piece, to hold the hardboard cover upright. (With a long mantel-piece, a centre support might also be required.) This cover or panel simply rests on the mantel-piece and, again, can be painted to harmonise with the general colour scheme.

To get at the gear, it is only a matter of lifting off the hardboard cover. In a bachelor establishment, of course, it might not be necessary to go to any serious lengths to camouflage the gear!

Shelving with Fitted Panels

For the accommodation of a more ambitious layout—let us say, a full-power station, fully modulated, with recording and play-back amplifiers and all the paraphernalia that goes with remotely controlled rotary beams—a different approach is necessary if floor space is a factor.

The idea is to fix strong, wide shelves to a convenient wall, in a corner of the room with the shelves at right angles, and then to fit hardboard panels (vertically to the edges of the shelves) hinged to open either like cupboard doors or as flaps.

If the shelf fitting is done by fixing wooden uprights to the wall (with "Rawlplug" or "Philplug" fastening) and the shelves themselves held in position by large metal brackets, a very strong framework results, on which heavy power packs can be carried.

The gear is assembled, as before, on open chassis. The hardboard panels can very easily be cut to carry meters and switches, connected by "loose" leads, having enough slack to allow the panel to swing open on its hinges. In a layout along these lines, the panel sizes will have to be planned a bit to avoid having to deal with unwieldy sections.

In a particular instance where this general form of station layout has been adopted, four shelves 14 ins. wide by 4 ft. 3 ins. long, with another set of four of the same width 3 ft. 3 ins. long butted up to them, are fitted in the corner of the room, the vertical separation between the shelves being 18 ins. This gives a total available shelf area for the accommodation of gear of no less than 35 square feet; in addition to this, there is another 24 sq. ft. of hardboard panelling, available for meters, switches and the direct mounting (on the inside) of light chassis. All this with only a 14-in. width of a corner of the room being taken up! The shelves are positioned at a comfortable level for standing at, the gear is safe, reasonably dust-proof, with the minimum of what, to the feminine eye, are "unsightly wires and bits of thing," and any unit of the assembly is immediately accessible by swinging back the appropriate panel.

Conclusion

The ideas outlined here can, of course, be varied in many ways. The whole point is to suggest that
neither table room nor floor area need be taken up by the most ambitious transmitter equipment if there is some empty wall space available.

It is also worth adding that hardboard can be used for a great variety of purposes in amateur station construction—even to building an operating table or console. It can be obtained from any builder or home-decorator’s supply stores. It is cheap, easy to work, takes paint well, and is available in large sheets, with one surface smooth-finished and the other rough for “insides,” for cutting to required size.

A.J.D.

Letters to the Editor

ETHICS OF AMATEUR RADIO

Sir,—In the discussion on p.144 of the May issue, the YL’s argument is based on a false assumption, viz., that British licences are granted for experimental purposes. Theoretically, they may once have been, but they are certainly not now. I think there is too much laying down of the law in Amateur Radio—the CW men say phone operators are not true amateurs, phone men say CW is out of date, and home constructors look down on stations equipped with commercial gear.

After all, Amateur Radio is only a hobby, not a life-or-death affair, and it is big enough for everyone, no matter what their interests may be. If a man is able to buy all his equipment, why on earth shouldn’t he? It would have a greater investment value than the equivalent cash spent on home-constructed gear, for one thing, and for another he would be helping to support an important section of the radio industry.

We never hear any suggestion that stations in the South Pacific operated by U.S. personnel using Service AR88 receivers and BC-610 transmitters should be banned because they are not strictly amateur.—on the contrary, everyone seems only too anxious to work them. And when W6ITH appeared as FS7RT with Collins commercial gear, nobody said he ought not to be on the amateur bands—they were all too busy busing their waistcoat buttons trying to raise him!

H. Yee, G6UA, 406 Higher Bransham, Burnley, Lancs.

SIR,—I am writing on the topic: To pay or not to pay for rare QSL’s. During a period of 8½ months last year I held the calls VS4CT, VS5CT and ZC5CT; I sent out over 1,500 QSL cards. This was 100% QSL’ing, and I adopted what I considered to be a reasonable system in view of the exorbitant postage rates from Borneo. This was to QSL direct to those who tried to assist with postage, even though IRC’s were not accepted by Borneo post offices—but they had been sent me in good faith. All other cards were cleared in bulk to the appropriate QSL bureaus (again a heavy postal charge). Sometimes it happened that after I had sent my cards to the bureaus, duplicate QSL’s would arrive with IRC’s, and in these cases I felt bound to send a further card direct.

Any help I had with my very high postage bill was most welcome, but it was never stipulated that only those who paid the postage got the card. I disagree most strongly with the idea of QSL’s being sent for payment only. Some amateurs are well able to pay for whatever they want, but for the majority this is out of the question. There is nothing to stop anyone sending a donation to assist a DX-pedition, but it is, or should be, unthinkable that his rare DX QSL card should be dependent on it. To send QSL’s in bulk by sea mail from the DX end is certainly not prohibitive.

Had I asked a dollar per QSL, and got it, for all the 1,500 cards I sent, I should have made quite a profit. But that seems to me right against everything that Amateur Radio is and for which it stands.

P. H. J. Green, G3DCT (VS4CT, VS5CT, ZC5CT), 65 Balcombe Street, London, N.W.1.

SIR,—I think the dollar-a-QSL idea a very bad thing for Amateur Radio. If a chap cannot really afford to make one of these expeditions, then he should not start out.

I would never pay for a QSL; in fact, I do not agree with the prevailing American tactic of sending a clip of IRC’s for a return card by airmail.

W. E. Waring, G3GGS, 43 Towngate, Leyland, Preston, Lancs.

SIR,—Regarding the question of paying for QSL’s: This is obviously a controversial matter. My view is that while I am quite prepared to pay postage plus something towards printing costs (for a card I really want), one dollar I regard as quite unreasonable—but then I am not a DX hunter! I think the effect on Amateur Radio of paying for rare DX cards would be bad. Besides introducing a measure of commercialism into a hobby which has always been singularly free of it, the result in the end might be that one would have to pay for every QSL (or is that being too pessimistic?)

