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Purpose

We have often enough outlined broadly what might be called the Argument for Amateur Radio in face of the Pressure on Ether Space—it being agreed that the ether, like the air we breathe, is free for all to use, subject to reasonable safeguards.

To deal with some questions so frequently asked when Amateur Radio is under discussion, such as—"What good are amateurs?"—"What do they do?"—"Can they serve any useful purpose?". The quick answer is, of course, that the mere fact of there being some 12,000 of them in the U.K. alone, and over 400,000 in the world of the West as a whole, is by itself a good enough reply to these questions. If no benefits flowed or advantages accrued from the pursuit of Amateur Radio, it could not possibly exist on such a scale — and continue to expand at the rate it does.

It is this fundamental interest in and practical knowledge of radionics that make the radio amateur, and the Amateur Radio movement, so important from the national point of view. As a nation, we are among the leaders in the Electronic Age into which the world has now moved. Amateur Radio is one of the influences by which radionics engineers and technicians of the best type are produced. This is not an imaginary or high-falutin' conception of the value of Amateur Radio, nor even a theoretical appreciation of its potential usefulness, but is actual fact, proved over and over again. These lines will fall under the eye of some of the leaders, senior engineers and executives, of the radio industry, to say nothing of many "lesser lights" in it — let them ask themselves how much they owe to Amateur Radio, and whether it was not as transmitting amateurs that they got their start!

For its educative influence alone, therefore, the healthy development of Amateur Radio is of the utmost importance to the nation. Those who, as juniors, learn the fundamentals simply because they want to get on the air, go on to take out a licence, and then have ideas of becoming professional, are regarded within the radionics industry itself, and by the Services, as being of the very best — provided they progress to getting themselves properly qualified. Amateurs, as amateurs, cannot expect to get far in a professional environment.

And in the larger context, can it be seriously suggested that tens of thousands of radio amateurs, in daily communication with one another all over the world — and to a lesser degree the correspondence, personal contact and mutual interest which such communication entails — do not together contribute anything to the international understanding and co-operation which has so far eluded the politicians?

The fact is that the true potential of Amateur Radio is as yet only dimly realised even within the circle of its own adherents!
DISCUSSING SINGLE SIDEBAND TRANSISTORS IN SSB CIRCUITS
EXPERIMENTAL TRANSCIEVER—DESIGN PROBLEMS ENCOUNTERED — CASCODE AMPLIFIERS—BALANCED MIXERS — VFO CONSIDERATIONS

Part X

B. A. WATLING (G3RNL)

In this article—the tenth of a series started with our issue for December 1965—the discussion is on the all-important problem of transistor circuitry in Sideband equipment. Our contributor deals with some of his own failures and difficulties in arriving at a design for a hybrid transceiver, which is still in its final stages of development.—Editor.

SOME time ago when considering going /M for the forthcoming Rally Season a basic design for a transistor transceiver covering 160 metres and 20 metres was evolved. After considerable deliberation a valve driver and PA were decided upon, with a valve RF amplifier on the receiver side. The decision to use a valve PA was governed by several factors: Firstly, the cost of power transistors is still fairly high, and the power gain is generally much lower than cheap and easily obtainable valves. In addition, to realise a reasonable power output the supply voltage must be greater than the 12 volts available from the car battery. If, therefore, one has to step up from 12 volts to around 50 volts it's just as easy to step up to 750 volts. Then comes the point of a driver. A Class-AB1 PA provides the greatest power gain but requires around 50 volts to drive it. A Class-A valve driver, such as an EF80, running at about 250 volts on the HT rail, is therefore required. The drive to the EF80 is only a matter of a few volts, which can easily be supplied by a transistor with a 12-volt HT rail.

The choice of a valve RF stage in the Rx was probably for mistaken reasons—but to be on the safe side in terms of cross-modulation, noise and blocking of the front end, it turned out to be a valve RF stage.

The next problem was size. Little space was available, so all the valve circuitry was to be in one unit mounted under the shelf on the passenger side, while the transistor transceiver, which measures 8 inches wide, 6 inches deep and 2½ inches high, is a convenient size to mount also under the shelf to the right of the steering column.

Circuit Considerations

Having a rig so small, maximum use must be made of common circuitry between the receiver and transmitter sections. Switching also must be kept to a minimum so the choice of frequency for original sideband generation must be such that the output on the two bands comes out on the correct sideband. As discussed in the articles on the G3RNL "Mini-5" (November-December, 1966, SHORT WAVE MAGAZINE) 62 mc is the only choice for these two bands. A VFO running 7.8 mc to 8.2 mc when mixed with an USB signal at 62 mc will provide 14 mc to 14.4 mc Upper and 1.6 mc to 2.0 mc Lower Sideband.

Unfortunately time and other commitments have prevented the rig being finalised, but the practical experience already gained—mainly due to errors made in the initial design—may be useful to readers.

Fig. 1. Block diagram of experimental transistor transceiver.
who are contemplating a transistorised rig. The basic transceiver is virtually completed, but, due to the various modifications carried out, is quite a "rat's nest." However, it does work reasonably well on 160 metres, and even with its low output—about 10 mW p.e.p.—contacts on SSB up to about 5-6 miles with R5 reports have resulted. The receiver side, even without an RF stage, gives acceptable results.

When starting the circuit design the transistors that were in the junk box at G3RNL were used. Improved performances could, no doubt, be obtained had better transistors been available. In any event, the idea to start with was to experiment. It is not intended in this article to go into full circuit and constructional details but rather to give, perhaps, food for further thought based on these experiences. One thing that has been discovered during the development period of the rig was how much simpler, constructionally, it all was compared with valve circuits.

A block diagram of the transistor transceiver is shown in Fig. 1. The sections enclosed within dotted lines indicate how the circuitry was physically divided, each section being constructed on a piece of plain Veroboard with the components mounted vertically and all wiring done underneath using the component leads. In the case of the VFO this was constructed in a separate box. The complete rig is in an inverted four-sided chassis measuring 8 in. x 6 in. x 2½ in. A U-shaped lid is used to complete the screening. Fig. 2 shows the layout inside the chassis as used on the experimental version.

So on to some circuitry. Transistors, as you well know, are low impedance devices, therefore matching the output into a tuned circuit presents us with the first small problem. If a tuned circuit is used directly as the collector load, similar to the way one treats tuned circuits in valve designs, then several things occur. First, this mismatch means an overall low efficiency and secondly the damping of the tuned circuit by the transistor will reduce the Q and so broaden the selectivity curve. It was decided, therefore, to keep the tuned circuits to a minimum. Hence the use of a transistor phase splitter Tr2 instead of the more conventional tuned circuit with low impedance secondary to feed the balanced modulator. Fig. 3 shows the method used in the experimental rig, while Fig. 4 details the more conventional method—see p.716.

The audio side comprises two common emitter OC73's with a 4.7K collector load to the second stage coupled by 0.5 μF and a 1K resistor to the balanced modulator. The junction of these two components is decoupled to RF by means of a 0.01 μF disc ceramic capacitor. The first stage of the audio section has some negative voltage feedback due to an undecoupled 1K emitter bias resistor. The gain from these two stages is far more than is required, in fact, and with the audio gain only half up the rig

Fig. 2. Layout of experimental transceiver.

Fig. 3. Carrier oscillator and balanced modulator used in experimental rig.
can be overdriven.

The only problem found with these audio stages was a rather high noise level. Immediate locals reported a noticeable hiss on the signal. The only way to reduce this is to cut back the standing current of the transistor. This, however, reduces the gain, so a better approach would be to use low-noise audio transistors which can be obtained quite cheaply.

**The IF Section**

Next the IF strip, which is common to both "transmit" and "receive" sides. As shown in Fig. 1 a dual input amplifier is used feeding a half-lattice crystal filter which is followed by a further stage of amplification. The circuitry is shown in Fig. 5, where Tr6 and Tr7 form the dual input amplifier with a common collector load, which is the primary of T1. This type of amplifier was found necessary in order to get the correct degree of isolation between the "transmit" and "receive" circuitry. Cutting off the transistor not in use is accomplished by lifting the emitter return resistor from earth, leaving it connected to the 12-volt rail via a 47K resistor.

This IF strip proves to be extremely stable. This is no doubt due to the resistive termination of the filter at the input of Tr8. If it is required that a two half-lattice section filter be used for improved sideband suppression, then the circuit shown in Fig. 6 should prove satisfactory. Alternatively, if only a transmitter is envisaged then the circuit of Fig. 7 will provide the required results as well as simplifying things a little.

**Points of Interest**

This cascode amplifier (Fig. 7) has proved to be a very useful standard circuit as it has some rather unique and interesting properties. First, the impedance transformation is very high. It has a low input impedance and very high output impedance, the actual value depending upon the frequency. It is so high as to obviate the need for tapping the collector into the tuned circuit and high enough to provide good coupling between collector and the grid of a following valve stage. It is particularly useful as an isolating amplifier following a VFO because of the high impedance transformation resulting in good isolation between input and output. It is inherently stable because the second stage is in a grounded base configuration, the base acting as a screen between input and output. This means that at high frequencies it is particularly useful due to the fact that the internal feedback becomes rather significant and instability could, and does, easily occur using the more conventional cascaded common emitter configurations, which of course require unilateralising—similar to neutralising of a valve but the transistor boys prefer
to use this term to differentiate from the simpler neutralising. The gain is slightly more than a single common emitter stage—about 30 dB up to 30 mc—in fact two of these amplifiers cascaded will provide similar gain to three common-emitter stages. It uses one extra transistor, but saves one tuned circuit plus a few components and is very much simpler without tapped circuits and unilateralisation.

Mixer Circuitry

And so on to the mixers. First of all, the transmitter mixer, which is the least critical as the noise generated by this is insignificant compared to the signal levels being handled. In the experimental transceiver discussed here the frequency conversions did not warrant the use of a balanced mixer. Three possible configurations are available as shown on p.718. Those of (A) and (B) are similar except for the method of injecting the oscillator voltage. However, the configuration shown in Fig. 8 (C), where both SSB and conversion oscillator are fed to the base, produces the best conversion gain. In fact, the output from this with 1 volt VFO injection can be followed by an EF80 Class-A amplifier to give more than enough drive for any Class-AB1 PA.

The amount of oscillator injection required was the subject of a great deal of investigation. The lower the injection the higher the mixer standing current must be. The limit here is the collector dissipation of the transistor in use. A higher injection voltage provides more conversion gain—up to a point. The first problem along these lines encountered at G3RNL was that the injection was too low, which meant that there was a threshold before the mixer would mix. This produced a very "jerky" distorted output similar to that described in the November issue when discussing the design of the "Mini-5" balanced modulator using silicon diodes. During these experiments an old AVO signal generator was used as the conversion oscillator. This gives an output up to one volt but has no isolation amplifier following the oscillator. It has a link coupled low-impedance output, the link being over the oscillator coil. Needless to say it's easy to pull!

After discovering the cause of the distorted output the signal generator was connected and the injection increased. This then resulted in a clean undistorted output but with a fair amount of frequency modulation. The problem here was that what the conversion oscillator "sees" will vary as the SSB is applied to the mixer. Even though there was no oscillator isolation stage it was felt that matters could be improved. In fact if one could reduce the SSB signal and increase the oscillator injection to maintain the same output then things should get better. In fact, they did. With 1 volt oscillator injection the frequency modulation disappeared completely! The single transistor VFO was then followed by a cascode amplifier (as shown in Fig. 7) and coupled from the collector to the base of the mixer by a 100 μF capacitor. The VFO amplifier is constructed on the same board as the mixers. The VFO is in a separate screened box so that with the required injection, good isolation due to the cascode amplifier and good screening of the VFO, frequency modulation was considered impossible. How wrong can one be! It was as bad as when first tried! The mistake had been to earth both ends of the screened cable coupling the VFO to its amplifier. Lifting the screening from earth at the amplifier input cured all. It's an easy cure—but takes a long time to find!

In the design described here a single-ended mixer is all that is required, but some readers may be considering, for example, a low frequency sideband generator where, as discussed earlier in this series, the frequencies used warrant a balanced mixer. This
may present a problem in terms of cost because two transistors are required. A typical circuit is shown in Fig. 9. However with semiconductor circuitry it is generally more convenient to use a diode mixer which does not contribute gain, as does the two-transistor version, but can be followed by a single common-emitter stage to make this up. Any of the circuits for diode balanced modulators as described in Part II of this series can be utilised as balanced mixers. Fig. 10 shows a two-diode balanced mixer coupled into a common emitter stage. The method in (A) is the most usual but where more efficient coupling is required the circuit in (B) is to be preferred.

Transceiver Points

Back to the transceiver. The receiver mixer is the same configuration as the transmitter mixer—both inputs to the base. The VFO injection required is considerably less than the transmitter mixer because of the small input signals being handled. This would mean that the transistor should be biased to a higher standing current—so that its collector dissipation is just below the maximum allowed. The problem here, though, is noise. The higher the standing current the greater the noise. The best arrangement is to allow as much gain as possible from the valve RF stage in order to overcome this noise and provide an acceptable signal-to-noise ratio. The standing current of the mixer can then be reduced to the point just before the overall sensitivity of the receiver becomes unacceptable. Probably better results would be obtained with a transistor having a lower noise figure than the Mullard OC171 used. This is food for further thought.

The product detector, which is just another form of mixer, is also very noisy if biased wrongly. Emitter injection of the carrier oscillator was found to be the best and the noise is proportional to the level of injection. Biasing the transistor down to almost cut-off and following the carrier oscillator with a tuned common-emitter stage to provide the required injection proved to be the best arrangement, introducing very little noise. The circuit is shown in Fig. 11 opposite.

The audio section is pretty conventional except perhaps for the base biasing of the push-pull output stage. Having heard several reports of car radios developing distortion after having been on some time it was decided—without investigation, incidentally—that the probable cause was the working point of the output stage shifting with increase in tempera-
ture. Some form of temperature compensation, then, is required and can be provided quite simply with an OA10 germanium diode in the base biasing circuit, as in Fig. 12. The germanium diode has temperature characteristics identical to the output transistors used. Its action is that if the temperature rises the standing current in the output transistors—which are biased to Class-B—will also increase. This moves the working point up toward Class-A, meaning that the stages can easily be overdriven to produce distortion. However, this same temperature rise will have the same effect on the diode. The current through it will increase, thereby reducing the voltage drop across it. The bias voltage to the bases of the output transistors will, therefore, fall, reducing the standing current, hence counteracting the bias change due to the temperature increase.

VFO Problems

Now on to the heart of any rig—the VFO. Without making any wild claims the experiments conducted at G3RNL over a period of some months prove without a doubt that a transistor VFO will make its valve counterpart look silly. The problem with valve VFO's is that the heat generated by the valve can be a problem. The other point is the supplies to the valve. The HT rail can be stabilised, so that is only a minor point, but with some valves (the ECF80 in particular) only very slight variations on the heater line can have drastic consequences. The mains supply at G3RNL tends to jump on occasions. It's only a small jump but it was found to cause an ECF80 VFO to drift at an alarming rate. About 5 seconds after the initial voltage change it would jump back and the VFO would then return to its original frequency. It was traced to the heater voltage shifting but it was so small as to be hardly measurable.

With a transistor VFO only one supply is required and this can be regulated using a zener diode. When designing a transistor VFO the considerations for stability are similar. The first consideration is the oscillator tank circuit. The biggest problem here is the coil. This has a positive temperature coefficient. The amount that the inductance will change with temperature will vary depending upon the construction of the coil. It is best to have a tension wound coil on a ceramic former. Even so, it will still have some positive temperature coefficient. One way to reduce this effect is to use a smaller value of inductance and increase the amount of capacitance in circuit to maintain resonance. If that does not cure all drift then some negative temperature coefficient
capacitance can be put across the tank circuit to counteract the coil effects.

Another cause of instability is due to the transistor parameters changing with supply voltage or temperature. The supply voltage, as mentioned earlier, can be stabilised, leaving temperature change as the problem once again. Let’s first consider its effect on the transistor. The standing emitter current will vary with temperature which in turn means that the gain and internal phase shift will vary. The next thing to consider is the emitter diffusion capacity, which appears between emitter and base. It is directly proportional to emitter current and inversely proportional to temperature. As the emitter current varies with temperature this means that the capacity between base and emitter could either increase, decrease or remain constant with a temperature increase. If the emitter current could be made to change by the same proportions as the temperature then the diffusion capacitance will remain constant. This could be arranged by using a thermistor in the base biasing circuit, but a better way would be to shunt the base-emitter junction with a very large value of C, so that these small changes are proportionately small enough to neglect. Therefore, the best configuration for an oscillator is a grounded base. Two oscillator circuits have been considered—the Clapp and the Colpitts. As previously mentioned the smaller the inductance in circuit the better the stability. With a Clapp VFO, which is series tuned, a proportionately larger coil must be used. A grounded base Colpitts, as shown in Fig. 13, turns out to be a good answer.

The next important point to consider is the biasing conditions for the transistor and the amount of feedback, determined by C2 (Fig. 13). The object, as with valve circuits, is to isolate, as much as possible, the tuned circuit from the transistor, or to reduce the gain of the transistor stage such that its effects on the tuned circuit will be less. To reduce the gain of the stage emitter current must be reduced. The problem with reducing it too far is that any temperature change is going to have a proportionally greater effect on the transistor parameters. As the gain has been reduced, C2 must be large enough to ensure the correct feedback to maintain oscillation—therefore, as the transistor parameters change the tuned circuit “sees” a substantial change and the frequency will shift. If, however, the gain of the stage is increased then C2 can be reduced so that there is a fairly high impedance between the transistor and the tank circuit. In addition, to increase the gain of the transistor stage the standing emitter current has been increased and therefore the temperature change is going to have proportionally less effect. A two-fold improvement then!

The actual amount of positive feedback around the circuit can be varied by changing the ratios between C3 and C4. If C3 is reduced then the feedback is reduced. However, by reducing C3 the amount of capacity across L1 is lower so that C4 must be increased to maintain the same ratio. The method preferred at G3RNL is to keep the same ratio between C3 and C4 so that only C2 need be varied. After all this, even further protection against frequency drift due to temperature changes can be effected by wrapping the completed VFO assembly in expanded polystyrene. The component values given for Fig. 13 are when using an OC171 transistor running at 8 mc. In fact, by using the Denco coil suggested, adjustment of the core will provide an overall range of about 7-5 mc to 10-5 mc.

And after all that, the only second thought on the design shown in the block diagram of Fig. 1 is to add further amplification in the IF strip of the receiver. In fact the cascode amplifier of Fig. 7 inserted before the product detector Tr14 should result in the extra amplification required.

(To be continued)

NEW HORROR — TELEPHONE VISION

With some justifiable pride, the Post Office announces that it is exploring the possibilities of television links for conferences between distant centres, and also a vision-phone for calls between individuals. These service would make use of the existing coaxial cable and microwave links, and it is hoped that by the 1970's studios for TV conferences and booths for vision-phone contacts will be available at principal centres up and down the country. An experimental closed-circuit link is being set up between the Engineering Dept. Hq. in the City and the G.P.O. Research Station at Dollis Hill, and live conferences are to be arranged to see how the idea works out in practice. At the prospect of having to conduct some vision-phone contacts we could think of, the mind boggles (and the eyes become fixed in a glassy stare). But it will come, and by 1970.

CANADIAN CENTENARY PREFIXES

With effect from January 1st, Canadian amateurs could use 3C as a special centenary prefix, and Newfoundland stations 3B. Thus, VE2HN becomes 3C2HN, and V01FB would sign 3B1FB. Two more for the prefix hunters—but apart from that it seems a bit pointless.
There are various ways of getting the Class-D Wavemeter (designed in the original for 6-volt DC input) to work off AC mains. This is the safe way of doing it. Fig. 1 is the circuit before modification, and Fig. 2 shows the final arrangement. Values are, for Fig. 2: C3, 0.1 µF; C4, C5, 8 µF; R3, 1000 ohms; T1, existing vibrator transformer; and T2, heater transformer using 6.3-volt secondary as 6-volt AC input into original rectifier-smoothing section.

THE CLASS-D WAVEMETER ON AC MAINS

SIMPLE MODIFICATION FOR A POPULAR SURPLUS UNIT

M. I. WILKS

The Class-D wavemeter has been with us now for twenty years and judging by the number offered in recent advertisements the stock is far from exhausted. These comparatively simple and inexpensive wavemeters fulfil the requirement of the licence "that where the transmitter is not crystal controlled there shall be available a reliable frequency meter of the piezo-electric type."

In the original the Class-D has one disadvantage—it was designed for operation from a 6 volt DC source. Many suggestions have been put forward to overcome this, including applying mains voltage across the secondary of the existing transformer. This type of modification is, however, considered by the writer to be irresponsible and possibly lethal.

A far simpler and safer way was designed at a cost of only 7s. 6d. and this can be adapted for use with other similar equipment.

Fig. 1 above shows the wiring of the power unit section of the wavemeter as purchased unmodified, while the lower diagram covers the modification suggested. The only additional component required is a 6.3-volt heater transformer of suitable physical size to be accommodated under the chassis.

The actual vibrator and its associated suppressor resistors R1 and R2 are first removed together with the choke L1 and condensers C1 and C2 and all associated wiring cut away (Fig. 2). Next, depending on the size of the new heater transformer, re-position the bridge rectifier if necessary. The mains lead is brought in via the existing switch on the front panel and connected to the heater transformer primary, the secondary being wired across the heater and dial lamp and also across half of the original transformer primary winding, thereby producing the intended HT of approximately 130v. from an AC rather than a DC source—see Fig. 2.

The whole modification took less than an evening to complete, the existing case of the Wavemeter can still be used, a hole and grommet being suitably placed at the rear to take the mains connecting cable.

WE ALWAYS LIKE TO HEAR . . .

How readers have got on with the constructional designs, circuits and ideas offered so profusely (we think) in the pages of SHORT WAVE MAGAZINE. It is always interesting, as well as being very helpful to us, to have letters from readers about their experiences based on Magazine articles. Address to: Editor, Short Wave Magazine, Buckingham.
INTERESTING PROTECTION CIRCUIT
FOR TRANSISTOR RECEIVERS OPERATED BESIDE TRANSMITTERS

R. J. HULBERT (G3SRY)

The operation of a transistor receiver alongside a transmitter is not entirely devoid of problems. The particular one under consideration here is that of the first RF transistor suddenly terminating its life.

In spite of an aerial change-over relay, it is still possible to overload the first RF stage, mainly by reason of the capacity of the relay contacts. Shorting the receiver aerial input does not always solve the problem either, since induced currents set up may be just as destructive. A trick often resorted to is to connect two diodes, back to back, directly across the aerial coil. This, however, seldom has enough effect to reduce the transistor base current to a safe value. Even switching off the battery supply altogether is not absolutely safe, since the RF current can be of sufficient magnitude to break down the base-emitter junction.

The circuit described here works on a sound principle—the object is to destroy the Q of the tuned circuit, to such an extent that the base current falls well below the safety level. This is achieved with a diode, which is arranged to be forward-conducting on transmit, and reverse-biased on receive.

Circuit Details

The earthy end of the tuned winding is lifted from earth and connected to a potential divider across the battery supply. This is decoupled to allow proper function of the tuned circuit. At the hot end is connected the cathode of a diode, the anode of which is decoupled and taken to the collector of the transistor switch Tr1. The base of Tr1 is fed with negative muting voltage, via a limiting circuit.

Function of the arrangement is as follows: With no muting voltage ("receive"), Tr1 is non-conducting; therefore its collector assumes battery voltage, as does the anode of the diode D1. The cathode of the diode is connected, via the tuned winding, to a lower potential. The diode cathode is positive with respect to its anode, and is therefore reverse biased. The only effect this has is slight detuning by its self capacity, and this is compensated by re-adjustment of the main tuning trimmer.

On "transmit", a muting voltage is applied to Tr1 base, and enough current flows to bottom the device. The collector voltage falls to earth potential (or very nearly so), and so does the anode of the diode. The diode cathode still has potential. Since the anode is positive with respect to its cathode, current flows via Tr1, which is now in series. The effect of a conducting diode across the tuned circuit, is to damp it very heavily. The efficiency of the tuned transformer is seriously degraded, and base current is reduced to a safe level.

General Points

New components associated with the protection circuit are easily identified in the diagram, since they are numbered. The remainder are part of a typical receiver, and included only to illustrate function.

The transistor protection circuit suggested by G3SRY. This problem of safeguarding Rx transistors with a transmitter running full power alongside is an important one, and is probably not getting all the attention it should. Values here are: C1, 0.1 μF, 30v.; C2, 0.1 μF, 30v.; R1, 180 ohms; R2, 470 ohms; R3, R5, R6, 1K; R4, 4.7K; R7, see text. D1 is an OA79, Tr1 can be a Newmarket NKT-222, and the zeners ZD1, ZD2 are rated 6v. As explained in the text, this is by way of being an experimental circuit.
The writer wishes to make quite clear that the circuit discussed here should be considered as experimental only. It has only been tried in one receiver, and for a short period at that. Modification of component values may be needed to cover variations in particular receivers, or particular diodes used for D1.

The following points may be of interest to readers proposing to try the circuit:

ZD1 is included to permit a wider range of muting voltage; it can be dispensed with, and a single base-feed resistor fitted, providing the absolute maximum base current never exceeds 25 mA and does not drop below 3 mA. R4 must be left in circuit.

When breaking the earthy end of the tuned winding to insert CI care should be taken to ensure that the lead length is no greater than before, and that CI is connected to the original earth point.

The diode cathode lead must be short, and connected directly to the tuned circuit. C2 should go to the same earth point as CI, the other side being connected close to the anode end of D1 with a reasonably short length of lead.

D1 should have negligible vari-cap qualities, and should be capable of passing a reasonable current without failing.

R7 will need to be adjusted to suit the battery voltage, and about 20 mA should flow via ZD2 on "receive". ZD2 is included to hold the voltage reasonably stable, since the circuit draws different currents on "transmit" and "receive". Prototype figures were: Receive, 9.5 mA; and Transmit 15.5 mA. These figures exclude RF amplifier and zener currents.

In conclusion, it may be stated that, while this arrangement is more complex than the usual protection circuits, the degree of safety offered more than justifies the slight extra complication and increase in power consumption.

NOTES FOR CONTRIBUTORS — IMPORTANT

While we are always glad to see articles of Amateur Radio interest for possible publication in SHORT WAVE MAGAZINE, we must again remind potential contributors that—since we pay at not ungenerous rates for material we can use—we expect them to conform to the simple rules set forth on the Contents page of every issue. Contributors are also expected to adopt our normal setting convention, i.e., the signs and symbols as shown in any technical article in the Magazine. Never mind if you haven't got them on your typewriter; put them in neatly by hand. For instance, we never talk about pF, pf's, puffs, but always μF or μμF, as appropriate. We never write megs, mc/s, Kc/s, kc's, but always me or kc. And so on all the way through, which means careful scrutiny of the technical material to find out the convention we favour.

The same considerations apply to circuit diagrams and drawings, on which we always use the CI, LI, R1 notation throughout, not values on the circuit components in the sketch (except sometimes in the case of small drawings, or in special circumstances, such as the R.A.E. answers in a recent issue). Using the CI, LI, R1 circuit element identification means not only a neater presentation but, what is more important, easy and accurate cross-referencing in the text, e.g., it is much easier to refer simply to "R3" than to "the 15K resistor in the anode of V3," or whatever. The table of values (not called the "list of components" or the "parts list") appropriate to each diagram should be on a second sheet, and every diagram likewise on a sheet separate from the text. While drawings need not be copper-plate (in any case, they have to be re-done by our draughtsman to accord with our convention as regards size and uniformity) they must be electrically correct and easy to follow—this means using a reasonably-sized sheet and avoiding that abhorrent habit of scribbling thumb-nail sketches in the evident hope that "the draughtsman will sort it out." (Not with us, he won't). The best way to produce circuit diagrams neatly and accurately is to use squared paper, with a transparent ruler and a ball-point pen. As regards text, this should be laid out so that not only are there generous margins but also ample space between lines.

Much of the foregoing will be obvious to anyone thinking seriously about trying to produce a decent article, properly presented, and for which adequate payment is expected. And it is fair to say that many of the articles we see (and can use) are models in all respects as outlined here. But others are so scruffy, or would involve so much editorial attention to make them presentable, that really they are only fit to go straight into the waste-paper basket. Put in another way: If you feel like offering an article (and almost anyone capable of coherent expression can produce something interesting on a subject he really understands) you might just as well try doing the job properly. Apart from the money, it is extremely satisfying to see one's own work in (immortal) print.

CORRECTION NOTE — "THE PADDINGTON TRANSCEIVER"

In the circuit Fig. 3 on p.658 of our January issue, there should be a resistor R12 in series with VR1 and the HT+2 line—this could be 68K under fixed-station conditions, but it has been found an advantage to make it 33K if the battery supply voltage is likely to fall off when working portable. Also, to improve modulation and looking at Fig. 5 on p.659, an 8.5K resistor with 40 μF in parallel with it could be put in series with R32. The effect of this is to reduce screen voltage on V7, the 6CH6 PA, and thus to raise the level of modulation.

To ensure a regular copy, become an Annual Subscriber — 42s., post free
AN INEXPENSIVE BEAM ROTATOR
USING A WINDSCREEN WIPER MOTOR
D. COUNSELL-DAVIS (G3DIO)

This article will appeal to those who like to shop around and adapt whatever is available to meet a particular requirement—thus not only saving money but also satisfying the d-i-y urge latent in most of us. And in case anyone may wonder about the power of a wiper motor, normally taking about 20 watts, to turn a beam, the answer is that it is the gearing-down that does it.—Editor.

HAVING built a 21 mc two-element beam and having had very satisfactory reports from it in a fixed position on the mast, there was an obvious need for a rotator. A survey was carried out of the commercial models available and a choice was made. The matter was submitted to the Director of Economics. “No,” said she, “You have to pay the rates this month and next month the electricity, gas and telephone. And just look at the bedroom carpet...”

Thwarted and repressed (it was certainly true about that carpet), further consideration was given to the problem and driving into the town on a very wet morning a few days later it seemed that the windscreen wipers were muttering with increasing insistence “rotator, rotator, rotator.” The next day a visit was paid to a car-breaker’s yard and a 12-volt Lucas wiper was prised off an old wreck, filthy but in good electrical order. “How much?” “Thirty bob.” Upon explaining that it was not intended for the car—full explanation of the wonders of Amateur Radio—the price fell sharply to half-a-crown!

The type of wiper motor thus obtained embodies a very solid reduction gear train with a concentric boss on the final gear driving a Bowden-cable assembly to the wiper blades. It was found to be very easy to separate the field and armature leads and bring them out in two pairs, thus making the motor reversible. Current consumption was 1½ amp., well within the capabilities of the station relay supply.

Fabricating the Drive

Next problem arising was from the realisation that one could not couple the beam directly to the motor gear assembly because the speed of rotation would be too high and the inertia of the beam would put too great a strain on the gears themselves. It was then found that the concentric boss already mentioned was mounted on a triangular steel plate which in turn was rivetted to the final gear. In the centre of this plate was a very convenient ½in. hole. The rivets were drilled out, the plate detached and the boss cut off. With the help of a local garage, a short length of ½in. steel shafting was welded into the hole in the triangular plate and this was then refitted to the gear. The cover plate of the gearbox was drilled to clear the shaft, a liberal dose of grease was packed into the gears and the cover plate refitted.

A couple of pulley wheels with ½in. centres were found in a washing machine service department, one of ½in. diameter and the other 3in., together with a suitable V-belt. The smaller pulley was fitted to the shaft protruding from the motor gearbox (both pulley wheels had Allen grub screws).

The bearing for the beam itself caused some more deep thinking but an excursion to the loft revealed a long-discarded vacuum cleaner (the writer cannot bear to part with anything electrical in case a use could develop one day!). This was torn asunder and studied and it was soon apparent that (a) The armature spindle was ½in. diameter; (b) The casting for the motor incorporated a very nice ball-race, and (c) The impeller fan consisted of a strong cone-shaped casting—with the ubiquitous ½in. hole at the summit. Here, almost ready made (after the removal of the motor itself) were the top and bottom bearings for the rotator shaft, which is a 12in. length of ½in. hard steel.

Another foray, this time to the kitchen, revealed a wooden rolling pin of good seasoned oak. It was in any case deemed advisable to confiscate this offensive weapon and it was promptly pulled apart. Yes, you’ve guessed it, the roller itself took a ½in. shaft! This roller, fitted and pinned to the rotator, then provided a perfect clamping point for the aerial boom U-bolt. It only remained to fit the ½in. pulley wheel to the shaft and to mount the top and bottom bearings on a 12in. square baseboard of ½in. oak.

Getting it Going

Fitting the shaft in the bearings, positioning the motor on the baseboard and slipping on the V-belt was carried out in a mounting fever of anticipation and in a short time two pairs of leads had been connected between the armature and field fly-leads and a DPDT rotary switch and thence to the 12-volt relay supply. The board—beg pardon, the rotator—was taken outside, propped on an up-ended garden bench and the beam was clamped on. G3DIO retired to the shack to try the DPDT switch and to observe results. Astonishingly, the thing worked—the beam rotated at about ½ r.p.m. and the motor showed no signs of undue strain. Even more astonishing was the fact that a tentative and rather ridiculous CQ produced a W2 with an S8 report, and this with the beam all of five feet in the air!

Finally, the baseboard and all fitments were liberally coated with aluminium paint and fitted to the end of a 2in. diameter mast by means of three small angle brackets underneath the baseboard and the mast was raised.

Results

This rotator has given service for over six months without any attention. Recently however, the
writer acquired a small low-voltage Selsyn unit and the opportunity was taken to lower the mast and
examine the rotator for wear-and-tear. Nothing
appeared amiss but it was considered worthwhile to
make a waterproof cover (out of perspex and alu-
iminium angle) to fit over the baseboard, with a
clearance hole for the roller, and generally to repaint
and grease again ready for the winter. At the same
time the Selsyn transmitter was fitted, driven by an
additional pulley system. This has proved a great
boon as previously it had been necessary to shine
an old car headlamp on the aerial at night in order
to verify bearings—this method failed miserably on
foggy nights!

Some amateurs have expressed doubts about the
effect of wind on a pulley driven system but, in fact,
this has not caused any difficulty as the maximum
"hunt" in a strongish wind has not been more than
10 degrees, limited by the slack in the V-belt. It
proved important to treat this belt with an anti-slip
preparation, obtainable from any belting specialist.
Of course, a solenoid braking device would be a
refinement and thoughts are being directed to this
end.

The sketch indicates the general layout, in sec-
tion, of the assembly. The additional pulley for the
Selsyn drive has since been fitted between the main
pulley shown and the top of the impeller casting.
The motor has had to be raised slightly on bushes
to maintain belt linearity.

Comment from the Director of Economics when
she first saw the beam gaily rotating. "Very pretty,
but what about the bedroom carpet?" It is a sad
and inescapable fact that on the domestic front
genius is not recognised.