As it affects the rare DX station, $2000 is not a bad return for a few days of Amateur Radio which, presumably, a man only undertakes because he enjoys it anyway!

C. N. Chapman, G2HDR, Yeovil, Stoke Hill, Stoke Bishop, Bristol, S.
And this is what the June issue of the Northern Californian DX'er has to say about what it calls the "Yasme Affair," round which, as they put it, this regrettable controversy centres:

"The DX'er wants to make it crystal clear that the Northern California DX Club is not in any manner whatsoever entering into this conflict. We feel that it is strictly up to the individual whether he donates to DX-peditions. The general feeling seems to be that in those cases where financial support is essential to a DX-pedition, this fact should be made clear well in advance of departure.

It is well known that DX-peditions are costly affairs; it is further known that contributions, unsolicited and strictly voluntary, do not provide funds in worthwhile amounts. FS7RT and TI9MHB together did not receive enough to buy the whale oil for their lamps.

There are some who stick firmly to what they term "principle" or "amateur standing." But the inescapable fact is that Amateur Radio, just like everything else, costs money. Every move you make costs money: The power you consume, the gear you purchase, the call book you use and the cards you send. These things are provided by legitimate commercial enterprises. The American Radio Relay League itself is a million-dollar corporation, and by its existence (entirely at amateur expense) a large group of people have a means of livelihood.

Does all this have any effect on anyone's amateur standing? There wouldn't be any amateur standing without it!"

Since the cat is now out of the bag and Danny Weil, of the yacht Yasme, signing various exotic Pacific calls, is named as the focus of all this comment, here are our own findings, as a result of a good deal of correspondence and information received:

The individual in question is a Christchurch (Bournemouth) watchmaker, and apparently was quite unable to get any local support for his venture. Various firms approached by him in the world of yachting and small-ship supply were equally unenthusiastic. He left England feeling that his own people had given him a raw deal. Before setting out from this country he did not hold a G call-sign nor had he qualified in any way for an amateur licence—his practical knowledge of Amateur Radio was virtually nil. This is an important point to note.

On arrival in the Caribbean (in itself a feat for single-handed sailing) he was, in effect, taken up by certain American interests who saw in his venture some publicity value, both on the Amateur Radio side and in regard to supplies for his vessel. Since leaving the Caribbean and getting into the Pacific, he has been well supported by American commercial concerns. From his own point of view, he also found that many of the American amateurs he worked were quite prepared to fall in with the "dollar-a-QSL" idea.

He cannot be blamed for this because, remember, he is not and never has been a radio amateur in the accepted sense. He is an adventurer using Amateur Radio as one of the aids to get him round the world. He has, in fact, been misled (mainly by amateurs, at that) through not realising that the dollar-a-QSL basis of operating was certain to be widely construed as a racket, and would expose him to a good deal of odium.

According to our information, he has been so well supplied with dollars as to be able to make remittances home, and when temporarily short of money at any of his ports of call, finds he can earn what he needs by putting in a few days' work at his trade.

Whatever one's opinions may be as to the ethics of the "Yasme Affair," it affects Amateur Radio—and something of this sort was in any event bound to happen sooner or later—what should never be forgotten is that single-handed sailing in a small craft over thousands of miles of empty ocean is in itself a great feat. It has often been attempted by solitary enthusiasts but seldom brought to a successful conclusion. Yasme has a long way to go before she completes her round-world voyage. So far, in the hands of Danny Weil, she has done extremely well.—Editor.

**CW PROCEDURE SIGNALS ON TELEPHONY**

**SIR,—** I must agree with VQ4RF's comments in the May issue of SHORT WAVE MAGAZINE. Many of the abbreviations to which G2NS appears to take exception have become so internationally recognised as to be enormously helpful in conveying one's meaning to overseas operators whose language one may be unable to speak.

I shudder to think how difficult it would be to explain QRM or QSB or QSY in Portuguese to a Brazilian, in Spanish to a Peruvian, or in German to a Swiss. I myself have no hesitation in using these generally-accepted CW procedure signals on phone, and I cannot see why anyone should object to them.


**SINGLE-CHANNEL PROCEDURE**

**SIR,—** As a professional operator of 1919 vintage, I deplore the attitude of many stations in utilising two channels as much as 10 kc apart for QSO's on a congested band. Surely any experienced operator can read two, or even three, beat notes without difficulty; the probability of an exact zero beat is very remote. In my experience there is, in 95 cases out of 100, a separation of at least 500 cycles between stations calling; this is ample. In fact, 250 cycles should be more than enough for CW with any respectable receiver.

It rather points to inexperience in handling AVC. How many operators know that to pick out DX comfortably it is necessary to use maximum AVC with minimum audio gain? In this manner, loud signals are reduced to somewhere near the level of the weaker DX station; slight adjustment of the BFO will bring the note to that "peak" which is present in most receivers (and headsets); this reduces the necessary channel
width to something less than 1,000 cycles. A lot of time is wasted through stations not indicating how they are tuning—though, of course, it is usually understood that they are listening on or near their own frequency. On the phone bands, it is vitally necessary to zero accurately if everyone is to get a look in.

A VFO is now the only answer on the amateur bands, unless the CC-only operator is satisfied to work merely what comes up 1 kc or so either side of his fundamental—but if this happens to coincide with a wanted DX station, he becomes nothing more than a nuisance.

Our available frequencies are diminishing almost yearly, and we must make the best use of what we have. So let us hear no more about the DX operators who “refuse to answer less than 10 kc off their fundamental.” I might add that (if I am DX to anybody) a call to me more than 2 kc off my frequency is flogging a dead horse.

H. Grist, GD3FBS, 48 Victoria Road, Douglas, Isle of Man.

The views of readers on the points made by GD3FBS would be interesting.—Editor.

THE CALL-SIGN SEQUENCE

SIR,—I read with interest your note on p.201 of the June issue, and was reminded of how I got my own call in September 1937. I was 17 years of age at the time and call-signs in the G8 group were being issued; actually, they were practically all out and several of my friends, including G8KL and G8RF, had just beaten me to it in getting their full tickets. However, on applying for my licence, I requested the G.P.O. to grant me, if possible, a call-sign from the earlier G2 or G6 group. Imagine my surprise and delight when, on opening my licence on the morning it arrived, I found I had been given G6TC.

I believe that I am the third holder of this call; originally I think it belonged to a GI, and after that to a G in Lancashire, before being issued to me.

The only disconcerting thing (if you can call it that) is the number of people who refer to me as “old timer” when in QSO. Come to think of it, however, perhaps I am.

T. Rowley, G6TC, 136 Black Halfre Lane, Wednesford, Wolverhampton, Staffs.

SAFETY IN MOBILE OPERATION

SIR,—In view of the increasing interest in mobile operation, one feels most strongly that emphasis should be laid on the safety angle. The problems involved are quite complex, and may be out of the province of many amateurs. A glaring example came to my notice a few days ago. It was of a beautiful mobile rig which, with its attendant power supplies, had been fitted in such a manner that the car, a new one, lifted its front wheels slightly off the ground every time the accelerator was touched, this resulting, of course, in uncertain steering. From every aspect other than safety, this car with its installation was a certain “mobile concours d’elegance” winner. From the safety point of view, it was a death-trap. Luckily, the danger was demonstrated to the owner’s entire conviction; the gear was immediately dismantled and a major rebuild undertaken.

A very few errors of this nature would soon lead to a spectacular crash, and the outcome could well be a loss of our /M privileges. After all, how is a magistrate or a coroner to differentiate between inattention to the wheel and unexpected under-ster of a particularly vicious nature?

Being connected with the service technical section of a large motor manufacturing group, I would be glad to give professional advice and assistance gratis to any amateur who, being inexperienced in fitting mobile equipment and not clear on the importance of proper weight distribution, cares to get in touch with me.


We drew attention to this important factor of safety and careful driving, when operating /M, on p.25 of the March issue of SHORT WAVE MAGAZINE. G3KFE emphasises another point from his own experience, and his suggestion will no doubt be welcomed by many readers who are embarking on mobile working.—Editor.

ISLE OF WIGHT BBC TV STATION ON FULL POWER

The BBC announces that with the installation of the permanent aerial system on the new 500-ft. mast at its Rowridge, Isle of Wight, television transmitting station now nearing completion, the station started radiating with increased power on June 11, using Channel 3 (Vision 56.75 mc, Sound 53.25 mc) with vertical polarisation.

Rowridge was brought into operation in November, 1954, with a temporary aerial system on a 200-ft. tower in order that BBC TV could be made available to viewers in the south of England at the earliest possible moment. The permanent aerial system on the 500-ft. mast now brought into service increases the effective radiated power of the station by more than three times, and is expected to extend the coverage as far as Seaton in the west, Lewes in the east, and inland to include Wells, Trowbridge, Marlborough, Reading and Guildford, linking up with the service areas of the BBC’s Wenvoe and Crystal Palace stations.

NEW MULLARD FILMSTRIPS

The first of these, entitled An Introduction to Electronics, describes the structure of the atom, ionization, conductors, insulators, semi-conductors, thermionic emission, photo-electric emission and secondary emission.

The second new filmstrip is called Electronic Devices: 1. Electron Tubes. It deals with space charges, diode, triode and multi-grid valves, gas-filled valves, thyatrons, cathode ray tubes, the electromagnetic frequency spectrum, X-ray tubes, photocells and cold cathode tubes.

The third, Electronic Devices: 2. Semiconductor Devices,” illustrates the operation of the transistor.
Surplus Converter for Surplus Receiver

THE RF-24 UNIT WITH AN R.1155

J. S. BENNETT (G3KLC)

The theme here is extending coverage at the HF end and improving performance of "surplus" receivers by the use of an RF-24 as converter-preamplifier. Though the R.1155 is taken as the working example, the general idea is applicable to any other type of receiver which either does not tune much above 16 mc or is insensitive on the HF bands.—Editor.

This article is written with particular reference to the R.1155, but applies equally to any surplus receiver. Most people who use such receivers do so for one reason—economy, and battle with the disadvantages as best they can. Some of these disadvantages, notably lack of the 21 and 28 mc ranges and low sensitivity on 20 metres, can be overcome by adopting the converter and preamplifier arrangement described in these notes. This costs less than 20s. and takes under one hour to put into operation.

The basis of the idea is the RF24 unit, which is still being advertised in new condition at "give-away" prices. It is a broad-band converter designed to plug into various IF strips at a frequency of 7.5 mc. (This has to be changed to 8.0 mc.) Valves used are the SP61 in three stages — RF, mixer and oscillator. (These valves are in ample supply at very reasonable prices.) At the frequencies we are concerned with they are efficient and have only the disadvantage of heavy heater current.

The RF24 has switched tuning centred on five frequencies between 20 and 30 mc. These are:

<table>
<thead>
<tr>
<th>Switch position</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
<th>No. 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>22.0 mc</td>
<td>22.9 mc</td>
<td>25.3 mc</td>
<td>27.3 mc</td>
<td>29.7 mc</td>
</tr>
</tbody>
</table>

Experiments were first made by fitting ganged tuning condensers in place of the switch and using variable tuning. It was soon found that easier control was obtained by using the RF24 for band setting only and then tuning on the main receiver. When it was decided to try using the RF24 with the original switching, very good results were obtained.

Construction

The actual constructional work is very simple. At the rear of the RF24 is a six-pin "Jones plug" and two locating spindles. These spindles are easily removed by pulling out two small split pins. The hole resulting on the left-hand side (looking from the rear) is then drilled slightly larger to take co-ax cable. The other hole is large enough for power supply leads. The inner of the co-ax is connected to pin No. 6 of the Jones plug and the braiding to chassis. (This pin is easily identified by the length of co-ax from the mixer section which is connected to it.) The neutral side of the heater supply is connected to chassis and the live to pin No. 1. HT+ goes to pin No. 2 and HT− either to chassis direct or via a 5,000-ohm resistor. (See under "Power Supply").

The trimmers associated with the switch positions are marked on the outer case. The trimmer marked No. 1 in the oscillator section is shorted across. Those marked No. 1 in the RF and mixer sections are shunted with 100 µµF silver mica condensers. This completes the constructional work.