NOTE OF EXPLANATION

Because from time to time we publish illustrated
notes on items of radio equipment intended pri-
marily for large buyers and commercial users—as
distinct from individuals such as radio amateurs—
we get reader enquiries about the firms concerned.
For instance, Redifon, Ltd., whose latest Trans-
ceiver for commercial operation on the HF bands
was shown on p.615 of the December issue. The
firm has overseas offices for sales, service and
exported, and as well as full coverage of the U.K.,
will have to be rummaged for in the dark recesses
between the wars it was often the local iron-
monger who stocked "wireless parts." The aerial
wire they sold was always 7/22's stranded copper,
hard drawn, in 100 and 150ft. lengths. When on
your travels these are the shops to look in for it,
and the knife switches. But don't try on a busy
Saturday, or just before finishing time on early-
closing day, because almost certainly such items
will have to be rummaged for in the dark recesses
at the back of the shop. He might even unearth
some useful or interesting "wireless parts" and be
glad to get rid of them.

SHOP AROUND A BIT

Radio amateurs are well accustomed to "shopping
around"—looking for just what they want at the
right price—and it is very gratifying to register a
success, even if you never use the piece when you
get it home! However, the purpose of this note
is to talk about something specific—in fact, aerial
wire and switches. It would be agreed by any of
the older hands that the very best wire for trans-
mitting aerials is 7/22's stranded copper, and the
most sensible aerial-earth (or manual Ac. c/o)
switches are those old SPDT or DPDT knife type
mounted on porcelain. But where to get 7/22's
aerial wire and porcelain knife-switches these days?
The answer can often be at an ironmonger's in
a small country town—especially one of those rather
old-fashioned family businesses—because in the
years between the wars it was often the local iron-
monger who stocked "wireless parts." The aerial
wire they sold was always 7/22's stranded copper,
hard drawn, in 100 and 150ft. lengths. When on
your travels these are the shops to look in for it,
and the knife switches. But don't try on a busy
Saturday, or just before finishing time on early-
closing day, because almost certainly such items
will have to be rummaged for in the dark recesses
at the back of the shop. He might even unearth
some useful or interesting "wireless parts" and be

QSL CARDS—WATCH THE SIZE!

In about 18 months' time—by July 1st 1968, to be
exact—mail items like QSL cards will have to be of
a certain size (known as Post Office Preferred), to
qualify for the lowest rates of postage. Cards will
have to conform to a size within 31 x 51 inches-and
41 x 51 inches, these being minimum and maximum
dimensions. If outside the limits, they will have to
be stamped as letters. All interested on the QSL
front are advised to obtain, from their local head
post office, G.P.O. form PL197 3/66, which explains
the details. (And our thanks to G2TA for drawing
attention to this new Post Office ruling.)
THE G3CGQ P-E SET

FURTHER NOTES ON ELECTRICS

READING the very helpful contribution by G3CGQ titled "Cheap P-E Set for Portable Operation" in the January SHORT WAVE MAGAZINE, the writer has various suggestions to make, some of which have perhaps not been considered.

The first suggestion is one of simplification, especially with only 100 watts involved, and this is to fit a rectifier which will carry this load of 100 watts and install it in place of the cut-out. With a rectifier there will be about 1 volt drop but with the manual voltage regulator already in the circuit this would not matter. Rectifiers are, however, polarity sensitive and battery connections would need to be watched. Polarity is not normally important where car dynamos are concerned, the polarising being done after fitting of the dynamo to the vehicle (see later).

By his wiring diagram, G3CGQ evidently obtained a constant current, third-brush dynamo for his generator. These dynamos are fast on their way out because of their adverse output curve for present-day vehicles. If a more modern two-brush dynamo (which, incidentally, would be lighter in weight) could be installed in place of the present three-brush, then not only would G3CGQ get his 100 watts but also another 100 watts as well to feed a permanent desk lamp if need be, plus maybe the shack also. An output of 19 amps at 12 volts would be obtainable from the smaller and lighter machine compared with the generally low-output three-brush dynamos of yesteryear, while spares for the three-brush versions are disappearing. A cut-out would be the cheaper in a rectifier v. cut-out price consideration at 19 amps.

Polarisation

Polarisation of a two-brush dynamo is easy and means disconnecting both cables from the end plate on an earth-return machine, taking a lead from the live side of the battery and connecting the other end of this cable to the small (field) terminal for a few seconds. Then, remove the jumper cable, reconnect the dynamo wires as they were and the dynamo is then re-polarised. This is normally all that is required to cure polarity problems with vehicle dynamos.

A higher output dynamo involves increased internal heating and it is recommended that always a fan should be fitted; fans can normally be obtained from the agent of the vehicle manufacturer who in the first place fits the named dynamo as initial equipment. Fans are supplied by the vehicle manufacturer and not by the maker of the dynamo.

Now coming to the battery: There is a query here, which is why 12.5 volts? A flat battery can fall to 11 volts yet when fully charged would rise to 15 volts, so why carry a fairly flat battery around? To think a little we find that a charged battery would keep the station on the air should the generator fail whereas a flat battery would fail also. The normal battery voltage on a car during a reasonable run is often between 14 and 15 volts, made necessary to keep a healthy battery going, so why keep your battery at starvation level electrically? Cannot a resistance be used to drop unwanted volts from the battery while keeping the battery fully charged in case of generator failure?

W.S.B.

THE UNESCO BUDGET

Touching upon the Editorial comment in the August and September 1966 issues of SHORT WAVE MAGAZINE, it is of interest to note that the budget for the United Nations Educational, Scientific and Cultural Organisation (UNESCO) will total some £22 million for the next two years. It seems a pity that some of this could not be channelled into our sort of education, science and culture—Amateur Radio, also organised on a world-wide basis.

EXAMPLE FOR US ALL

In this month’s "New QTH" page will be found the address for G3VXL. This lady is in her mid-fifties and is an invalid confined to a wheelchair. About 18 months ago she started from scratch (and “from scratch” means never having heard of a volt or an amp.) on a postal course for the R.A.E. While doing her reading she was visited each week by various members of the Surrey Radio Contact Club—a well-known radio amateur group of many years’ standing in the South London area. Miss Lonsdale took and passed her Subject No. 55 in May last year. She was then taken in hand for the Morse by SWL E. J. Boyle (Norwood, S.E.19), who is himself an ex-GPO telegraphist. Working hard with a tape recorder between the fortnightly visits by SWL Boyle, she duly passed her Morse Test last November, receiving her licence and callsign G3VXL that same month.

This little piece is not intended as a sob-story but as the record of a remarkable achievement, particularly in so short a time by a lady no longer young. While much credit is due to her mentors—and here we should say that the Radio Services Dept., G.P.O., were most helpful in arranging invigilation for the R.A.E. and facilities for the Morse Test at Miss Lonsdale’s home—it would not have begun to be possible unless G3VXL herself (now on the air with the help of the S.R.C.C. boys) had not shown exceptional tenacity and enthusiasm. We hope that she will enjoy many years of pleasurable activity on the amateur bands.

Circuit using diode limiter.
COMMUNICATION and DX NEWS

As your E.P.E. is making his preparations for a move to a place where the grass is undoubtedly far greener, he has, as a result, been able to indulge in that most delightful of idle pastimes, namely, designing the new (and, of course, ideal) shack and station. Leaving out of account the more obvious things, it is quite amazing to note the changes that have come over the state-of-the-art in the few years since last we suffered a change of QTH.

The problems inevitably seem to divide themselves into two parts—the shack, and the aerial system. As for the shack, for the sake of a little peace and quiet to the family, one can only think in terms of the loft or a shed in the garden—one will be cold, and the other both cold and almost certainly damp. As for the aerial question, a garden the size of an undernourished postage stamp (while saving labour) has a quite definitely large apple-tree in precisely the spot—the only possible spot!—where one could think of putting a pole such that its guys all stay in the garden.

Amateur Radio, the man said... Grrrr!

Piracy Again

A brief note from G3RFS, who is a little hot under the collar; he is drowning in a sea of waste QSL cards, from people who have an idea he is QSL manager for ZD7RP, and VK9ORS. Just to add insult to injury, Neville has information which leads him to believe both stations are pirates anyway. Incidentally, G3RFS has been off the air for the past nine months, but hopes to be back on the bands in the near future.

Still on this tack of piracy—how does one classify the present kerfuffle which purports to put Albania on the Amateur Radio map—this confirmed looker-into horses' mouths is going to reserve judgement until someone shows a QSL card with an Albanian postmark on the wrapper.

Contests

This is as good a moment as any to mention the BARTG Spring RTTY Contest which comes off over March 4-6, the rules of which are obtainable from G2HIO, 3 Trinity Close, Ashby-de-la-Zouch, Leics, and in any case are the same as last year. Logs go to the same address, to arrive not later than May 1 to qualify.

Into the Outback

Between February and June, members of the RAFTARS will be with the Joint Services Expedition to Central Australia—which is a mighty long walk from Lisle Street for spares!—and, as would be expected, they will have some Amateur Radio gear with them. In charge of this particular ploy, we understand, will be G3POX, who will be signing VK8OX on the trip, on 14290 and 21390 kc.

Certificates

From the Antwerp (OSA) CW-DX Club comes a broadsheet, listing the requirements for claiming three certificates—the "Antwerp Maritime Mobile Award," for contacts with /MM stations, the "Benelex Award," for working stations in the Benelux area, and the WOSA award for contacts with stations located in Antwerp. The address for full details is: Antwerp (OSA) CW-DX Club, P.O. Box 331, Antwerp 1, Belgium.

New Year's Revolution

Most of the letters during the period under review made some summing-up of the activities of the old year, and offered thoughts or Resolutions for the New Year; no doubt all the latter have well and truly bitten the dust by the time this appears. However, one point that arises is from G3IDG (Basingstoke), who would like to see, every now and then, an issue of CDXN that is devoted to the doings of what he describes as the Small Fry and Short Wire Merchants. Seems a sound scheme—but as usual, there is a snag—in the first place, not many Small Fry write in, and secondly, of those who do so, we cannot imagine many of them taking kindly to being mentioned in an issue devoted to their doings!

Of course, there is another aspect to this question; in a lot of cases, one finds that the big signals are, in fact, radiated by people with quite small gardens and unpretentious gear. One such friend of the writer, years ago, was standing at 98/98 in the Top Band Counties scale, with a rig that was positively prehistoric, at least in appearance, and an aerial that would have been regarded as a bit short for a quarter-wave on Forty. Again, over the past few years, while nothing much has happened to make cold shacks any warmer, a lot has happened to make things easier for those who can brave the cold (or have warm shacks!). In the aerial line one immediately thinks of verticals—in spite of the nasty things they are liable to do to TV—and then on to such things as the DDRR antenna, which is only four feet high for Top Band and yet behaves as a full-size, unloaded quarter-wave vertical. On a more obvious tack, the improvement to be gained by "doing something about" the earthing system used in conjunction with an end-fed wire—such as tying all the local fences, if of wire-mesh type, together and to the earth terminal, or using the ring type of ground-plane to act as the lower half of a vertical when the

<table>
<thead>
<tr>
<th>TOP BAND LADDER</th>
<th>(G3U- and G3V- stations only)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starting Date</strong>, January 1, 1966</td>
<td></td>
</tr>
<tr>
<td><strong>Station</strong></td>
<td><strong>Counties</strong></td>
</tr>
<tr>
<td>G3UUTS</td>
<td>89</td>
</tr>
<tr>
<td>G3UAN</td>
<td>87</td>
</tr>
<tr>
<td>G3UBW</td>
<td>76</td>
</tr>
<tr>
<td>GM3UVL</td>
<td>55</td>
</tr>
<tr>
<td>G3UVT</td>
<td>44</td>
</tr>
<tr>
<td>G3VMQ</td>
<td>45</td>
</tr>
<tr>
<td>G3UGK</td>
<td>43</td>
</tr>
<tr>
<td>G3UGF</td>
<td>43</td>
</tr>
<tr>
<td>G3UIS</td>
<td>42</td>
</tr>
<tr>
<td>G3USE</td>
<td>40</td>
</tr>
<tr>
<td>G3UMK</td>
<td>39</td>
</tr>
<tr>
<td>G3UCS</td>
<td>36</td>
</tr>
<tr>
<td>G3VLT</td>
<td>33</td>
</tr>
</tbody>
</table>
more normal type of arrangement would, of necessity, have to terminate outside the garden. An important fact to remember is that any LF-band system will benefit enormously from attention paid to the earth system. This simply must be low-resistance if you are going to do any good on Top Band.

Again, while it is undoubtedly true that if you can't hear them, you can't work them, the converse is also true, if you can hear them you should be able to work them—always provided you go about it in a reasonable way and are prepared to exercise both patience and a modicum of cunning in the timing of calls.

Ten Metres

Just to emphasise the point, the first letter in the clip comes from G3LXO (Maidstone) who runs ten watts of AM, crystal-controlled on 28-43 mc; over the past two months he has worked 16 American States, in all areas except W6 and W7, and 15 countries in eleven Zones, to give a ten-watt WAC on the now-outmoded “ancient modulation.” The current month's crop include ZS's, OD5, VS9's, ZC4, VE's, VK's, ZEI, and all W districts other than W6 and W7. In the way of general-interest notes, John mentions that VS9ASC wishes it to be known that he is genuine, being a G from Croydon.

G3NOF (Yeovil) has found, in general, that the band has been open, if at all, only during the hours of daylight; then a few short openings in the morning to Asia and Australia; West Coast W's from luntime through the afternoon, albeit not strongly, the pick of his bunch being HC1AF, KP4BCL, and VU2JM.

Alan of G3MBL (North Finchley) uses 25 watts of Phone, to a 2-element beam, and gets the replies on a Mosley CM-1. During the period under review, Alan found CR7CZ and ZE1CB, both during what could be defined as “lunch-time.”

Nice letter from G3PQF (Cove) in which he mentions that he still has not taken delivery of the garden—this is distinctly difficult as the installation has to be done with a bull-dozer, which could easily do a disastrous modification to any poles that may already be erected. However, the first month of 1967 has already yielded 12 new countries on Ten, despite the aerial situation, and it is hoped to keep up the pace for the rest of the year.

Tackling the CW end of Ten has brought KP4, VE3, and all the W call areas except the elusive sixes and sevens, to G3VDW (Coalville, Leics), although Terry seems to have spent rather more time on the other HF bands in the period before the holiday; his later letter, covering the after-Christmas sessions, does not even mention ten metres.

Change of Prefix

The VE and VO stations have, as mentioned some time back, been given the option of using the 3C and 3B prefixes respectively, during 1967 to mark the Centennial Year. This has provoked some irreverent thoughts from G3NWT. Geoff has noted the way the Canadians have pitched gleefully into the resulting pile-ups, and suggests that the working of G stations could be made a little less yawn-provoking to the DX were the PMG to allow the odd deviation—for instance 11 to commemorate the Battle of Hastings, or NKO to mark the last possible escape from a British Prison.

Top Band

The Top Band Tests have produced quite a lot of comments, as well as the more general-interest news. It seems that up to January 3, the efforts of H18XAL had not borne fruit; several G's had been heard but no actual contacts achieved—any seeming ones would have been with a “thing” in Europe who has apparently been trying to help by using the H18XAL callsign. Fred is using an inverted-Vee with the apex up to 136 feet as his aerial, and favours transmitting on 1802 kc, with the H18XAL receiver tuning the 1820-1824 kc region—verb. sap.

A very pleased G3VLX (Sidcup) mentions that he has not only finished the decorating but has also exorcised the gremlin that formerly lived in the shack—lucky fellow!

### FIVE-BAND DX TABLE

(All Time)

<table>
<thead>
<tr>
<th>Station</th>
<th>Countries</th>
<th>28 mc</th>
<th>21 mc</th>
<th>14 mc</th>
<th>7 mc</th>
<th>3.5 mc</th>
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</thead>
<tbody>
<tr>
<td>G1MVJ</td>
<td>331</td>
<td>192</td>
<td>268</td>
<td>327</td>
<td>104</td>
<td>84</td>
</tr>
<tr>
<td>G2DC</td>
<td>331</td>
<td>171</td>
<td>292</td>
<td>319</td>
<td>171</td>
<td>113</td>
</tr>
<tr>
<td>G3NOF</td>
<td>297</td>
<td>138</td>
<td>198</td>
<td>281</td>
<td>34</td>
<td>39</td>
</tr>
<tr>
<td>G3GW</td>
<td>197</td>
<td>123</td>
<td>136</td>
<td>161</td>
<td>119</td>
<td>74</td>
</tr>
<tr>
<td>G3LQ</td>
<td>214</td>
<td>79</td>
<td>132</td>
<td>177</td>
<td>63</td>
<td>29</td>
</tr>
<tr>
<td>G3UML</td>
<td>235</td>
<td>74</td>
<td>115</td>
<td>221</td>
<td>63</td>
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</tr>
<tr>
<td>G8DI</td>
<td>167</td>
<td>71</td>
<td>113</td>
<td>145</td>
<td>74</td>
<td>44</td>
</tr>
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<td>G3DG</td>
<td>108</td>
<td>63</td>
<td>77</td>
<td>54</td>
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<td>18</td>
</tr>
<tr>
<td>G5JR</td>
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<td>46</td>
<td>97</td>
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<td>G3KLA</td>
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<td>10</td>
<td>32</td>
<td>93</td>
<td>13</td>
<td>44</td>
</tr>
</tbody>
</table>

Note: Placings this month are based on the “28 mc” column.