Power Supply

The heater supply required is 6.3 volts at 1.8 amps. and 150 to 300 volts HT. In the
Service the equipment was run at 300 volts, but it has been found that there is only slight loss of sensitivity but much improved noise level by using 150 to 200 volts. HT is not taken directly to chassis in the R.1155, but via a resistor network. As the converter is connected to the main receiver by the coaxial cable outer a resistor of about 5,000 ohms must be put in series with the HT lead if the same power supply is used.

**Setting Up**

The IF of the RF24 is adjusted to 8 mc by unscrewing the iron-dust core of the mixer anode coil. It can be done on “noise” with the R.1155 set at 8.0 mc.

Connect the coax to the aerial socket on the main receiver. To prevent break-through and make a more efficient job it is better to fit a screened plug and socket. When set up, the converter will cover five amateur ranges 14, 21, 27 mc (American band) and 28-29 mc and 29-30 mc.

Switch the converter to Range 5 and the main receiver to cover 7.5-8.5 mc. With a local oscillator or harmonic beat from a VFO at 29.5 mc and the main receiver at 8.0 mc, tune the RF24 oscillator trimmer until the signal is heard, then peak it with the trimmers in the mixer and RF sections; use the tuning indicator on the R.1155 for maximum response. The oscillator will be found to tune very sharply. It will also be found that by tuning the R.1155 the range 29-30 mc will fall almost exactly between 7.5 and 8.5 mc on the main dial.

The operation is repeated with the RF24 on Range 4 and a local signal of 28.5 mc. Range 3 is tuned to 27 mc and Range 2 to 21 mc; the 21 mc band falls between 7.6 and 8.1 mc on the main receiver.

On Range 1 the main receiver is tuned to 14 mc and the trimmers in RF and mixer sections adjusted for maximum response.

**The Pre-Amplifier**

It was originally intended to make the converter cover the 14 mc band as well, but this was found to be impracticable because of break-through. So by shorting the oscillator trimmer the oscillator is put out of action on this band and by adding the condensers already mentioned across the mixer and RF trimmers on Range 1 the 14 mc band is covered, and a sensitive pre-amplifier results. The increase in gain on 14 mc is phenomenal! Lack of bandspread is still a problem, but on the writer’s R.1155 this has been overcome by adding mechanical bandspread.

It will be found that the original bandwidth of the RF24 is quite adequate to cover the bands as described and break-through is no problem. The trimmers have plenty to spare to cover the bands without further padders.

This converter has been used for many a QSO on the 21 and 28 mc bands and will be found remarkably efficient. In fact, it is all that is needed to help anyone who is restricted to the R.1155 as a receiver to get going on 10 metres.

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**Audio Clipper Unit**

**TO LEVEL RECEIVER OUTPUT**

D. M. WILLIAMS (GW3HZZ)

Most operators, especially those addicted to using headphones, have at some time or other been temporarily deafened due to the appearance on the frequency of a sudden high-powered signal—their own, a near neighbour’s or a commercial station.

A method exists, however, whereby the audio output can be limited or clipped, and it is worthy of inclusion in every communication receiver. In audio clipping the output can be set to a predetermined level, from a readily accessible control, such that any signal, either CW or phone, is reduced to a comfortable level.

This audio clipping unit consists of two triodes and with associated bits and pieces can be constructed either on its own small chassis or inside the receiver—running off the receiver’s own power supply in most cases. The requirements are about 230 volts at 5 mA and 6.3 volts at 0.3 amps if a double triode such as a 12AU7 is used, as shown in the circuit.

In the writer’s case the unit has been built into an HRO immediately behind the RF control, the extra knob being brought out on the side of the chassis; the only other modification is that headphone output is via a transformer off a 6J5 output valve. In either case the clipper input lead is taken off either the detector valve anode, or the normal front panel headphone socket, the output lead being connected to the grid of the output valve or direct to the headphones; the setting control can, with advantage, be interchanged with the existing
audio gain control and space found for the second knob on the front or side of the case.

**Action of the Circuit**

The circuit should be considered as an infinite impedance detector followed by a biased diode. This type of detector is known for its high signal-handling abilities combined with low distortion—also, it does not load the previous circuits.

When an audio signal is put on the detector grid a positive voltage appears across the cathode resistor, its actual value being determined by the action of the receiver audio control and the voltage on the diode plate; this audio voltage is impressed on the diode which will conduct as long as the diode plate is positive with respect to the cathode. But when the applied signal is big enough to make the cathode positive with respect to the plate, that portion of the signal is cut off—in fact, the signal is clipped. The large value by-pass condenser, following the diode, effectively reduces the harmonics produced in the clipping process.

**Operation**

The unit is brought into use by setting the RF gain slightly higher than normal, then advancing the audio control resistor R4 until a comfortable output is heard in the headphones or speaker; a loud signal is tuned in on the receiver dial and the clipper control is adjusted until the signal is brought down to a reasonable level. Then, by slightly varying the unit audio gain and the clipper controls a point can be reached whereby normal signals are un-

affected but all very loud signals reduced to a safe level.

In the writer’s case, the RF control (on the HRO) is usually set at 8½, the audio gain control to 6, and the clipper control to 3; once set, the two latter knobs need not be varied except when changing bands.

If instability is present, usually shown by wooliness in the audio system, especially when the clipper control is used, suspect the condensers. Once in use, the writer feels sure that much more comfortable listening will be the result, whether on 160 metres or any other band.

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**NEW BBC TELEVISION TUNING SIGNAL**

The BBC introduced a new television tuning signal on June 16. The new tuning signal retains all the essential features of the old one but the presentation and general appearance have been improved. The purpose of the tuning signal is to assist viewers in making any necessary minor adjustments to their sets immediately before the start of the programme.

**BRITISH STANDARD ON THE USE OF ELECTRONIC VALVES**

A new publication, Part 3 of British Standard Code of Practice CP.1005, *The Use of Electronic Valves*, covers requirements for photo-cells, transmitting valves and cold-cathode gas-filled valves. The new part should be read in conjunction with the recommendations for all electronic valves contained in Part 1 of the Code of Practice; this was published in 1954 together with Part 2.