(N.B. This Table is now temporarily suspended)
Mike Webb runs G3OOQ at 14 Townsend Road, Tiddington, Stratford-upon-Avon, Warwickshire, and is by profession a plant pathologist so that Amateur Radio is strictly a hobby with him — even though his telephone number is 5973. At first, the main interest was Top Band but now it is chatty contacts with the DX, as distinct from QSO's of the rubber-stamp variety. G3OOQ can also be found /M on 4m. and 160m. The gear seen here is fitted into an alcove in his dining-room, with a KW-2000 and KW-500 linear, feeding out through a Z-match unit into a Mosley TA-33Jr. multi-band beam at 30ft., and a G8KW trap dipoles with its centre at 50ft. The operating table has been made to fold up, to cover the main apparatus compartment, with a curtain to conceal the built-in shelving beneath. The construction for this part of G3OOQ is in varnished plywood, for a total cost of about £2. It shows how compact modern gear can be built into a living room without too much disturbance.

For Deryck, the high spot of the period under review was a 5 & 9+ from Worcestershire on Phone, particularly so in view of his not-so-good aerial. Deryck uses the trusty old HRO in conjunction with a Q5'er.

G2NJ mentions working LZ5MN on November 30, in the late evening; this one is not reported by any one else other than GM3UVL, who seems to have his doubts; so we must contain our souls in patience until either Nick or Bill sees the card for the contact. However, your scribe has a feeling that LZ5MN is, in fact, the real McCoy. Another one who is viewed with suspicion by GM3UVL is OY5EE, who is not mentioned by anyone else at all.

“Andy the Light” is the name by which GW3UUZ is known in the district around Nash Point Lighthouse. Andy, of course tends to be working when other folk are sleeping, and so most of the things he gloats over are in the realm of Daylight DX. His latest success is OE5FE, on 1827 kc, in mid-afternoon. However, he gave the OE 599, and got 589 back, which seems a little too good to be true, so we must hope that in due course Andy’s eyes will light up at the sight of the QSL card.

A letter from W1BB, on his cruise, records some results he has obtained, listening with a bent 133-foot wire as the ship was on its way to Hawaii just before Christmas. At 4076 miles west of San Francisco, KL7FRY was pounding in at 599, W6ML 579, W7DOL peaking to 579, K9PAW up to 569. At 3164 miles from San Francisco a few days later, K7ZQU was up to 599, and the following day, at 2745 miles out, W6LRA was 56 on SSB, while W6WX was 33 on SSB but 579 on the key. All this points up the advantage of a good earthing system! Incidentally, for those who like to record “firsts,” KL7FRY worked JA1PVK and ZL3RB in early December for a couple of handsome ones.

G3UGK (Watford) managed to miss the deadline last time out but
reports on the Test on December 18. He found conditions to be rather poor, as indeed was the case, and only heard someone working W1WY, and a signal from VO1FB. Phil mentions ZD8J as possibly being QRV again during January. Time unknown.

Transatlantic SSB contacts are not unheard of and G3CHN is one of the practitioners of the art. After a five-year break, Roger is again at it, and has a regular sked with W2FYT every Friday evening (2300 to 2315) and Saturday for a quarter of an hour from midnight, transmitting on 1822 kc and listening on 1802 kc. Any others who have a pretty good idea they can get over are invited to join the party. Incidentally, Roger mentions that, from tapes of his signals made by W2FYT and W8ANO, there is a lot to be said in favour of heavy compression of the audio signal—albeit this sort of thing needs to be very carefully done indeed if it is not to make things worse.

Some of our correspondents are decidedly Top Band ambitious, and G3VEK (Shipley) is in this category—he wants the design department to produce data on a 3-element static beam for Top Band, aimed at W1, as he already has an uncle who is (a) Mildly interested in Amateur Radio, and (b) Owns a farm. This should be easy, Steve: All you need is first a pole \( \frac{1}{4} \)-wavelength high on which to sit the beast, and possibly a few helpers to erect it—it would not be a one-man job! As for the constructional side at G3VEK, all effort is being directed towards getting the RF up the spout by way of a new ATU, but very little time has actually been put in on the air. Steve hooked HB9NL for a new one, and heard, but could not attract, VO1FB on First-Timers’ morning. GM3AA also mentions VO1FB, who seems to have quite the most consistent signal from across the Pond, and says that Joe has once again remarked on the strength of some of the G signals over there, and, what is more important, the strength of some of the key-clicks which can blot out many of the weaker brethren only too effectively. Your scribe has to admit he would dearly love to hear a recording of the signals from U.K. as received over there! On the other hand, one would expect reports to be about the same both ways, if things are perking well, regardless of the aerials (assuming the same aerial is used for both Tx and Rx), and there is no doubt that the VO1FB signal is one of the best on the band—which could just mean that Joe hears the G’s far better than most. But—that doesn’t excuse the key-clicks, as they are as much of a nuisance to the G’s as anyone.

Very short one indeed from Richard of G3UGF, who simply says he aims to do better in 1967—and more strength to his arm, say we. Another quickie from G3UTS who writes to enter a final score in the Table, after which Reg proposes to shift HF and try his hand at the easy DX.

The New Year’s Day Tests were the subject of a letter from G3BDQ (St. Leonards) who drew a blank, apart from hearing W8HGW, in Cleveland, Ohio, calling CQ DX several times on 1803 kc, but all to no avail.

Our congratulations are due to G3UJS, who (all at once) has been presented with another son, a listener card from LZ giving him 579 on 160m., and a QSO with VO1FB on First-Timers’ Morning, December 18, when he got a report in of 559, and on the evening of January 1, when he was in a Phone 3-way contact with G16TK and DJ4SS at 57 all round. Definitely an eventful month, which has put Snettisham on the map in more ways than one!

GM3JZK (Mull) has got his aerials

### FIVE-BAND DX TABLE

(NEW CYCLE)

<table>
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<tr>
<th>Station</th>
<th>Countries</th>
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<td>—</td>
<td>16</td>
<td>30</td>
<td>43</td>
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</tr>
</tbody>
</table>

**Note:** Placings this month are based on the "28 mc" column.

(N.B. This Table re-opens again w.e.f. January 1st, 1967)
Roger Bains, MP4TB0, of the Trucial Oman Scouts, BFPO 64, runs a KW-2000, with a Drake 2B receiver and a Mosley TA-32.

up, and fired up the machinery on the band, working 13 counties so far, in spite of a mite of noise from the generator which provides all the electricity. Among the contacts one brought joy to the heart of G3UBW (Sevenoaks) who thereby rises by one in the Counties Ladder. At the moment he is concentrating his limited time on the acquisition of more countries on the band, and has worked ZB2, W1, W2, and VO1, with 9V1LP, ZD8J, and W1F3I/KP4 on the list of gotaways.

Burgess Hill is the QTH of G3VMQ, who started on 160m. in August, using a Tx which now boasts relayless BK on CW; the receiver is the good old HRO. As to the aerial, Phil started off with a 130-foot length of wire, shaped like a "U" lying on its side, end-feeding the lower leg of the U. This progressed to a more conventional, inverted-L which was far better. Since then, a change of transmitter providing SSB as well on Top Band only has still further widened the horizon. As to results, Phil mentions 9H1AF, and, on the following day, 9H1AE, various EU DX pieces, several W's and JA5PKU. One startling call in the list is W6TTR on the morning of December 4—yes, on 160m., and not impossible.

A friend of G3VLX is G3VLT (Orpington) who runs a TCS transmitter and receiver, quite extensively modified, mainly on the Top Band. Chris has so far managed to rake up 33 counties and enters the ladder on that basis; he also mentions a contact with ZB2AY on December 29 (CW).

Up in Shetland GM3SVK (Unst) has at last managed to get over the Pond, with a contact with W1HGT at 0430z, achieved with ten watts, which of course has lifted his enthusiasm by a large factor. Fred remarks that it seems the Shetland Top Band DX season is different from that down South—which may well be true—and your scribe could not help but notice that GM3SVK hooked his fish when we Southerners would at best have only just switched on the rig to let it warm, and at worst would still be snoring!

Eighty and Forty

Having spent so much time discussing the Top and Bottom bands, the ones in the middle will have to be treated very shortly this time—but no doubt this will balance out as time goes on. G3VPS is rapidly joining the ranks of the DX-men; this month he seems to have specialised in Forty, between 2200 and 0300 clock, where conditions were found to be distinctly variable, but W, VE, PY, YV, HI7 were nevertheless brought to book. Surprising how soon they change from "new boy" to "old hand"—if, like G3VPS, they are ready to learn, whatever the source.

G3LZQ (Hull) has been coming home from work at 0100z, which tends to give him an outlook on Amateur Radio rather different than the rest of us; he is really restricted to the LF bands by conditions. As a result, John offers YV5CIL, H18XAL, hooked within minutes of each other.

G3JZK "was not excited" about 80; on 40m. the tale is a little different, with VP1DX as the piece de résistance, and such as DJ7X/M1 classified as "routine."

Twenty and Fifteen

Short and sweet, like a donkey's gallop, is the motto here, like the report from G8DI, who finished 1966 with 112 countries and started 1967 with 40 in the first week! The best of the crop was VP1VR for an all-time new one, on Twenty, just after lunch.

The first report for 1967 from G3NOF shows a down-turn in conditions generally on Fifteen, with the band usually closing by about 1900, latest. The mornings have produced ZL's by both long and short paths, with VU, VS6, JA, and VK heard around 1000 the long way over. The only QSO's made were with East Coast W, VK, and KR6JC. Twenty has also been changeable, staying open rather later since the New Year and up to
THE SHORT WAVE MAGAZINE

February, 1967

the time Don wrote. The VK signals in the mornings over the long path have peaked to S9, and on some days have remained audible till as late as noon. All sorts of DX signals have been heard over the period on weird beam headings, a phenomenon also noticed by G3NWT. HR2AFK, HS2AK, HV3SV, KG6AAY, W7, YN1, S24JH, 9J's, are mentioned in Don's list.

This "odd beam heading" business is quite interesting. Those with a beam, like G3NOF and G3NWT, hearing an echo, can turn the beam and find out whether the echo is the long-path signal; this has not been the case, and the "echo" signal peaks with the beam as much as 90 degrees off the "correct" heading—a procedure that is liable to make the most optimistic go outside and look to see what has fallen off the beam!

G3NWT also mentions the CW signals from ZS, on the low end of Twenty, who absolutely refuse to return to his calls; however, among the ZS's one weak and watery ZL comes back as soon as he reaches for the netting switch! As Geoff says, the possible clue is the fact that there is just the one signal, instead of the dozens that must be about somewhere—so the skip has chosen just the right parish to settle on, instead of half Europe.

GM3SVK spent Christmas on leave, which knocked a sizable hole in the period under review; however, on Fifteen FG7XJ, HI8XAL, KS4CC, VK's, and on Twenty OA4VE, PY2DFR, UA0KJA (Zone 23) were all brought to book.

GM3IJK, with a slight smile, offers GI on Fifteen as one of his catches of the month; George has been suffering from rather Wx conditions, wind having "seen off" the 28 mc folded dipole. Electrical occurrences included ball lightning which reduced a gate-post to match-wood, and abolished the internal organisation of the telephone, but fortunately left the aerials and the rig all in one piece.

The long and always-welcome letter from GM3IJA mentions, in the present context, only 606BW, and sundry W and EU contacts.

The period under review seems to have been predominantly 14 mc CW activity at G3VDW (Coalville), who offers VE1-7, W's, including the sixes and sevens, 9H1AT, 4X4, OY's, U18, UM8, TF2, OX, UA9's in Zone 18 and UA0's in the same Zone; the overall result is, of course, reflected in the Tables where he goes to 111 Countries.

Nice to hear from G3NMH, who reports that, in spite of the mishaps to the aerials, Hal has ended the year 1966 at over 200 in the New-Cycle Table, during which he made about 300 VP8 contacts!

The 25 watts at G3MBL seems to get around very effectively indeed, and this time Alan has been raising ZL in the morning before work, and then hooking FL8RA at lunch time. With only 10 watts available at G3TLX (Edgware), which he puts...
into a trap dipole, the results over the period include all W other than W6, CR6, ZS, MP4BGG, UF6, ZD8J, VE, VO, TA2AC. Which seems to dispose effectively of the argument that you need QRO to break out of Europe!

Over at Chalfont St. Giles, G3VLD has had an inactive month, relatively, and hence only offers on Twenty ZL, KG6AQA, PY, and EA8. As for Fifteen, PY, 4X4, 9J2, ZS, and VS9, all the quoted ones being CW contacts.

DX Snippets

Rio de Oro is being activated on 21 mc AM by EA9EJ; rumour hath it that Justo will shortly appear on SSB. A new prefix for a lot of people will be provided by HS3NT, who says he is on from Northern Technical School, Chiang Mai, Thailand.

HV3SJ puts, as may be expected, a thumping great S9 signal into the U.K. whenever he comes on the band; it should be the case, therefore, that a lot of people will be sending cards to WB6OOP, who is handling the paperwork.

The ZA situation seems to be even more confused than it was when the opening paragraphs of this piece were on the typewriter—having now eliminated ZA1BR from the ranks of the upright, another contender has promptly stepped in, signing ZA1ALX. Your conductor does not expect to have to eat his hat over this one, either!

Lucky fellow, 3W8D, who has been made taboo by FCC, as far as U.S. stations are concerned, and hence should be able to enjoy his Amateur Radio even if he isn't a DX-chaser! On the other hand, 8R1P is the new callsign of VP3AA, and hence he may expect to have to go through the hoops all over again.

The Tabular Matter

This issue brings the Tables up to the end of 1966. For 1967, a change seems to be indicated, in accordance with the general line of your comments. Thus, the All-Time is now suspended (after this issue) and will be replaced by a new effort in which the ploy is first to concentrate on Zones until they are all booked in, and then to accumulate countries. The Table (called the New Zone Table) will show in order of Zone score until someone has the lot, and then we'll sort out the top of the Table on the Country-Zone basis. Everyone to start level, at January 1, 1967, and countries and Zones worked since the starting date totalled on the 7, 14, 21 mc bands only, with CW and Phone listed separately.

The Five-Band New Cycle Table will open again with effect from January 1, 1967, and the Top Band Tables carry on as before—with the proviso that if the G3U--/G3V-- Table does not show much life, it will be necessary for it to give place to something more in line with what people want—so let's be having the entries!

What about Ten?

All these changes seem to be putting the 28 mc addicts out to grass—but no such thing, as there will be an Activity Sunday set for April 16, and another one or two later on in the year, for the success of which we require only the best in the way of conditions; to that end our old friends Dotty Dit and Donald Quack are being supplied with a liberal quantity of expense-account joss-sticks. Get on and work what you can, any time during 1000 to 1800 GMT April 16, and let us have a summary of the results, beam headings where known, and your comments, by April 28, 1967.

Comment on the Preamble

The remarks about moving are no indication that your E.P.E. does not want any mail in the coming period—indeed, your notes are definitely looked forward to, and the rig will not be off the air for more than a few hours, so long as Murphy's Law does not intrude.

Sign-Off

That seems to be about that, so good hunting, 73, and don't forget the deadline for next month which is first post, Monday, February 6, addressed, as ever: CDXN, SHORT WAVE MAGAZINE, BUCKINGHAM.

JUST SHOWS WHAT CAN HAPPEN...

Just recently, a short CQ in the CW area of the 20-metre band brought a routine come-back from a station signing K3AA, giving his QTH as Doylestown, and name Lewis. After the usual exchange of reports and courtesies it was agreed that QSL'ing should be direct. When K3AA's card arrived (by airmail), it disclosed that he had started in 1906 under the callsign BD, using a 2in. spark coil; that he had become SAG in 1910 with 3 kW of spark, giving a range of 500 miles; that after that he was suspended (after this issue) and will be an Activity Sunday set for April 16, and another one or two later on in the year, for the success of which we require only the best in the way of conditions; to that end our old friends Dotty Dit and Donald Quack are being supplied with a liberal quantity of expense-account joss-sticks. Get on and work what you can, any time during 1000 to 1800 GMT April 16, and let us have a summary of the results, beam headings where known, and your comments, by April 28, 1967.

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J ust another reminder that all mail affecting the Editorial side of our activities, or requiring Editorial attention, should be addressed simply: Editor, SHORT WAVE MAGAZINE, BUCKINGHAM. This is full and sufficient, and from any part of the world if "England" is added.

Correspondence on all other Magazine business, such as subscriptions, book orders or enquiries, circulation queries, bulk orders, the small advertising and advertising matters generally, should go to: Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. (ABBey 5341/5342.) It is by dividing the work-load in this way that we try to give quicker and more efficient service.
The only report we have on the Leonids shower is from EA4AO (Madrid), whose skeds with UB5KDO and SV1AB were abortive—however, he is keeping at his MS work, and suggests IICZE (on 144-300 mc) and IIIZUP (144-250 mc), both of Livorno and QTHR, as useful sked possibilities from the U.K. They have the gear, are good CW operators, and are regularly in QSO on two metres with EA3/EA5 stations, across the Med., a nice all-sea path of about 450 miles.

* * *

We are asked to draw attention to the projected Midlands VHF Convention and Dinner, to be held at the Park Hall Hotel, Penn, Wolverhampton, on April 29. This is being organised to be a really good show, of which we shall have full details later.

Another announcement requested is that the South Wales VHF Group, who now hold regular meetings, will have their next on February 16 at GW4CG, Porthcawl (QTHR).

Incidentally, there is quite a lot of two-metre Sideband activity around mid-band on Monday evenings, with good QSO's being made over a wide area—even if the netting is not always spot on. In fact, in the Midlands they say that “Monday Night is Sideband Night”—and you can find G3BA-and-the-group discussing all manner of interesting matters.

When Jack Hum, G5UM, pulled up his sticks in Herts, to move to Leicester, he checked over his VHF logs, to find that in his 18 years on two metres (in itself a remarkable record) he had had about 9,000 contacts with 1,329 different stations. In 12 years on 70 cm the totals came out to 2,000 QSO's with 1825, and in two years on four metres, 550 with 2435—all indicating a consistently high level of activity, and helping us much with our statistical records of VHF band occupancy. Jack now starts out again in the

Interesting 70-centimetre report from G8APX, who is operational during school term from Bushey.
FOUR METRES

ALL-TIME COUNTRIES WORKED LIST

Starting Figure, 8

From Home QTH Only

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<td>8</td>
<td>G3NNO, G3TLB, G8VN</td>
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</table>

This table records Counties Worked on Four Metres, on an all-time basis. Claims can be made as for the other Tables, e.g. a list of counties with the stations worked for them, added to from time to time as more counties accrue. QSL cards or other confirmations are not required. Totals in excess of 100 different stations worked can be claimed and will be shown in brackets after the call.

The mobile 70-cm. array carried on his car by G8APX (Witnesham, Ipswich) is a 6-over-6. The position of this beam has been found by trial-and-error for optimum radiating efficiency. The Tx runs 6 watts, and some very satisfying results are being obtained on the 430 mc band. During April, G8APX will be touring Scotland and would like to fix skeds with anyone up there.

Herts.; from home at Witnesham, Ipswich, in the holidays; and can also be found /M—see picture. The Bushey rig includes a J-Beam Parabean at 300ft. a.s.l., off which he puts out a beefy signal. The home station is virtually the /M gear, consisting of a QQV02-6 6-watt PA on 433.09 mc, modulated by an EL84 (using "auto-modulation") and his Rx is a CC converter into an EC-10, with a /M aerial as seen here. On January 15 he had two good mobile contacts, over distances up to 25 miles, with G8AJV (St. Albans) and G8ARH (Leatherhead)—the point being that in spite of all the obstructions and blind spots over the routes around Bushey, Watford and Harrow (which might be thought likely to cause signal black-outs on two metres, let alone 70 cm.) satisfactory contact was maintained with both stations—proving, as G8APX suggests, that 430 mc should be as effective as any

THREE-BAND ANNUAL VHF TABLE

September 1966 to August 1967

<table>
<thead>
<tr>
<th>Station</th>
<th>FOUR METRES Countries</th>
<th>TWO METRES Countries</th>
<th>70 CENTIMETRES Countries</th>
<th>TOTAL pts.</th>
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<td>G3TLB</td>
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<td>39</td>
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</tbody>
</table>

Scores are since September 1, 1966, and will accrue until August 31 1967. Position is shown by last-column total, as aggregate of all scores. Own county and country score as one each. Entries may be made for a single band, any two, or all three. Claims should be sent in as often as possible, to keep the Table up-to-date.
The Reigate boys, active in most competitive events, put G3PNA/P on the air for the last VHF field day—they were also on for MCC with three stations (see p.673, January). When this was taken G3BR was in charge, with the Tx on the left.

**SEVENTY CENTIMETRES**

**ALL-TIME COUNTIES WORKED**

Starting Figure, 4

<table>
<thead>
<tr>
<th>Worked</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>G2XV</td>
</tr>
<tr>
<td>44</td>
<td>G3BNL</td>
</tr>
<tr>
<td>42</td>
<td>G2CIW</td>
</tr>
<tr>
<td>36</td>
<td>G3JMA</td>
</tr>
<tr>
<td>35</td>
<td>G3KPT, G6NF</td>
</tr>
<tr>
<td>33</td>
<td>G3JHMA/A, G3LTF, G8ADC</td>
</tr>
<tr>
<td>32</td>
<td>G3JHA, G3LRQ, G61ATM</td>
</tr>
<tr>
<td>31</td>
<td>G3JWQ, G5YV</td>
</tr>
<tr>
<td>30</td>
<td>G3EDD, G3KEQ</td>
</tr>
<tr>
<td>28</td>
<td>EI2W, G3HAZ, G3HBW, GINNG</td>
</tr>
<tr>
<td>27</td>
<td>G3PTM</td>
</tr>
<tr>
<td>26</td>
<td>G3KQF, G2WADZ</td>
</tr>
<tr>
<td>24</td>
<td>G3AHD, G3HRH, G8ACB, G8ADP</td>
</tr>
<tr>
<td>23</td>
<td>G3BKQ, G3VGH, G4AC, G6NB, G5UM (182)</td>
</tr>
<tr>
<td>22</td>
<td>G3OBD</td>
</tr>
<tr>
<td>21</td>
<td>G3AYC, G3FII, G3HOO</td>
</tr>
<tr>
<td>19</td>
<td>G3OWA</td>
</tr>
<tr>
<td>18</td>
<td>G20I, G5QA</td>
</tr>
<tr>
<td>17</td>
<td>G3BA, G3MPS, G8ADS, G8AKI</td>
</tr>
<tr>
<td>16</td>
<td>G2DDD, G3BYY, G3MED, G6AAC/A</td>
</tr>
<tr>
<td>15</td>
<td>G4RO</td>
</tr>
<tr>
<td>14</td>
<td>G2BQI, G2HDZ, G2FAN, G3JHWR, G5DS, G6APX</td>
</tr>
<tr>
<td>13</td>
<td>G6XA, G8ARH</td>
</tr>
<tr>
<td>12</td>
<td>G3NJO/T, G5BD</td>
</tr>
<tr>
<td>11</td>
<td>G2AXI, G3JEP</td>
</tr>
<tr>
<td>10</td>
<td>G3IRW, G31LN, G8ACK</td>
</tr>
<tr>
<td>9</td>
<td>G8APJ</td>
</tr>
<tr>
<td>8</td>
<td>G2HDY, G3JHM, G6AX/P</td>
</tr>
<tr>
<td>6</td>
<td>G3KHA, G3WW</td>
</tr>
<tr>
<td>5</td>
<td>G3FUL, G3IRA, G3UD, G31TN, G5ML, G2FZC</td>
</tr>
<tr>
<td>4</td>
<td>G3IUY</td>
</tr>
</tbody>
</table>

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

for mobile use. He hopes that some more of 70-cm. boys will try /M.

By the way, we are glad to notice, this time, some new G8/3 claims for the 70 cm. Table, but still not enough to start the proposed Seventy-cm Annual.

Several two-metre reports to hand, including G3JIOE (Newcastle) who has been very busy on the construction front with a Sideband Tx for two metres, running a pair of 4X150A's in the PA, capable of being pushed to 300-400w. p.e.p.—very nice, too ! Alan will also be putting this Tx on at the CW end. It would certainly be a good thing to find this area of the band being used more.

G3DAH (Herne Bay, Kent) keeps in touch with the PAO's across the water and is moving up steadily in the two-metre Annual. He draws attention to the fact that by October last, PA0CML had worked no less than 500 different G's on the two-metre band. G3AHB (Slough) found Two lively at times during the period, raising five more counties for the Three-Band Annual.

G3BNL (Keyworth, Notts.) also progresses in the Tables and, it should be noted, is one of those who is operational on all three VHF bands.

In writing a friendly letter G3AOS (Hale Barns, Ches.), to report on the general state of things, says (meaning A.J.D.) "not too certain whether you are firing on upper or lower sideband these days. However, I have a feeling that we shall be able to resolve you whatever the mode" ! Tnx, Geoff. E16AS (Dun Laoghaire) turns in a full claim for the Three-Band VHF Annual, with a nice lot of EI/GI/GM's worked on two and four metres; however, from where he is, he's a bit stuck for 70 cm.

**Dead-Line**

And that's about it for this time. Henceforth, your A.J.D. hopes to be in full song as of yore and, to get things moving again with this feature, would appreciate all VHF reports by Tuesday, February 14 latest, addressed: A.J.D., SHORT WAVE MAGAZINE, BUCKINGHAM. With you again on February 24, all being well.
Do You Know That——

A centre-fed aerial of the dipole or doublet variety can be quickly contrived from a suitable length of flat twin lighting flex, of the sort having a clear plastic covering. The aerial is formed by separating the flex into two arms to give the correct roof-length, e.g. 8 feet each arm for 10 metres, and the feeder is then the remaining length of twin flex. The T-point is bound with polythene cord, or whatever, to prevent further separation when the aerial is hoisted. To make a 28 mc aerial, Tx or Rx, having a 30ft. feeder, and allowing for end insulators, about 13 yards of flex would be required. The impedance of the feeder can be taken as "low"—anyway, not more than about 100 ohms. Such an aerial is light, strong, cheap and virtually Wx proof.

Very neat plug-in coils of the two-terminal type, ideal for GDO's and similar circuits, can be made by filing the lugs off a 1lin. Aladdin former (ex junk TV set) to make a snug fit in the thimble of the coax plug. One end of the coil winding is soldered to the plug body and the other to the centre pin.

High-voltage type silicon diodes can be used for speech-clipping by inserting the diode in the PA HT lead, in the direction to prevent the anode going negative. One 800v. p.i.v. diode is sufficient for normal high-level AM modulators. You still need the filter (see Handbook circuits) for harmonic suppression.

The plastic spoons from Kodak 126 "Instamatic" film are ideal for coil formers, these being about 1lin. by 1l in, with a hollow centre and flange at each end. One flange can be used for fitting to the chassis and the other for the coil connection anchorages. Any local photographic dealer who processes on the premises would probably be glad to supply "for free" if asked, as normally these spoons are thrown away.

A small quantity of Valspar black enamel thinned down to a weak solution makes a good reconditioning agent for black-crackle finishes that have become dulled with age (and dust particles). The solution should be applied sparingly and worked well in with a stiff brush, so as to avoid filling and so losing the crackle effect.

Any milliammeter or microammeter is easily converted to a DC voltmeter by putting a suitable resistor in series. Divide the voltage range required by the original meter scale, the result being the value of the series resistor in thousands of ohms. For instance, to get an 0-250v. reading with an 0-500 micramp (0.5 mA) meter, the series resistor would be 250 ÷ 0.5, giving 500K. Only slight inaccuracy is introduced if the nearest preferred value (in this case 470K) is used.

When using an audio filter on the output end of a receiver—peaked at 1000 c/s for CW reception—considerably louder signals can be obtained by using low-resistance headphones, such as the ex-Army type sold as surplus. The cheap 35-ohm speakers used in some transistor radios will also be found to have a fairly pronounced peak at around 1000 cycles.

Lighting protection, always very important, becomes essential if a transistor receiver is in use at the station. The RF transistor in an EC-10 was destroyed by surge on the aerial from a nearby lightning flash which was far from being a direct hit on the aerial. A safety measure is to wire in an aerial relay, operated off the Rx, which opens automatically when the receiver is not in use.

It is a good thing, every time you construct some piece of apparatus, to stick a self-adhesive label somewhere inside with the issue of the Magazine from which the design was taken. It is then an easy matter to check for future reference. It is also a good idea, with any equipment, to keep a record of valve replacements or circuit changes on a card inside the cabinet.

When building beams using aluminium tubing carried on stand-off insulators, rather than drill the tube to fit the stand-off's (which often leads to misalignment and fracturing) it is better to mount Terry clips on the s/o's to hold the elements. These clips should be of the plastic-coated variety now obtainable, as this will prevent corrosion. Any local D-I-Y store or ironmonger should stock coated Terry clips.

An effective method of obtaining negative bias from an existing power pack is to connect two silicon diodes to the HT transformer secondary in the opposite sense to the main HT rectifying diodes. Use the same values of condenser and choke as for the positive supply, to ensure even voltage distribution in the pack.

If you are without a GDO, a signal generator will make an excellent substitute. Simply wire a diode, a 500K resistor and an 0-500 mA meter in series with a small pick-up loop, feed the output from the sig. gen. across the resistor—and you have a GDO.

This is the revival of a once-regular feature that has not appeared for some time. We pay half-a-guinea for any hints, tips or notions we can use here, the only rules being that they must be practical and explained briefly without diagrams. Payment is by postal order immediately on publication. Send your idea to: D-Y-K-T, SHORT WAVE MAGAZINE, BUCKINGHAM.
CONVERTER FOR
FOUR-METRE BAND

CRYSTAL CONTROLLED —
CIRCUITRY AND ESSENTIAL DETAILS

R. S. HEWES (G3TDR)

This article is based on material appearing originally in the "Newsletter" of the Echelford Amateur Radio Society, with acknowledgements. —Editor.

This article describes a relatively simple, valve-type crystal-controlled converter for the 4-metre band, with a tunable IF range of 4:1 to 4:7 mc. Readily available valves are used to avoid supply difficulties, and the suggested third-overtone crystal is also obtainable cheaply.

While the circuit is quite conventional, a few notes may be helpful for the less initiated in VHF practice. V1, an EF95/6AK5 low-noise pentode is used as an RF amplifier at signal frequency. The aerial is tapped into the grid coil to give the best “noise-match” (sharsh effect) as this is considered more important than optimum power match. Under these conditions, the gain available is of the order of 20 dB and is thought sufficient. The anode coil, which is inductively coupled to the mixer grid (L2 to L4), oscillator injection being from L3, is screened from the RF grid coil L1, and this eliminates the need for any neutralising. V2A, half an ECC85, functions as a triode mixer, with link-coupled oscillator injection, L6-L3. V2B is a cathode-follower, for low-impedance output into the main receiver, for which 50 or 75-ohm coax would be suitable; this arrangement also obviates any possibility of break-through at IF (provided the main Rx itself is well screened).

Stage V3B is connected as an overtone crystal oscillator. In the prototype a 33 mc HC6/U xtal is used, although an 11 mc fundamental would also be possible. V3A works as a frequency multiplier, and output at 66 mc is developed across L7, fed across to the mixer grid as already mentioned. With an RF (signal frequency) coverage of 70:1-70:7 mc, the IF is tuned across 4:1-4:7 mc. All HT and heater circuits are liberally decoupled, as indicated in the circuit.

Alignment Procedures

All resonant circuits—L1, L2, L4, L5, L7, L8—can be adjusted initially with the aid of a calibrated grid dip oscillator. This will be good enough for the first rough inductance settings.

Oscillator Alignment: Put in the crystal, apply 150v. HT to V3 only, connect a high-resistance 0-5v. metre across R10, and adjust slug L8 for maximum CO output, as first step. Now turn slug back just one turn; this circuit displays the usual overtone oscillator characteristics so that if the core is screwed in too far, oscillation will cease. The output across R10 should be about 1v. after C4 is tuned for resonance and maximum output will be obtained at this sort of setting for voltage reading. Adjustments on L8 and C4 should be such that, with 1v. across R10, the crystal goes off immediately HT is switched on.

Mixer Alignment: With voltmeter to read 0-100v., take reading between junction R1-L5 and earth. With HT on V2 and V3, the voltage at this point should be about 25v. Then touch up on C4 in V3A anode to get a rise in anode voltage at R1-L5 to about 30v., showing that optimum injection has been attained—which is the object of these adjustments. The injection coil L3 should be between L2 and L4, with a very slight separation; L6 is in line with L7, and some changes in their separation should be tried for optimum injection.

With these adjustments completed, there should be some "signal noise" audible from the main receiver. The latter should then be set at 44 mc (mid-band on the IF tuning range) and the slug of L5 adjusted for maximum noise.

RF Alignment: Apply HT to V1 and, with the other two stages running, there should be an increase in noise if L1 and L2 are approximately correct. With an "aerial load" (4-metre dipole) plugged in, tune the main Rx to 4-6 mc and adjust C3 for maximum noise output; then set the main Rx on 4-4 mc, adjusting C2 for full "sharsh"; finally, tune receiver to 4-2 mc, and get maximum noise by variation of C1. The converter should now

Table of Values

<table>
<thead>
<tr>
<th>Circuit of the Four-Metre Converter</th>
<th>R1</th>
<th>R2, R5</th>
<th>R3</th>
<th>R4, R6</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1, C3</td>
<td>3-30 µF</td>
<td>220 ohms</td>
<td>33,000 ohms</td>
<td>2,200 ohms</td>
</tr>
<tr>
<td>C2, C4</td>
<td>3-9 µF</td>
<td>33,000 ohms</td>
<td>3,300 ohms</td>
<td>270 ohms</td>
</tr>
<tr>
<td>C5, C6</td>
<td>.001 µF</td>
<td>2,200 ohms</td>
<td>33,000 ohms</td>
<td>270 ohms</td>
</tr>
<tr>
<td>C7, C8</td>
<td>22 µF</td>
<td>2,200 ohms</td>
<td>33,000 ohms</td>
<td>270 ohms</td>
</tr>
<tr>
<td>C10, C13</td>
<td>R12</td>
<td>22,000 ohms</td>
<td>22,000 ohms</td>
<td>22,000 ohms</td>
</tr>
<tr>
<td>C15</td>
<td>.01 µF</td>
<td>22,000 ohms</td>
<td>22,000 ohms</td>
<td>22,000 ohms</td>
</tr>
<tr>
<td>C11</td>
<td>82 µF</td>
<td>100,000 ohms</td>
<td>100,000 ohms</td>
<td>100,000 ohms</td>
</tr>
<tr>
<td>C12, C17</td>
<td>27 µF</td>
<td>47,000 ohms</td>
<td>47,000 ohms</td>
<td>47,000 ohms</td>
</tr>
<tr>
<td>C14, C16</td>
<td>Xtf</td>
<td>33 mc overtone oscillator (see text)</td>
<td>33 mc overtone oscillator (see text)</td>
<td>33 mc overtone oscillator (see text)</td>
</tr>
<tr>
<td>C18, C19</td>
<td>.0033 µF</td>
<td>V1 = EF95 (6AK5)</td>
<td>V2 = ECC85</td>
<td>V3 = ECC85</td>
</tr>
<tr>
<td>C20, C21</td>
<td>56,000 ohms</td>
<td>R1</td>
<td>R2, R5</td>
<td></td>
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</tbody>
</table>

Table of Coil Data

<table>
<thead>
<tr>
<th>Coil Data</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>7 turns 20g. tinned, self-supporting, 1-in. i.d. by 3-in. long, turns spaced one wire diam., with tap 3 turns up from cold end.</td>
</tr>
<tr>
<td>L2</td>
<td>9 turns 20g. tinned, ħ-in. long by 3-in. diam. ħ-in. long.</td>
</tr>
<tr>
<td>L5</td>
<td>45 turns 34g. enamelled on 1-in. diam. former with iron-dust slug.</td>
</tr>
<tr>
<td>L7</td>
<td>11 turns 20g. tinned, ħ-in. i.d. by 3-in. long.</td>
</tr>
<tr>
<td>L8</td>
<td>22 turns 26g. enam. close-wound on ħ-in. former with iron-dust slug, tap at 6 turns from xtal end.</td>
</tr>
</tbody>
</table>

Notes: RF chokes are made of 40 ins. of 34g. Coils L3, L6 are single-turn p.v.c., enamelled wound on insulated carbon-resistor body. Link coils L3, L6 are single-turn p.v.c., with iron-dust slug. Coils L1, L2, L4 and L7 are self-supporting.
be in its most sensitive condition over the whole of the tuning range.