Part 3 gives information, additional to that in Part 1, on the more usual problems in the use of electronic valves, such as ratings, mountings and temperature. Specific aspects of the subject, of which the following are examples, are also dealt with: Modulation-frequency response and relative spectral-response for photo-cells; means of ventilation and cooling for transmitting valves; and ionization and de-ionization in cold-cathode gas-filled valves. Reference is also made to the possibility of danger arising from X-radiation from valves operating at high voltages.

Copies of the Standard can be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1, price 3s. each.

**POSTAGE — PLEASE NOTE**

Due to the heavy (and increasing) postage charges now prevailing, readers are asked to note that all correspondence to which a reply is expected must be accompanied by a stamped envelope. Overseas readers can meet this by enclosing the appropriate IRC, air mail or surface mail.
NEW QTH's

EI5BD, A. J. Hopkins, 35 Main Street, Bray, Co. Wicklow.
EI6BD, B. Harkin, 67 Main Street, Letterkenny, Co. Donegal.
G3GNR/A, R. E. Short, 25 Russell Avenue, Sprowston, Norwich, Norfolk.
G3JBF, L. P. Brown, La Myrtle, High Street, Markyate, St. Albans, Herts.
GM3JRX, J. A. Dalrymple, 1 Gill Place, Dornock, nr. Annan, Dumfries-shire.
G3KDZ, C. Ferns, 47 Cornwall Street, Ashwood, Longton, Stoke-on-Trent, Staffs.
GW3KLU, E. Eaton, Kelsterton Hall, Flint, Flintshire.
G3KTL, M. K. Dunn, 417 Wilmslow Road, Withington, Manchester, 20. (Tel.: Rusholme 4759).
G3KTR, H. D. J. Roek, 583 Harrow Road, Wembley, Middlesex.
GM3KWN, W. C. Nicoll, 32 Durham Square, Portobello, Midlothian.
G3KXB, D. E. Pantony, Herts Farm, Linton Road, Loose, nr. Maidstone, Kent.
G3KXP, G. H. Tillett, 42 Park Lane, Hornchurch, Essex.

CHANGE OF ADDRESS

G2AIM, C. E. Clarke, Flat 3, Rockstone House, 77 Paines Lane, Pinner, Middlesex (Tel.: Pinner 1171).
G2APF, J. Frampton, 33 Christine Avenue, Rushwick, Worcester.
G2CBS, L. G. Thompson, 55 Roecliffe Road, Woodhouse Eaves, Leicestershire.
G2FMP, T. Elkes, 10 Chesterton Road, Eton Road Estate, Burton-on-Trent, Staffs.
G2FUU, T. Knight, Homefield, Upper Nazeing, Watham Abbey, Essex. (Tel.: Nazeing 2274).
G2HOP, J. H. Parrish, Uffington, nr. Stamford, Lincs.
G2OS, J. W. Ostens, 27 Seaford View, Tynemouth, Northumberland.

G3ADH, A. G. Sutton, 15 South View, Austerfield, Bawtry, Yorkshire.
GW3ARB, W. F. Brittle (ex-G3ARF), 27 Mayals Avenue, Swansea, Glam.
G3BHQ, K. Robinson, 9 Victoria Street (North), Old Whittington, Chesterfield, Derbyshire.
G3BLO, F. G. Sargent, 75 Hele Gardens, St. Maurice, Plympton, nr. Plymouth, Devon.
G3BGO, C. L. Turville, 18 Tredington Road, Glenfield Frith Estate, Leicester.
G3CO, J. B. Kay, Dene Bank, Ash Road, Hartley, Dartford, Kent.
G3COY, G. B. Woffinden, 5 Peckmill, St. Bees, Cumberland.
G3CYS, J. B. Walker, 170 Edlingham Road, Warmsworth, Doncaster, Yorkshire.
G3DLH, P. Evans, 25 Stanley Drive, Bramcote, Notts.
G3ECX, A. P. Newport, 24 Winn Road, Lee, London, S.E.12.
G3EDJ, J. W. Swan, 80 Woodfield Road, Harrogate, Yorkshire.
G3EHA, G. F. Hendriksen, Brad- ford Hotel, 60 Holyhead Road, Coventry, Warks.
G3EIT, E. A. Read, 13 Eastry Road, Erith, Kent.
GM3FHS, Hawick Radio Society, c/o 13 Wilton Crescent, Hawick, Roxburghshire.
GW3FPH, J. W. Hayes, 4 St. Mary's Drive, Northop Hall, Mold, Flintshire.
G3FWW, S. W. Watts, 8 Killarney Avenue, Burnham-on-Sea, Somerset.
GW3FWY, G. Tashara, 16 Vivian Park Drive, Aberavon, Port Talbot, Glam.
G3GTW, D. Kirk, 337 Doncaster Road, Rotherham, Yorkshire.
G3HFA, R. Cairns, 107 Dewalden Place, Pegwood, Morpeth, Northumberland.
G3HHT, F/Sgt. J. A. Bassford, 8 Franks Close, R.A.F. Station, Henlow, Beds.
GW3HOJ, A. R. Holbrook, 80 Mynydd Garnllywd, Morriston, Swansea, Glam.
G3HRJ, J. T. Gordge, Mayfield House, Blisford, nr. Fordingbridge, Hants. (Tel.: FOR. 3383).
G3HWO, B. Taylor, 57 Mongeham Road, Deal, Kent.
G3JQF, Sgt. R. A. Fowler, 11 Edgecumbe Avenue, Newquay, Cornwall.
G3JXE, R. J. West, The Cottage, Dunkan's Yard, Westerham, Kent.
G3JLF, K. V. Franklin, 33 Corf- ton Road, Ealing, London, W.5. (Tel.: PER. 1033).
G3JTF, G. T. Allen, 83 Hunts- moor Road, Tadley, nr. Basing- stoke, Hants.
G3JTP, F/Lt. E. Oldham, DFC, 2 Brooklands, Edgerton Road, Preston, Lancs.
G3JYT, F. Jeannod, 188 Kennington Lane, London, S.E.11. (Tel.: RELiance 3925).
G3KDA, M. G. Rimmer, 38 Grafton Lane, Bidford-on-Avon, nr. Alester, Warks.
G3KLJ, F. C. Beadle, Mellstock, The Drive, Longfield, Kent.
G3ZY, J. R. Tweedy, Bridge Close, Bridge Street, Rothbury, Morpeth, Northumberland. (Tel: Rothbury 45).
G5HB, H. Billcliffe, 101 Thorpe Road, Melton Mowbray, Leics.
G5IG, C. H. Babbs, 47 Partridge Avenue, Baguley, Manchester, 23.
G8LT, R. W. Addie, Sunhaven, Church Road, Ham Common, Surrey. (Tel.: KINgstong 0669).
The Other Man’s Station