Of course, if you have a signal generator capable of giving output over the 70 mc band, it may now be used to advantage, to bring all the fixed-tuned circuits to optimum. But you will not be far off by relying on Rx noise output and taking care. If then you run into a local signal at about mid-band, final adjustments can be made under real conditions. Tuning over 4.1-4.7 mc on the main Rx should result in a fairly constant noise level over the whole range.

There should be no instability in the RF stage, and to ensure this all leads should be kept as short as possible. If the RF/IF alignment procedure is carried out as outlined, the response should be reasonably level over the whole of the tuning range.

Building It

Of the several ways in which it is possible to put this converter together, the method adopted at G3TDR was to build it on to the lid of a box measuring about 8in. long by 4in. wide by 2½in. deep. The lid thus forms the main chassis, which is also divided into three compartments (for the V1, V2 and V3 sections) by means of two vertical screens, to fit the width and depth of the box. Thus, when "the lid is on," not only is the converter totally enclosed, but the RF, mixer and oscillator sections are screened from one another. The exterior connections are just the HT/LT feeds, the aerial socket, and the IF output connector.

Third London SSB Dinner

The London SSB Dinner has now become a biennial occasion, with a large attendance not only from the U.K. but also by keen Sideband types from overseas. It is organised by G3BXI, G3FPK and G3KZI, and is a full radio amateur function, with a trade show, a big dinner, cabaret and dancing—all well laid on and in very pleasant, not to say recherché, surroundings. The distaff staff, in all its finery, is expected in support.

This year the venue is the Royal Garden Hotel, Kensington High Street, London, W.8—where an entire floor has been booked—and the date is Saturday, May 20. The cost of tickets is 75s. per person, and this side is being looked after by G3FPK, QTHR, who is i/c bookings. Trade participation is being arranged by G3BXI, who would like to hear as soon as possible from interested parties.
THOUGHTS AFTER GOING SSB ON TWO METRES

AND SOME IDEAS AND SUGGESTIONS

D. A. BODDEY (G3KUM)

In recent weeks 10 metres has been opening quite regularly. Following this, comments have been heard on the bands regarding the quality of some signals coming from our brethren in the U.S.S.R. (If you have heard them you will know what is meant.) They come up on a frequency calling CQ and finish several kc away from the starting point, having treated you to an earful of AM, FM plus sidebands from here to eternity. It's not surprising that their efforts have failed to impress a large number of European and American stations also trying to use the band and attracted to themselves a certain amount of caustic criticism.

Following from this the writer wonders whether people have listened with the same critical attention to some of the signals to be heard on two metres. One has doubts, because it is a fact that a very large number of the signals on Two exhibit the same characteristics to a larger or lesser degree. This the writer has studied, and arrived at the conclusion that the main causes can be classified as:

1. The myth still prevalent that because an oscillator is crystal controlled it must be stable,

2. Inferior selectivity of a great many receiving set-ups used on two metres as compared to the performance of Rx equipment on the HF bands, particularly so since the advent of SSB on VHF.

Since the idea of this article is to be constructive, the writer would like to offer suggestions as to cure as well as cause in discussing the two points already raised. Let's have a look at the first point.

Facts About Stability

Although it is correct to say that a crystal controlled oscillator is inherently more stable than its SEO counterpart, nevertheless it is still prone to drift due to temperature changes and, in particular, variations in supply voltage—and this is assuming that rugged mechanical construction rules out changes due to displacement of components by shock and vibration. This in itself merits careful consideration, particularly where mobile equipment is concerned.

The drift encountered in a CO can be broadly classified under the two headings of long term and short term. Long-term drift is more usually the result of a steady rise in temperature of the equipment from switch on, and once this has levelled off, to changes of ambient temperature. After 30 minutes or so the drift from these two causes should be so slow and slight as to be insignificant in the practical application.

Short-term drift is by far the most annoying and in most cases the most easily remedied. In the writer's experience the two commonest causes of short-term drift are:

(a) Over excitation of the crystal, causing a rise in temperature of the crystal and consequently a change of frequency. The remedy is to keep the excitation low, just sufficient to maintain reliable operation, and use a buffer amplifier to raise the output level if necessary. A triode-pentode 6U8 or 6AN8 is a useful valve for this job,

(b) Change in operating potentials of the oscillator. Do not assume that a 150-volt gas stabiliser will adequately take care of the oscillator HT supply. Received on a wide band AM Rx, the signal will in all probability sound all right—but try feeding the converter into a decent SSB receiver (or transceiver) with a 2 kc bandwidth of good shape factor and listen to the signal as though it were SSB, i.e. exhausted carrier reception. If there is no FM with speech peaks count yourself amongst the fortunate few. In the writer's case the signal was moving nearly 500 c.p.s. on speech peaks. The cure was to fit a 27K decoupling resistor from the stabiliser anode to the oscillator anode and a 100 µF electrolytic to earth. It does not move now! Certainly not a very costly modification. See opposite.

Believe it or not some AM signals have so much FM on them that they are unreadable on a selective receiver. They sound all right where exceptional Rx bandwidth masks this fault. In passing, it is fair to remind people who use receiving equipment with 50 kc bandwidths that in all probability the sideband station whose splatter(?) they complain of is more than likely 30 kc away and he has to give a hearty flick to his tuning dial even to hear your signal.

Using Zener Diodes

It may be of interest to VHF constructors to hear of a recent experience with zener diodes.

In earlier attempts to improve the stabilisation of the oscillator supply, 8w. 150v. zener diodes were tried. The beacon signal from Wrotham, which at Ipswich was normally 40 dB over S9, suppressing all receiver "shush," took a sudden apparent drop and a noise level of S7 was present all the time. After spending some considerable time checking through the converter section of the transceiver to find out what had died the gas stabiliser was re-introduced—needless to say the situation returned to normal. Several zener diodes were tried in case a dud had been chosen but the result was the same. So if you want an efficient noise generator try an 8-watt. 150-volt. zener! The manufacturers were approached about this problem. Their answer was
that although they knew it existed they had not heard from anyone with equipment sensitive enough to measure its effect! Incidentally, the better the zener the worse the noise!

With regard to the second point, receiver selectivity, it will be apparent that if the signals are monitored on wide-band equipment only, frequency shift in the form of drift, or FM on voice peaks, may go unnoticed. Because you cannot normally hear the drift does not mean that, if present, it should be tolerated. Not everyone can listen to it on your receiver.

There may be those who wonder what prompted this article. The answer is that having recently turned his attention to two metres after the HF bands, G3KUM must confess himself shocked by the quality of some transmissions to be heard on Two. It is felt that this is almost entirely due to the fact that the drift does not mean that, if present, it should be tolerated. Not everyone can listen to it on your receiver.

Time has produced a great many changes and the tables have just about been turned on the HF bands. The same thing is going to happen on Two. Perhaps if some VHF operators had the chance of tuning across the two-metre band with a selective Rx so that they could take an S-meter reading of carrier level and sideband strength they would modify their views—an S5 carrier that yields a sideband which is unreadable would be RS-55 with the same power on SSB. There is no more striking way of demonstrating this than actually tuning AM signals on a selective VHF receiver.

The transverter is a very convenient way of going SSB on two metres if a good HF SSB station is already available. It gives one the advantages of VFO control and stability of an HF station in the VHF band, complete with Vox, p-t-t or what-have-you, and a selective receiver. In this way it is as easy to tune SSB on VHF as it is on 80 metres.

Finally, if you do call a sidetone station remember that he may be using a transceiver without split-frequency facilities, so do not forget to listen on your own frequency when all else fails! Someone had better tell the band planners about this one.

**REMEMBER — MOBILE RALLY DATES**

With the issue dated April (due out on March 31) we shall be starting the new season's Mobile Rally calendar. This means in the first instance just a notification of date and the name of the organising group concerned. Fuller details (provided we receive them in time) of each particular event will be given in the issue coming due a month or more before the date of the event. The deadline for receiving information, month-to-month, will be given in each issue under the Mobile heading.

Those responsible for Rally organisation are asked to let us have their dates as early as possible—the sooner yours can appear in print, the less the likelihood of a clash.

For the 1967 Season, Mobile Rally dates already notified are:

- **North Midlands**, on April 30, at Drayton Manor Park, near Tamworth, Staffs., organised jointly by the Midland and Stoke-on-Trent Amateur Radio Societies. (This is actually "Trentham" at a new and better venue.)
- **Thanet Mobile Rally**, May 7, at Cliffsend, Ramsgate, Kent, by the Thanet Radio Society.
- **Hunstanton (bucket-and-spade) Rally**, on June 18, organised by the local group.

Closing date for Mobile Rally notifications to go into the March issue will be **February 11**; for the April issue, **March 18**. Address to Editor, SHORT WAVE MAGAZINE, BUCKINGHAM.

**THE R.A.E. — MAY, 1967**

Though the date looks a long way off, this is to remind all candidates that their applications to sit must be in before the end of February. This can usually be arranged through the course tutor where an R.A.E. class is being attended. Those making individual entries, *i.e.*, not through any course affiliation, should check with the local office of their Education Authority, quoting Subject No.55, City & Guilds of London Institute. It is not possible to be specific about exactly what date in February applications to sit must be in, by, because this varies with different technical colleges and night schools across the country.
UP-DATING THE EDDYSTONE S.640

MODIFICATIONS FOR A POPULAR COMMERCIAL TYPE

L. A. MILLER (G1LSM)

The 640 is a well-known post-war design and although now out of production, large numbers remain in use. Mainly, their owners are very satisfied with their S.640's but there is no doubt the receiver is now somewhat out of date, to say the least. This article discusses possible modifications which have been found considerably to improve the S.640 in the light of present-day operating conditions.—Editor.

THERE must be many readers who own the Eddystone S.640 receiver and who find, like many of the receivers of this type, it falls down somewhat in selectivity (even with the crystal in) under the crowded band conditions of today.

A quite simple modification to the “640” has been carried out by the writer and has resulted in bringing the receiver, perhaps not up to the standard of the high-priced modern communication types, but at least to give a worthwhile improvement, e.g., single-signal reception on CW with the crystal switched in. On phone, signals are slightly clipped but are of good communication quality and on SSB there is a vast improvement and signals can be tuned in more easily.

All the work has been carried out without upsetting the layout of the front panel. The only change is that two toggle switches have been replaced with variable controls; however, if Eddystone knobs are fitted to these the layout still remains symmetrical. This is an important factor, because nothing looks worse than controls fitted here, there and everywhere on the front panel of any piece of equipment with a properly laid-out panel.

A handbook or complete circuit of the S.640 will be necessary to carry out the modification—which is to make the “640” into a double superhet with a second IF of 85 kc (see block diagram Fig. 1).

Modification Details

Change first IF amplifier V3 to a mixer stage. Build in new BFO at 85 kc with switch for upper and lower side-band selection.

Use existing BFO V9 as a second oscillator by tuning 85 kc above or below the first IF signal, which is easily accommodated by the core. Possibly fit another IF amplifier (see later in text), and modify power supply and fit VR tube.

Second Mixer

In the writer’s case a 6K8 was used in the 2nd mixer position (see Fig. 2) as it was then unnecessary to change the valveholder. But one of the more modern valves could be used here, which would probably give a better conversion gain and signal-to-noise ratio, and any frequency changer circuit would be required. If the 6K8 is used very few component changes are required. Reference to the diagram of the frequency changer V2 will show these, and as the base connections of the 6K8 and 6K7 are similar, this involves the minimum amount of work. It must not be forgotten to remove the cathode resistor R24 from the RF/IF gain control and connect it directly to the chassis. The coax cable coming from the existing BFO, V9, is removed from the diode of the 6Q7, V5, and connected to grid 1 of the triode section of the 6K8—see Fig. 2.

The BFO

The condenser C47 is removed (see Fig. 3) and it will be found that the existing hole will fit an IO valveholder. A 6J5 is fitted here as the BFO valve. An Electroniques HSO-85 oscillator unit was used and this can be mounted on a bracket under the valveholder. C47 can be replaced underneath the chassis with a physically smaller 8 µF condenser, preferably one having wire ends to facilitate fixing. The 6J5 valve should be fed from the stabilised supply.

The BFO on/off switch is removed and replaced by a small two-pole three-way rotary switch which gives BFO-off/on-LSB/on-USB. The capacity used here to switch sidebands can be between 200-300 µF. This is fitted across the switch and connected to the coil by a short length of coax.

Existing BFO as Second Local Oscillator

It is advisable to drop the voltage to V9 down to 40 or 50 volts, as the writer found spurious signals on the higher frequencies due to the injection voltage to the mixer being too high. The dropping resistor can be 30K to 50K, just giving enough voltage to maintain oscillation. This can be adjusted for optimum signal-to-noise ratio. This valve should also be fed from the stabilised supply.

The last two 1.6 me IF transformers are replaced by 85 kc types. Electroniques D IF 1/85 can be used and V4, now the first IF amplifier, connected into the AVC line. The cathode should also be connected into the RF gain control line.

Block diagram of the S.640 as modified.
This completes the first part of the modification. In the writer's case, for some time the receiver was used with only one IF amplifier. The performance was very satisfactory, although the audio gain control had to be kept well up, but the receiver was quite sensitive and the signal-to-noise ratio was very good.

It is thought that one IF amplifier is probably enough, especially if the 6K7 was changed to a valve having a higher mutual conductance, possibly a 6BA6. If more gain and selectivity are required, then a second IF amplifier can be put in. However, it is well worth trying the receiver for a while with just the one IF amplifier.

If, however, a second IF amplifier is thought necessary, space will be found behind the double-diode-triode V5—see S.640 manual. Slight rearrangement of components below the chassis will be necessary to make room for the valve base. In the writer's case an EF92 was used here but the choice of valve can be left to individual preference.

**Power Supply**

The extra load on the mains transformer due to having two more valves in the heater chain can be lessened by using two germanium diodes to replace the 6H6, V8. These can be soldered across the tags of the valve holder and no wiring changes are necessary. The rectifier V7 can be replaced by two BY100's and the existing valve holder used for the VR-150/30 stabiliser.

On the HT side the mains transformer in the writer's S.640 is running well within its limits and will supply the extra current without any trouble. When the receiver was used with just the one IF amplifier the power supply was not modified, and no VR tube fitted. This did not seem to detract in any way from the performance. To conserve current at that time the 6V6 output valve was replaced by a 6J5 (direct plug in) and this helped to compensate for the extra heater current of the BFO valve.

**Alignment**

No problem should be encountered aligning the receiver, once the second IF has been set on frequency. Alignment procedure is as stated in the Eddystone S.640 handbook except for the second oscillator, which is tuned 85 kc above or below the first IF channel, i.e., the crystal frequency. The existing BFO pitch control should be left in mid-position.

It will be found that the selection of upper and lower sidebands is dependent on which side of the signal frequency the local oscillators are set. This can be a complex feature of double superhets, so it is advisable to tune in an SSB signal—say, on 80 metres—and see in which position of the Sideband selector switch is can be resolved. This, then, is the lower sideband and the switch can be labelled accordingly.

Later, an IF gain control was fitted. This was done by removing the mains on/off switch and mounting a 10K potentiometer in its place, the earthy end of this control being taken to chassis through the standby switch, so that the IF amplifiers are inoperative during transmission periods.

To replace the mains on/off switch the 500K audio gain control was changed to one having a double-pole switch fitted, this now serving both purposes.

This discussion is not a wire-for-wire circuit description, so the additional components and valves can be left to individual choice—but it is hoped that it will provide food for thought and perhaps a few ideas for readers who own an Eddystone S.640 and are dissatisfied with it, or possibly those who have a receiver of line up similar to the S.640.

**For Small Advertisement Bargains in this Issue, see pp.759-768**
SOMETHING ABOUT REED RELAYS
WHAT THEY ARE AND HOW THEY WORK

It may have been noticed that, through the national press and such of the technical journals that could be persuaded to take an interest, the Post Office have been making "something of a Thing" about their projected new electronic telephone exchanges. One complete working example is now operating, as a pilot exchange, at a small Derbyshire town, Ambergate. It is in fact the first all-electronic exchange to be in regular commercial use anywhere in the world—hence, the G.P.O. is quite justified in claiming this as significant progress in telecommunications.

The all-electronic exchange is not only very fast, entirely automatic and potentially wholly unattended, but it also involves the minimum of maintenance—it should, in fact, operate virtually indefinitely without human intervention at the exchange itself.

Fundamentally, this is made possible by the simple device known as the reed-relay—which in itself has been available as an electric switch for all of 30 years. The reed-relays at Ambergate supersede the relatively ponderous and slow-moving electro-mechanical switches still in general use—devices which, in comparison with the reed-relay, are large and heavy, electrically vulnerable and mechanically unreliable, thus calling for constant attention and a great deal of maintenance. (When your telephone goes out-of-order it is nearly always because your switch on the main-frame at the local exchange needs attention.) These old switches are also very slow-acting compared with a reed-relay system, by which circuit changes can be made in 1/20th of a second.

Illustrated here are the essentials of a reed-relay. At (A) is a single-circuit element, having a contact-overlap of .015in. and a gap of .005in., made simply of nickel-iron wire in a 50/50 mix, the flattened contact tips being gold-plated. Each reed unit is sealed into a small glass tube filled with nitrogen. At (B) are two such circuit elements, making a double-circuit contact set in a single mounting.

How It Works

If now this unit (B) is inserted into the electromagnetic coil (C), and a current passed through the coil, the field so caused will produce opposite polarities in the reeds, and the tips will snap shut. Immediately the coil energising current is cut (there is no iron in the field except that of the reeds themselves) the gap opens again to break the circuit. It is as simple as that!

Very high switching speeds are possible and, because the elements are sealed units in an inert atmosphere, their working life is of the order of many millions of operations. Being cheap and easy to manufacture—it is reported that Ericsson Telephones (Plessey) at Beeston, Notts., now make reed-relays at the rate of several millions a year, with an eventual manufacturing capacity of about 140,000 per day—the failure of a unit is easily and quickly rectified by the insertion of a new one.

These reed-relays have, of course, only a small power handling capacity—indeed, that is all that is needed in a telephone switching system, which involves only low-voltage, small-current circuitry. That they have many applications in the radio amateur context, particularly in transistor circuits (themselves high-speed devices), is obvious, and it is equally clear that it will not be long before reed-relays are pretty cheap and easy to find in the electronic shopping.

Our notes here are primarily to describe the reed-relay, and how it works as a circuit make-break, for those who may not have encountered the device—there are many readers who will already know all about it, and how it is used in the highly sophisticated circuitry of the modern automatic electronic telephone exchange.

THANKS, INDEED!

We would like to thank those many readers who sent personal messages of greeting, encouragement and support for the New Year. All this goodwill was very much appreciated—and even A.J.D. came in for a little sympathy and some messages of good cheer! Tnx everybody.
BOOK REVIEWS

For The Examination Student

CANDIDATES for the Radio Amateurs’ Examination have long felt the need for a text-book which would give adequate coverage of the syllabus—and little, or nothing, else.

The essential information has always been available, by a process of selective culling from various texts, and the possible combinations of titles probably exceeds the number of R.A.E. course lecturers in the U.K. However, selective reading is really only practical under the guidance of an experienced teacher, and in any case is a time-consuming process as part of a formal course, whilst the lone student, making a “cold” start, can hardly be expected to know by instinct which book is best on which subject, or even how deep any given matter should be pursued. Thus, there is a real need, which is handsomely met by the volume under review—Amateur Radio, by F. G. Rayer, G3OGR, a frequent contributor to the Magazine—both as the “set book” for formal courses, and as the text for the lone student.

The only serious criticism that can be levelled against this work, in the context of the Radio Amateurs’ Examination, is the absence of a short chapter on the use of semiconductors in Amateur Radio—this now being part of the syllabus. However, to be fair, it must be said that, to date, there have been very few questions set in the examination which require any deep knowledge of transistors, and certainly no student need fear failure because of this gap in his knowledge. Another, possibly less serious, shortcoming, at least as far as your reviewer is concerned, is the absence of a chapter on examination technique, a matter in which many good candidates leave themselves woefully unready.

Your reviewer has every intention of using Amateur Radio as the basis of his R.A.E. course in future years; students who have it say they find the style admirable and easy to understand, so that the process of reading their lecture notes and trying to bridge the awful gap between what the lecturer said and what the student remembers is greatly eased—a matter of some importance with a syllabus that is distinctly “tight” on the usual basis of one evening per week for one winter session.

It may be argued that the price is a trifle steep for a work of this nature; the answer to this, of course, is that the cost of 31s. 6d. is trifling in the context of the pleasure one gains from the possession of an amateur licence—and even more so in the “last few minutes” when one can reflect that, at least, the preparation for the coming Exam. has been tailored closely to the syllabus, and hence to the likely questions on the paper.

*   *   *

The Radio Amateur Examination Manual, an admirable booklet, has recently been re-issued in a new edition which takes account of the changes that have occurred in recent years. Used in conjunction with G3OGR’s book, Amateur Radio, it should be possible for any student lacking other works of reference to prepare himself adequately for the examination. The large number of “model answers” and the even larger collection of questions, mostly taken from past papers, should enable the student adequately to assess his ability to deal with whatever horrors the examiner may decide are necessary to weed out the sheep from the goats.

As for the authenticity of the information given, one can only remark that G3BWQ and G5MP are old hands at the business of getting candidates through the examination, and, indeed, your reviewer would suspect that G3BWQ alone has a score of several hundred passes to his credit over the years.

To sum up, it can be said that these two works should be on every amateur’s bookshelf, to show his SWL visitors when they ask how they should set about the task of getting themselves on the air, and on every SWL’s bookshelf for really hard use during the time of preparation for the R.A.E.—your reviewer’s copies are already becoming dog-eared from overwork!

E.P.E.

Note: Both books mentioned here are available from the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. Prices, post free despatched on receipt of order, are: Amateur Radio, 31s. 6d., and Radio Amateur Examination Manual, 5s. 9d.

FRONT COVER—JANUARY ISSUE

We are asked to point out that the caption for the KW-2000A Transceiver illustrated on January’s front cover should have read “... 180 watts p.e.p. operation on all amateur bands 10-160 metres, complete for £220 inclusive ...” And a very nice piece of equipment it is, too, capable of holding its own on the DX bands on either CW or telenhony. We understand that the KW-2000A is available on hire-purchase, and is being found a very good investment by its users, now numbered in all parts of the world. Of course, some “local expert” can always be found who will be able to point out that it lacks some feature or capability that he considers essential or would prefer—but the test is always how it performs in the hands of the average operator interested more in results than in theoretical musings.

REMEMBER THAT YOU CAN ORDER ...

A single copy for the month direct from us, for despatch the day before publication, which is the last Friday of the month. For a copy of the March issue, publishing on 24 February, send a P.O. for 4s. to arrive by Wednesday, 22 February, with a note saying simply “March issue, pse.” Address: Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. (This will be the one that has the Index to the last volume.)
TRANSPORTORISED VOX UNIT

S UITABLE FOR ANY TYPE OF SIDEBAND TRANSMITTER

S. F. BROWN (G4LU)

The unit to be described was constructed specifically as part of a transistorised SSB unit for two metres, which has been under development at this station for some time, but there is no reason why it should not be equally useful for any transmitter whether it uses valves or transistors. For the latter, power is switched electronically but for valve stages indirect switching by mechanical relays can be used.

Basically, all a Vox unit does is to switch on the transmitter whenever the microphone is energised but in practice it is necessary to incorporate other refinements. Obviously the switching-on should be done as rapidly as possible, and this is quite easy to arrange, but in normal speech there are quiet passages between syllables, words, and sentences, and it would be quite disconcerting at the receiving end if the transmitter were always to switch off at these instants. Therefore, in a good design, some switching-off delay must be provided. The extent of this delay will vary with the characteristics of the operator’s voice, his rate of talking, and whether he has natural breaks or can keep up fluent conversation. To meet all these eventualities the delay will need to be adjustable. Also, since most operators dislike headphone listening, operation of the Vox by direct pick-up from the loudspeaker must be prevented, i.e., Anti-Vox. In addition, a push-to-talk facility, over-riding the Vox operation of the Vox by direct pick-up from the speaker coil circuit of T2, via a gain control, VR1. The output of Tr1 is transformer coupled to a voltage doubler rectifying circuit comprising capacitors C3, C4, diodes CR1, CR2, and load resistor R5. Difficulty was experienced in finding a transformer of T2, which has a voltage step-up ratio of 1:9, feeds a similar voltage-doubling rectifier circuit, but with reversed polarity output to the previous one. The outputs of the two rectifier circuits are balanced against each other in the resistors R6, R7, and smoothing provided by C7 ensures that the net voltage output follows the speech envelope. Normally, when the microphone is not being spoken into, VR1 is adjusted so that the direct input from the receiver is just balanced by that from microphone pick-up, or slightly more so, resulting in either zero or a small positive net output from the rectifiers. Diode CR5 prevents any positive voltage getting through to the base of transistor Tr2, thereby avoiding damage if this were to exceed its reverse voltage rating. Thus, Tr2 has zero input and is cut-off.

When the microphone is spoken into, usually at a much higher level than the pick-up from the receiver, the voltage at the junction of R6, R7 goes negative and CR5, being forward-biased for this polarity, transistor Tr2 conducts. As Tr2's collector load is fairly high the collector potential falls from the full supply voltage to zero with every burst of speech. Capacitor C8, which has remained uncharged whilst Tr2 has been cut-off, now charges rapidly to almost the full line voltage through the forward resistance of diode CR6. The requirement for this diode is that it should have a high backward/forward resistance ratio, and although diodes are made specifically to do this work, any of the types specified work satisfactorily—and are cheap. C8 can only discharge slowly through resistor R10 and the variable control VR2, which sets the delay. With the designated values a delay up to five seconds is obtainable. When C8 is uncharged, the junction of resistors R10, R11 will be at -12 volts potential and transistor Tr3 will be in a conducting state while transistor Tr4, since it derives its base drive from the latter's collector, will be cut off. When C8 charges up, Tr3 is cut off and Tr4 conducts, both remaining in these respective states for the delay period unless further speech passages keep C8 charged. The change-over of Tr3, Tr4 takes place rapidly due to the action of the common-emitter resistor, R14, the circuit being.

Circuit Discussion

Reference to the circuit diagram will show how the factors in mind have been incorporated in the design. A convenient level of audio signal (1-2 volts peak) is taken from the speech amplifier, through a control switch. A high value feed resistor, R1, avoids an undue load being imposed on the take-off point, and the loss of gain is restored by the amplifier stage, Tr1. The output of Tr1 is transformer coupled to a voltage-doubler rectifying circuit comprising capacitors C3, C4, diodes CR1, CR2, and load resistor R5. Difficulty was experienced in finding a suitable transformer for T1, but a standard Radiospares component, type TT6, was rewound with a secondary of 860 turns of 40 gauge enamelled wire. The Anti-Vox input is supplied from the loudspeaker coil circuit of T2, via a gain control, VR1. Transformer T2, which has a voltage step-up ratio of 1:9, feeds a similar voltage-doubling rectifier circuit, but with reversed polarity output to the previous one. The outputs of the two rectifier circuits

Table of Values

<table>
<thead>
<tr>
<th>Circuit of the Vox Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>C1</td>
<td>8 µF 16v.</td>
</tr>
<tr>
<td>C2</td>
<td>32 µF 6v.</td>
</tr>
<tr>
<td>C3, C4</td>
<td>2 µF 6v.</td>
</tr>
<tr>
<td>C5, C6</td>
<td>10 µF 16v.</td>
</tr>
<tr>
<td>C7</td>
<td>32 µF 25v.</td>
</tr>
<tr>
<td>C8</td>
<td>32 µF 25v.</td>
</tr>
<tr>
<td>CR1</td>
<td>CR2, CR3, CR4, CR5, CR6</td>
</tr>
<tr>
<td>R1, R6</td>
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</tr>
<tr>
<td>R7, R16</td>
<td>27,000 ohms</td>
</tr>
<tr>
<td>R8, R10, R13, R17, R19</td>
<td>100,000 ohms</td>
</tr>
<tr>
<td>R11</td>
<td>5,600 ohms</td>
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<td>R12, R15</td>
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<td>R13</td>
<td>150,000 ohms</td>
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<td>R14</td>
<td>180,000 ohms</td>
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<td>R19</td>
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<tr>
<td>VR1</td>
<td>10 ohms</td>
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<tr>
<td>VR2</td>
<td>330,000 ohms</td>
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<tr>
<td>T1</td>
<td>TT6 Radiospares</td>
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<tr>
<td>T2</td>
<td>TT4 Radiospares</td>
</tr>
<tr>
<td>TR1</td>
<td>BY100, or similar</td>
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<tr>
<td>TR2</td>
<td>C81DM</td>
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<tr>
<td>TR3</td>
<td>C82</td>
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<td>TR5</td>
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<td>TR18</td>
<td>C97</td>
</tr>
<tr>
<td>TR19</td>
<td>C98</td>
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</tbody>
</table>

Notes: All resistors are rated half-watt. For the transistors specified similar types may be substituted. Construction can be on slips of V-roboard.
of course, the well known Schmitt trigger. Every time Tr4 conducts base drive is applied through R16 to transistor Tr5, which gates the supply voltage to the controlled stages in the transmitter. A 2N2807 transistor was used here, because it was available but the type is not critical. Many of the n.p.n. computer switching types, provided they have a low saturation voltage and adequate current capacity for the controlled stages, would be suitable. As a matter of interest the voltage loss in the 2N2807 is 0.3 volts. If approximately 12 volts is sufficient, the voltage on the control line can also be used as muting bias on a conventional valved receiver, or if a transistor receiver is employed, requiring a negative supply when the transmitter is off, a similar gate driven from the collector of Tr3 would meet the need.

Relay Considerations

Unfortunately solid-state techniques, at least for the average amateur, have not yet reached the stage where the mechanical relay can be replaced for aerial change-over purposes, particularly for VHF applications. In addition, if some of the later stages of the transmitter are valved, it may be desired to carry out some ancillary functions by means of relays. The additional stage, Tr6, was therefore included with this in mind. Tr6 conducts when base drive is applied from the control line via R18 and the relays in its collector circuit will operate. With the component values given there is adequate current to operate a rewound Londex coaxial relay (60 ohms resistance) or a 300-ohm Type 600 telephone relay. Greater or lesser current requirements may call for some adjustment in the value of R18. Inductive spikes, produced when the relays are being de-energised, are prevented from damaging the transistor by the protective circuit comprising diode CR7 and condenser C9.

A push-to-talk (p-t-t) facility is provided by earthing the collector of Tr4 but if this is used merely to over-ride the Vox, the delay will still be operative when a speech passage precedes immediately the release of the switch. To avoid this the input switch should be off when the full p-t-t operation is required.

Constructional Points

The components for the unit discussed here can easily be accommodated on a 6in. by 2½in. board which can be fabricated using one of the readily available printed-circuit kits. Those who do not like playing about with corrosive chemicals would find that the Cir-Kit system of stick-down wiring strip makes a professional looking job. Alternatively Veroboard can be used. Layout of components is not critical but a functional layout based on the
circuit diagram will be found convenient. For board terminal points the writer favours Vero board push-through pins, which can be soldered to the board conductors and also the external wiring. If easy removal of the board from the transmitter assembly is required, it has been found that the tubular contacts from some B7G and B9A valve holders make convenient push-on connectors for the Vero pins.

ANOTHER OLD TIMER PASSES

We very much regret to have to record the death of Edgar James, GW5TJ, of Merthyr Tydfil, Glamorgan, South Wales, at the age of 66. He was licensed in the early 1920's and was one of those who started first on the then amateur band of 440 metres, in the days when the 180-metre band (which we could also use) was considered going pretty HF. GW5TJ was the local cinema proprietor and was well-known in the South Wales valleys. In later years, he became regularly active on the HF bands, always with the most up-to-date gear, and most recently he was on 80-metre SSB. He was a pleasant and friendly character, with a real interest in Amateur Radio. His funeral at Cefn Coed, near Merthyr, on December 15 was attended by GW5BI and GW8NP, both of Cardiff, representing the amateur fraternity.

THERE IS NOT MUCH . . .

In the way of equipment for the amateur bands that you cannot buy, sell or exchange through our Small Advertisement section—which each month carries by far the largest spread of small advertising of Amateur Radio interest. Indeed, we are often told (too often, for the Editor's amour propre) that "I only buy the Mag for the small ads"! (Gurkh.) This, in spite of all the toil and effort that goes into . . . oh, well, never mind.

Our Small Advertisement section is essentially a reader service—as such, it shows us no profit because the rate charged barely meets the printing cost—so we do ask that reader small advertisements should be carefully drafted (which saves space and money), using the accepted abbreviations and printing conventions (which saves time). If you are in any doubt about how to cost your insertion, send it in and we will do it for you—but it is easy enough if you remember that the rate is 3d. a word (with abbreviations such as 'PA', 'mc' or "VFO' each counting as one word), with a minimum charge of 5s., including QTH. This allows for 20 words, to include address. It is no use sending in a 15-word notice with a cheque for 3s. 9d.—or a 28-word advertisement with a P.O. for 5s. (and a note saying "in capitals, p.s.e.") If by "capital's" you mean bold print, the correct term is bold face, and the charge is 25 per cent extra on the ordinary rate. All small advertising should be addressed, with remittance, to: Advertisement Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. Pse Note: We cannot in any circumstances take small advertisements over the telephone (if only because the terms and abbreviations involved can get hopelessly garbled in the transcription—it's not like selling a house, or a car), nor can we accept small advertisements without the — or, necessary, accompanying the copy. And do please write clearly, with name, call sign and full QTH.

OBSERVE THE DEADLINES

For each feature in which reader correspondence can normally be used, a deadline date is set to catch "the next issue." These dates are carefully worked out to (a) Give correspondents as long as possible between the appearance of the last issue and the latest date for the next, and (b) Allow us adequate time for the preparation of the feature. Because a later deadline may be given for a feature (say, "VHF Bands") it does not mean that date will also do for others. In general, we cannot take in late reports. If we waited for every last-minute report for each monthly feature, we would never get to press at all. It is a fact that every month there are late reports for all features, always accompanied by some comment such as "Sorry I'm late but perhaps you could squeeze this in." Well, unless it is something really earth-shattering to justify a Stop Press (with all the bother and expense that involves) we can't "squeeze things in"—so, please watch the deadlines, and address correspondence exactly as given for the feature in which you are interested.