G3KEP

This time our picture is of G3KEP, owned and operated by young David Pratt, of 27 Woodlands Grove, Cottingley, Bingley, Yorkshire—who is lucky enough to be but 17 years old. He has been licensed since January, 1955, and operation is almost exclusively on 160 metres, although transmission on Eighty is possible by doubling in the PA; on Top Band G3KEP has had more than 2,500 QSO’s since starting up.

On the left in the photograph is the station receiver, a very much modified R.1224A; a mains power supply unit giving the necessary DC outputs for HT and LT has been built into the back of receiver cabinet, and the original valves are used because of their very low noise level.

The transmitter valve sequence is 6AC7 Clapp VFO into a 6AC7 untuned buffer driving a TT11 as PA, running the full 10w. on CW and phone. Keying is in PA plate and screen, the key itself being a home-constructed bug. The modulation side starts with an Acos crystal microphone into an EF50-EF50-6N7 speech amplifier driving a pair of 6L6’s in Class-AB1, as described by G2AJ in the March 1949 issue of SHORT WAVE MAGAZINE—David was just 10 years old when this was published! On the right of the transmitter is the CC frequency marker, consisting of a 6J5 100 kc crystal oscillator and a 6SN7 10 kc multivibrator; this unit takes its HT/LT from the transmitter. The receiver, transmitter and modulator each have their own power supplies in their own cabinets.

On the immediate right is an ex-Army 19 Set in the (inevitable!) process of modification. The 19 assembly consists of a 5-valve superhet receiver and a transmitter with an 807 in the PA, running up to 25w. CW and 10 watts on phone. As so far modified by G3KEP, anode modulation is used instead of the original grid control. With this rig, David hopes to go /P and /M on 160 metres—fortunate fellow!

The aerial at G3KEP is 260 ft. long and 25-30 ft. high, the coverage being NE-SW, and coupling to the PA is by means of a pi-section network.

All the QSL cards visible are for contacts on 160 metres: David has already gained his SHORT WAVE MAGAZINE WABC Award and hopes in the near future to be able to claim a second WABC for phone only. His Top Band counties score as at May 12 was 79C confirmed and 81 worked. No American contact has yet been achieved, but it is hoped that conditions during the next Trans-Atlantic season may be good enough to make that possible.

And to it all we can add that, still at Bradford Grammar School, David is honorary secretary of the school radio club, no less than five members of which took the last R.A.E. Bradford entered for the Tenth MCC in November, the station being G3KEP/A with David on the key. Readers will agree that with his very neat layout and the results already achieved, he has made a most promising start. With all the advantages of youth, he can look forward to many years of Amateur Radio activity—and we would hazard the prophecy that he is going to be outstandingly successful.
THE MONTH WITH THE CLUBS

By "Club Secretary"

(Dead-line for August Issue: JULY 13)

IN previous summers we have commented on the fact that some Clubs manage to hold their members together with the help of outdoor events—DF contests, private field-day battles with other clubs, mobile outings, and the like—while others quietly fold up for three months or so.

Clubs with permanent headquarters of their own need never fear a summer slump, because constructional work should hold quite a few members' interest during the summer months. It is those who have to meet in a café or institute of some sort, which either closes down or turns them out, who suffer a long period of doldrums.

May we suggest that even if members cannot all get together in the same place each week, it is most important to maintain contact with each other, either by radio on a network, or by organising summer outings of some kind. Visits to members' stations used to be the stand-by in pre-war days, and although not everyone can cope with a visitation of several assorted fellow-members, there are usually some who will welcome a visit of limited proportions.

With the increasing popularity of portables and mobiles, it should be possible to organise small-scale rallies at least once a month during the summer. Keep the pot boiling—that is the main thing!

ACTIVITY REPORTS

Aldershot have recently re-formed themselves, and hold fortnightly meetings at The Cannon, Aldershot. The main interests have been rag-chews, and demonstrations of mobile and static equipment; the future programme includes two-metre and low-power field day activities, film shows, visits and lectures.

Clifton had two interesting talks during May, when M. Paveley, VQ4CW (ex-G3GWD) gave details of Amateur Radio in Kenya, and G. Alderman, G3BNE, spoke on the Decca navigational aids. On July 13, G3MZ will talk on Tape Recording; on the 15th there is the third DF Contest, and on the 29th a Transmitting Field Day. The Club meets every Friday at 225 New Cross Road, London, S.E.14.

East Kent get together every Tuesday in the basement of the Technical College, Long Post Street, Canterbury, where benches and cupboards are still being built. One DF set has been tried out and found satisfactory; it is hoped to get at least two more going in the near future. Raffles and lectures are also held, with a Theory course by the Hon. Sec.

Hull meet on July 10 to hear the G5RV Transmitter (recorded tape lecture) and on the 31st for two films by the Mullard organisation. Two visits are also arranged—to Earles Cement Works to see the electronic control of the various processes. A recent lecture by Mr. Barry, of the Marconi Co., included a practical demonstration of closed-circuit TV. Meetings are at the Royal Oak ("Tony's") on the second and last Tuesday each month.

South Shields meet monthly, in the Trinity House Social Centre, Laygate Lane. These meetings are on the last Wednesday in the month, but facilities are available to use the Club instrument room, with the Club Tx, G3DDI, almost any weekday evening. They will again be taking part in the Annual Flower Show this year, from August 24-26. Special call-signs will be in use, including GB3SFS, and activities will be spread over all bands from 80 to 10 metres. Contacts will be welcomed, and reception reports will be QSL'd with a special card.

Spen Valley visited the R.N. W/T station at New Waltham on May 13, and then spent an afternoon at the Grimsby depot of the Marconi Marine Co., followed by a visit to the docks and the 1956 m.v. Prince Philip. The Marconi Co. rounded off proceedings with a magnificent tea. On July 11 they hold the final meeting of the season.

Bailleul (Arborfield Camp) provides first-class Amateur Radio facilities for REME Telecons tradesmen passing through. The Club has its own Tx, G31HH, and a fully-equipped workshop. Membership fluctuates with comings and goings on National Service, but rarely falls below 30. The Club would like to contact ex-members, especially those now overseas—see panel for Secretary's QTH.

Cray Valley will meet on July 24, when G3JRA will give a talk on Adventures with the Minimitter. This will be at the Station Hotel, Sidcup, at 8 p.m.

Crystal Palace have announced the rules for their Ann Cup and Trophy, the transmitting and
receiving contests for which are to run during TV hours on two amateur bands. The event will take place in October and will last nine days. Next meeting is on July 21, Windermere House, Westow Street, S.E.19, and will be a "Mobile Evening," with demonstrations of gear.

Grafton held their annual field day on June 9/10 on Hampstead Heath, with two stations covering four bands. We gather it was the usual highly successful event. They will be closing for the summer recess on July 20, re-opening on September 7.

Liverpool, in their excellent News Sheet, intended to advise members to get their Morse speed up to 16 w.p.m. before taking the GPO Test. Owing to a misprint this figure appeared as 10 w.p.m. The Club were surprised to find that their News Sheet, intended for private circulation, even found its way as far as the GPO, who pointed out the error! They will be running a demonstration station at a big Liverpool fête in aid of Spastics, on August 6; they hope to be on all bands. Meanwhile, they seem to be suffering from a surfeit of "pirates" up there. The list of phoney calls they supply is too long and the list of phoney calls they supply is too long for us to quote. Beware of anyone giving QTH as Liverpool unless you can authenticate him.

Portsmouth recently ran an outing for members and their families, in the form of a coach trip round the Isle of Wight, with visits to the GPO station at Milton and the BBC TV station at Rowridge. New members will be welcomed at the Club Rooms, British Legion Club, Queen's Crescent, Southsea.

Purley will again be taking part in the annual Summer Fair in the Rotary Field, Purley, on July 21. There will be an exhibition of members' equipment and an operational station. The call-sign is not yet fixed.

Slade will be meeting on July 6 to hear G3ZRF on An Introduction to Amateur Television. It is hoped that there will also be a demonstration by G3KBA/T. On July 20 there will be a lecture by Mr. J. A. Thomas on the Universal Avometer.

South Manchester notify the following programme: July 13, lecture by G6DN (subject to be announced); July 27 will be an Open Night; on August 10 they will hear a recorded lecture by G8TL on Mobile Operation; and on August 24 there will be a Junk Sale.

Reports for this feature are welcomed from all active Clubs and Societies. For the August issue, they should reach us by July 13, addressed “Club Secretary,” Short Wave Magazine, 55 Victoria Street, London, S.W.1. Closing date for September will be August 17.

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**NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:**

- **ALDERSHOT:** J. St. C. T. Ruddock, G8TS, 44 Hazell Road, Farnham, Surrey.
- **BAILLEUL:** T. Holbert, Bailleul Radio Society, Bailleul Camp, Arborfield, Berks.
- **CRAY VALLEY:** S. W. Coursey, G3JJC, 49 Dulverton Road, S.E.9.
- **CRYSTAL PALACE:** G. M. C. Stone, G3FZL, 10 Lipbook Crescent, London, S.E.23.
- **EAST KENT:** D. Williams, Llandogo, Bridge, near Canterbury.
- **GRAFTON:** A. W. H. Wemmell, G2CN, 145 Uxendon Hill, Wembley Park, Middx.
- **HULL:** M. P. Square, G3HTB, 118 Wolfeaton Lane, Willerby, Hull.
- **LIVERPOOL:** A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool 14.
- **PORTSMOUTH:** L. Rooms, G8BU, 51 Locksway Road, Milton, Portsmouth.
- **PURLEY:** E. R. Honeywood, G3JKF, 105 Whyteleafe Road, Purley.
- **RUISLIP:** (114 Sqdn. A.T.C.) A. Morris, No. 4 Main Unit, West Ruislip, Middx.
- **SLADE:** C. N. Smart, 110 Woolmore Road, Birmingham 23.
- **SOUTH MANCHESTER:** M. Barnsley, G3HZM, 17 Score Street, Bradford, Mancunian 11.
- **SOUTH SHIELDS:** W. Dennell, G3ATA, 12 South Frederick Street, South Shields.
- **SPEN VALLEY:** N. Pride, 100 Raikes Lane, Birstall, Leeds.
- **STOCKPORT:** G. R. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.
- **WIRRAL:** L. I. Powell, 549 Woodchurch Road, Prenton, Birkenhead.

G2BUJ/P was operated by Swindon Radio Club for the June field day. Identified in this photograph are G3KEU on the key, G3AYL (left, in headset, logging) and G3IRA in the far corner of the tent.

Stockport recently staged a very successful exhibition in conjunction with a local TV dealer, and much interest was shown in their display. On July 18 they will hear a talk by G3JLX, and on August 1 there will be a DF lecture. There is no meeting fixed for August 15.

Wirral continue to meet on the first and third Wednesdays at the YMCA, Whetstone Lane, Birkenhead. Next meeting after publication is on July 18, when there will be a Junk Sale. At the previous meeting G2AMV gave a talk and demonstration on his home-built panadaptor.
At Ruislip, 114 Squadron of the A.T.C. has formed an Amateur Radio Club, based on No. 4 Maintenance Unit, West Ruislip: they will be on the air in the 40- and 80-metre bands. CW and phone, on Sunday mornings between 10.30 and 12.30, and on Tuesday and Thursday evenings during 19.30-21.30, using call-signs G3LAF and G4GB/A. Reports and contacts will be welcomed—see panel.

FREQUENCY-MODULATED SHF RADIO SYSTEM PROVIDES 600 TELEPHONE CIRCUITS

The Swiss Posts and Telegraphs Department has recently placed an order with Standard Telephone et Radio S.A., Zurich, for SHF radio equipment, to link Berne with Geneva, providing 600 telephone circuits over a single radio channel, with facilities for future extensions. This will considerably augment the existing telephone network and cater for subsequent growth. The equipment will be designed and manufactured in England by Standard Telephones and Cables, Limited (associated with Standard Telephone et Radio S.A., Zurich), to the requirements of the Swiss Posts and Telegraphs Department, and will comprise terminals at Berne and Geneva with a repeater station at Chasseral.

The transmission path lies over mountainous country, and the section Chasseral-Geneva is some 70 miles long, a considerable distance to cover in one hop. This will be accomplished, however, with the Standard SHF System incorporating the newly-developed Standard 5-watt travelling-wave amplifier. The equipment to be provided will comprise a system equipped initially with one working and one spare RF channel for 600 telephone circuits, i.e., ten supergroups. Normal expansion will enable this to be extended to six RF channels in the band 3800-4200 mc, and if necessary additional channels can be added in the band 3600-3800 mc. These additional RF channels can be used for further telephone circuits or for television links. The frequency division channelling equipment used will provide facilities for "through-group" and "through-supergroup" working with other systems, e.g., a standard coaxial or radio system.

At the terminal stations, the equipment for each radio frequency channel will consist of transmitter and receiver cubicles, the transmitter being equipped with a travelling-wave amplifier which will deliver an output of 5 watts to the aerial system. In the case of the repeater station, two one-way 5-watt repeaters will be required, each consisting of one cubic mounting the transmitter and receiver.

NEW MULLARD OSCILLOSCOPE

The Mullard L.140 is a new laboratory oscilloscope for the observation and accurate measurement of pulse waveforms. It has an especially linear triggered time-base with a large range of sweep durations, and a wide-band Y-amplifier. Signal delay is included so that the full waveform of a random pulse can be displayed. The instrument is provided with stabilised power supplies, a cathode follower input probe, and a Mullard cathode ray tube with post-deflection acceleration.

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SMALL ADVERTISEMENTS, READERS—continued

SALE: Eddystone S.640; one owner; no extras; good order. Offers nearest £16.—H. J. Shaw, 11 Crawford Avenue, Sheffield, 8.

FOR SALE: Canadian Marconi-type 52 Tx/Rx; frequency 1.5 - 16 mc; fully valued; £13 PA and main power pack; buyer collects; £20.—Wilson, 18 Holdenby Drive, Park End, Middlesbrough.

Q-MAX B4/40, all-band, Phone/CW, 40-watt table-top transmitter, complete; in perfect working order and very good condition; £27 10s. (o.n.o.).—Box No. 1693, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.


Quick sale.—V. A. Cedar, 9 North Drive, London.

Eddystone S.640 Receiver, good condition, £10; STRO and 9 coils, £13; 50 microamp. meter, £1. Also dozens of valves, etc.—St. Martins, Locksheath Park Road, Locksheath, Southampton.

HRO, Rack Mounted; 6 coils, 500 kc - 30 mc; power supply; speaker; £23 (o.n.o.). Wilcox Gay VFO, £3 (o.n.o.); prefer buyer collect. BC-624A; TZ40 (2); MCR1 Rx, complete; R103, MK II; power pack; speaker; £6 (o.n.o.). R1224 (needs attention), £1. BC-453B, converted to MW; 6 valves; 30/-; Ali Chassis (2), 10/- each (14" x 8" x 2¾), front panels and side plates. Two field telephones (less batteries), 10/- each.—G3HWU, 200 Quarmby Road, Huddersfield.

SALE: Large Cabinet containing hundreds of components, £25 (prefer buyer arrange transport). R109 (mains), £5; 832, 15/-; 6v. charger transformer rectifier, 25/-; mod. preamp, £1. Voigtlander camera, £7 10s.; processing accessories, tank, 25/-; Vibrator P/Unit, £2; 6in. 1 mA meter. £3; R1155 D/F meters, 15/-; 100 kc Xtal, £1; 80m. driver, suitable QRP, phone (requires p/unit and tank circuit), £3. Short Wave Magazine, Oct. 1950 to Dec. 1955, £3; Radio Constructor, Vol. 8 (bound), Vol. 9 (unbound), £1. R.S.G.B. Bulletin, Sept. 1950 to Aug. 1954, 30/-; Jason FM Rx, needs aligning, £2 10s. (carriage extra).—Box No. 1694, Short Wave Magazine. 55 Victoria Street, London, S.W.1.

COMPACT 12in. x 7in. x 11in. Top Band Tx; VFO/BA/PA; plate and screen modulation; TT11 Pi-Section output; exhibition Tx; £10.—Box No. 1695, Short Wave Magazine, Ltd. 55 Victoria Street, London, S.W.1.

25-WATT Tx (Radiocraft design), complete with aerial tuner and 25-watt modulator; has worked over 80 countries, FB; compact job; £12 the lot for quick sale.—Box No. 1696. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CHANNEL 14in. Television; perfect condition. Never had the back off; 12 months old; all Mullard valves and CRT. Would exchange for FB Rx, preferably AR88, or sell for £45.—Box No. 1697, Short Wave Magazine, Ltd. 55 Victoria Street, London, S.W.1.

ZC1/Mk. II Transmitter-Receiver; has been modified for AC mains, but will supply 12v.; power pack and handbook; new Rx dial fitted, but needs mod. to modulation completing. First-class condition, with spare valves, phones, etc.; £9.—Box No. 1698. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

VALVES: 300 valves, including 35T, GU50, 80/70, 6K8, 656, 6C4, ECL80; all types American metal valves; too many types to list. State wants and prices offered (s.a.e., please). —Box No. 1699. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

R.C.A. AR88 with Manual, etc.; also R.C.A. Tone Keyer, two U.S.A. Transceivers; £3 10s. each. All brand-new.—17 Kent Road, Atherton, Manchester.

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