The new Danavox balanced-armature microphone is available in five types, to give different frequency responses according to requirements, for load impedances varying from 2K to 1 megohm. The manufacturers state that these microphones are "recommended for use in miniature electronic equipment." . . .
THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for March Issue: February 3)

(Please address all reports for this feature to "Club Secretary," Editorial Dept., SHORT WAVE MAGAZINE, Buckingham.)

W HEN a Club is looking round for possible subjects for lectures—and hence for the people to deliver them—one of the fruitful sources which can easily be overlooked is the "practical" type of talk. As an example, there may not be many who can give a good talk on "Aerials" from a theoretical viewpoint; indeed, Dud Charman, G6CJ, has probably cornered the market in this particular field—and more power to his elbow—but quite likely there are several members of any local group who could, if pressed, talk informatively and well on the equally important practical arts of putting the things up and getting them to stay up. Again, there are many constructors of published designs of receiver or transmitters who have approached the practical side with "ways and means" aspect of building a published design on the kitchen table. One such friend of the writer's, who took up Amateur Radio late in life, solves many of the problems in unorthodox ways (like mounting his PA tank coil former on a Top Band transmitter by using two ordinary rubber bath-plugs as the basic means of support from a couple of brackets on the chassis).

As to the sometimes difficult matter of getting the selected victims to talk—well, now, this is a matter for the secretary and his powers of bribery, corruption or main force—but there is always the bait of letting them off the tea-brewing rota!

THE REPORTS

Brighton Technical College are the top of the pile this time (they just missed the deadline for December!), and we are pleased to hear that, after a certain amount of difficulty over accommodation, and the revision of the staff timetable, they have managed to restart. The venue is Room B.7, in the Engineering Department, at Richmond Terrace, Brighton, 7. Tuesdays, on a fortnightly basis, is the general idea, although they are not too explicit as to which ones—no doubt this can be resolved by any earnest enquirer.

Another academic institution to climb on to the bandwagon is Glasgow University, who held an inaugural meeting on October 14 last, and have since been in session on the second Wednesday of each month, in the Engineering Building of the University.

Liverpool University also has its Amateur Radio Club, meeting in the Union, also apparently on a fortnightly basis, for a formal affair with a lecture, run R.A.E. and Morse weekly, and have a merry throng in the shack at lunch-time each day—the shack seems to be well fitted out, with a KW-2000, an AR88 for the VHF gear, and aerials to suit.

Stockport had their AGM during December; their routine seems to be one of a monthly meeting with all the trimmings by way of a lecture or film-show, at the Blossoms Hotel, Buxton Road, Stockport.

It is pleasing to hear that all the effort put in, and reported in these columns over the past few months, has had the effect of raising interest in the activities at Southport; every Wednesday, before the meetings, G3OYK gives a spell of Morse tuition, which is being enjoyed both by the SWL and licensed members.

Another new entrant to our ranks is the Culcheth Amateur Radio Society, who held their first meeting on November 18, at the Harrow Inn, Culcheth, near Warrington, and elected a committee under the chairmanship of G3SAY. As for the meetings since then, the routine is a weekly affair, starting at 7.30 p.m., at the Harrow Inn, on Friday evenings.

Harlow mention a change of secretary as a result of the recent AGM; meetings in the Old Barn on First Avenue, on Tuesdays, with the Clubroom also open on Thursdays. Your conductor visited recently, and was promptly co-opted to the post of assistant stoker—so if you pay a visit, take your own shovel!

The home of the Hull and District gang is at 592 Hessle Road, upon which much attention has recently been lavished—albeit the club station, G3RMW, has not yet been installed. The programme shows a talk by G3NOP on Marine Procedure on February 3, a discussion on Workshop Practice slated for the 10th, while the 17th is set aside for G3FCY to expound on Transistor Converters. The high-light for the month is laid on for February 24, which is to be a Grand Open Night—all amateurs in the Hull, Beverley, and surrounding areas are invited.

A world-wide organisation of active nets is the thing that would justify the continued existence of WAMRAC (World Association of Methodist Radio Amateurs and Clubs), so what could be more practical...
than to set out to formalise their activities in the way of national and local nets. In the important matter of getting the business in hand really going, there are many local groups who could learn a lot of lessons from WAMRAC in the art of stimulating activity and interest.

* * *

One way of keeping a newsletter interesting is to stir up a good old controversy in its pages, and the Southgate group are doing just this. On the subject of membership and attendance, G3MBL harks back to the "old days," when the club ran an attendance of sixty-odd for each meeting—the snag being the amount of working time spent on Club Committee business! As for meetings, these are on a monthly basis, but the newsletter does not say which dates are booked, so a quick call to the secretary seems to be indicated.

East Worcestershire group have their being in the Old People's Centre, in Park Road, Redditch, and on February 10 the attraction will be a lecture and demonstration by the J-Beams firm—which should be quite a draw.

Surplus Sale on the first, AGM on the eighth, a programme of "Collectors Items" recordings on the fifteenth, the Annual Dinner and Dance on the eighteenth, and a Technical Film Show on the twenty-second of February. They must be made of tough stuff at Derby! These are all slated to take place at Room 4, 119 Green Lane, Derby, with a start timed to occur at 7.30.

Salop run a formal monthly meeting, on February 9, when they will hear a speaker from the Royal Signals, and an informal ragchew, which always takes place on the fourth Thursday of the month. Incidentally, your conductor was amused to read that they had a portable TV produced at their recent Hot-Pot Supper event—so the lads could watch the Miss World Contest!

On to Cambridge University, with the Wireless Society getting together at 8.15 on the evening of February 7 to hear Mr. Wiseman of the University Mathematical Lab., who will lecture on Computer Storage Systems.

As for the lads at Verulam, they are in session at the Cavalier Hall, Watford Road, St. Albans, on the third Wednesday in February (and every third Wednesday), this time to hear Arnold Mynett, G3HBW, talking about Semi-Conductor Devices; kick-off 7.30 for 8 p.m.

A new reporter this month is the Newham Radio and Electronics Society, who are "open for business" each Wednesday evening in the Vicarage Lane Youth Institute, East Ham, London, E.6, and who have a Club station under the callsign G3UVJ.

Contest Note

The Royal Air Force ARS are running an intramember restricted Contest, from January 1 to June 30, 1967; a point is claimed for each member worked on each band, and there will be a winner from the U.K. area and another from an area best designated as the "rest of the world." Second prizes will be awarded if there is an entry of more than eleven from either area.

A novel idea has cropped up in the Reading newsletter, which has a front page intended to be used as a publicity handout, complete with an application form for membership. If this is used, the club will supply a replacement—this should be a good wheeze for roping in the new recruits. The meetings of the group are held in St. Paul's Hall, Whitley Wood (off the Basingstoke Road), opposite the "Grenadier." On February 14, G8APH will talk about "Mishaps with Receivers," and on the 28th the subject is "Mishaps with Transmitters," the latter being handled by G3VMY.

At Mid-Warwickshire they have a visit to Bierley Radio Station fixed for February 13, and on the 27th, at Hq., the topic is to be "Thirty Years of Amateur Radio." The location to look for is at 7 Regent Grove, Leamington Spa, which is adjacent to the Town Hall.

Wakefield get together at Ings Road School at seven in the evening, on February 7, 21 and 28; on the latter evening they will be hearing the WIBB tape lecture on Top Band activity. As a (most important) sideline, an R.A.E. course is being laid on at Wakefield Technical College—anyone interested should contact the hon. sec. at the address in the Panel, or get in touch direct with the Principal of the College.

Over to Wolverhampton, where the "gravy" for the month of February will be at the meeting to be held on the 6th at the "Golden Lion" and takes the form of the G5PP lecture on "Mobile Operation." Anyone who knows Bob Palmer and his knack of radiating a fatter signal than anyone else—and what is more showing others how he does it—will realise these lads are in for an interesting evening.

As for Coventry, weekly meetings are the rule, and on February 3 they gather together at Hq. to hear a member of the local Astronomical Society giving a talk, while on the 10th there will be a Slide Show by the honorary secretary on the matter of his foreign travels. G.E.C., Coventry, have kindly provided the Film Show which is slated for 17th, and the month is rounded off by a talk to be given by G5PP.

Your conductor was rather amused to see what seems to be the AGM of AERE (Harwell) described in their Newsletter as the "Annual Christmas Pantomime and Booze-up!"—Well!

The December issue of the ARMS Mobile News was one of the best for some time; a review of the U.K.
Callbook which had your scribe, as the theatrical times would say, "rolling in the aisles," together with a thoughtful piece by G3BID, and a very good article on the topic of thief-proofing a car full of Amateur Radio gear.

Radial is always interesting, and RAIBC can be proud of it; this is an organisation which must take its officers something close to twenty-four hours daily to keep running at the pitch they do—and there must be many hundreds of invalid and bedfast amateurs and SWL's who bless the day RAIBC was formed. Incidentally, the description of a banana on p.12 of the December issue is one of the funniest things your conductor has come across in years.

Surrey Radio Contact Club get together at the "Blue Anchor," South Croydon, these days, and the feeling seems to be very much in favour of the new "Blue Anchor," South Croydon, these days, and the conductor has come across in years.

Incidentally, the description of a banana on p.12 of the December issue is one of the funniest things your conductor has come across in years.

MID-WARWICKSHIRE: K. J. Young, 180 Northumberland Court, Leamington Spa (26426).
NEWARK: G. Francis, G3TW, 93 Balderton Court, Newark, Notts.
NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax (4129).
NORTH KENT: P. T. Baker, 64 Latham Road, Bexleyheath (6855), Kent.
PORT TALBOT: H. Hughes, GW4GC, 20 Austin Avenue, Portcawl, Glam.
PURLEY: A. Frost, G3FQT, 62 Gonville Road, Thornton Heath, Surrey.
RAINBOW CLUB OF SCOTLAND: A. Barnes, GMLTB, 7 South Park Terrace, Glasgow. (75 D 0439-4808).
RAIBC: Frances Woolley, G3EWH, 31 Wagin Lane, Wigan.
REIGATE: D. Thom, G3NKS, 12 Willow Road, Redhill (45033), Surrey.
SALOP: W. Lindsay-Smith, 21 Kingswood Crescent, Cophorne, Shrewsbury.
SOUTHPORT: N. K. Waring, 33 Chestnut Street, Southport.
STOCKPORT: G. A. Pike, G3VYV, 32 Lawrence Avenue, Leitchworth, Herts.
Wolverhampton.
WORTHING: P. J. Robinson, G6KHF, 46 Hillview Road, Worthing, Sussex.
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil.
Cray Valley should be in session for their monthly formal meeting fairly soon after this issue is out, but unfortunately we do not have details at the time of writing; however, no doubt earnest enquirers will receive full information if they contact the hon. sec., at the address given in the Panel.

Welcome

New reporters to this piece are the Baden-Powell House Scout Amateur Radio Group, G3TGS, who will be spending the weekend of February 11-12 in camp at Lasham Air Scout Base. In addition, they get together each month—on February 16 for a session of "Hints and Kinks," by Alf Watts, and on March 16 for the Annual General Meeting, at Baden-Powell House. As a sideline, on April 3-5, they will be showing at the exhibition "Venture '67," at the Royal Exchange.

"Always something different" seems to be the formula adopted by the Newark chaps—and a very good formula it is—which leads them to say that there is a film show on the "South Sea Islands" in the programme for the near future. Their ZL3QH rose bowl was presented at the recent AGM to G3VJE, for his home-constructed RC Bridge. At the same time all officials were re-elected to serve another session of "Hints and Kinks," by Alf Watts, and Crawford.

Over at Purley, the month's formal meeting will feature a lecture and demonstration of Decca Navigator equipment by SWL Dave Carrier, slated for the 17th, with the usual "informal" at the Railwaymen's Hall earlier in the month, on February 3. Incidentally, Purley are one of the few clubs able to run two nets—Top Band on Sunday mornings on 1980 kc, and Four Metres on Wednesday evenings at 8.30, the frequency here being 70-32 mc.

The first of the month for the chaps in the Wirral, at Harding House, Park Road West, Birkenhead, who will be in solemn concave on the question of VHF/UHF, led by a member of Liverpool University Radio Club. There is also a possibility of a lecture on the 15th, the topic this time being the KW-2000A transceiver.

* * *

Nice to hear again from Yeovil, who have had an AGM; hence there has not yet been time for them to let us have details of the programme for the near future, but we are told that several talks are all but finalised. The Club station, G3CMH, has been in the wars of late but all is well now, and G3CMH is once again on the air. Yeovil is a Club who make a point of saying that both visitors and prospective members are welcome.

Another crowd who have recently had an AGM and Crawley; again this results in your scribe not having any firm details of the forthcoming events, other than the Annual Dinner, which is fixed for March 17, at the Crawley Forest Hotel.

One way to get over the problem of persuading the members to contribute to the newsletter is for the chap who acts as editor to do the whole job himself—and one cannot but admire the selflessness of G3FZL, who does this (on top of his many other duties) for Crystal Palace. However, we have no details of the matter in hand at the February meeting, nor of the date, so we have to refer any interested readers to the Panel of addresses.

No mistake about it where the West Kent group is concerned; they have a meeting on February 10 to sell Surplus Equipment, and on the 24th they are to see a film show and to discuss the important matter of Field Day—both these sessions being held at the Adult Education Centre, Monson Road, Tunbridge Wells.

Radio Club of Scotland have a 26-page issue of the GM Magazine to wade through before they find out that the editor has forgotten this time to mention their forthcoming events, or even say where the Club get together! However, a smart walk to the nearest phone should soon rectify the slip-up, and maybe by next time round we shall have sorted things out!

Worthing and District has managed to find a place for a Club workshop, and in future this means the meetings occur on a weekly basis, at the Rose Wilmot Centre in Worthing. The Annual Dinner is due to come off on February 25, at the Lennox Hotel, tickets being priced at 19s. 6d. apiece.

Ashton-under-Lyne are in business on Friday evenings each week, starting at 7 p.m. in Rooms F52 and F53 of Ashton College, Beaufort Road, Ashton-under-Lyne. This group has an R.A.E. class, Morse tuition, and various events all organised; a lively crowd by the sound of things. Pathfinder Radio Group tell us they are in the process of forming a Hemel Hempstead Radio Club, of which no doubt we shall hear more in due course.

At Chelmsford there are two groups—Chelmsford itself, and Marconi Apprentices, who seem to work in together to quite an extent. Chelmsford will be in session at the Club Hq., Marconi College, Arbour Lane, Chelmsford, at 1930 hrs on February 7, when it is hoped to run an inter-Club Quiz.

Film Shows are very popular, it seems, in Nottingham University, where the Spring Term

CLUB PUBLICATIONS

We acknowledge with thanks the receipt of the following Club Publications:

Wimbledon (QRK-5); WAMRAC (Circular Letter); Southgate (Newsletter); Derby (Newsletter); Verulam (News Sheet); RAFA (Newsletter); Reading (Newsheet); Mid-Warwickshire (News); Southampton (QUA); Wolverhampton (Newsletter); Coventry (Newsletter); AERE (Harwell) (QAV); ARMS (Mobile News); RAIBC (Radial); Surrey (Monthly News); Crawley (QUA); Baden-Powell House (Winter Newsletter); Wirral (Newsletter); Crystal Palace (Newsletter); Radio Club of Scotland (GM Magazine); Religate (Feedback); Cornish (Cornish Link); Ex-G Radio Club (Bulletin); Echelford (Newsletter); Northcourt (Newsletter); Aeronaught Centre, Oklahoma (Collector and Emitter); Foundation for Amateur Radio (Autocall); Radio Society of East Africa (QTC); and Sutton and Cheam (Newsletter).
Committee of the Wolverhampton Amateur Radio Society installed in office after the recent AGM. Front row: G3UBX (hon. sec.), G2YM (president), G6GR (vice-pres.); middle row: G3RVA (newsletter), G3SDE, G2FPR; back row: G3GUI (treas.), and SWL's Packham, Welsh, Northwood. We would think that, between them, they must make up a pretty strong body of officials.

Meeting List shows five radio sessions. No less than four of the five are devoted to "the pictures." The ones of interest to us are on February 2, February 16, and March 16. The odd date is February 28, when the group has a joint meeting with the Astronomical Society, which will be addressed by Frank Hyde, F.R.A.S., well-known amateur radio astronomer, and author of books on radio-astronomy for the amateur. All these meetings are timed for 8 p.m., in the Browsing Library, First Floor, Portland Building.

Having resolved the problem of "some place to meet," the Sutton Coldfield chaps have fixed the second Monday and the fourth Wednesday in each month, the venue being "The Fox," Walmley, Warwickshire; one of the meetings in each month seems to be given over to a lecture (as, for instance, in February, "Transistors") but which is the lecture meeting date we are not told.

This matter of a Hq. is always a difficult one to solve, the more so if the group has to go into a state of "suspended animation" for a period while the responsible officials chase around looking for somewhere. Even if a stop-gap place is available, as at Leicester, it is quite an achievement to be able to report a phase of expansion and improvement. At present, they meet on Sunday mornings at 10.30, and on Monday evenings at 7.30, and in addition have a dinner dance tee'd up at the Empire Hotel, on Saturday, February 4, to which, we gather, old and new members are very welcome.

Maidenhead have two sessions organised for February, at the Victory Hall, Cox Green, Maidenhead, at which they would be delighted to see visitors; 7.30 p.m. on the 6th and 21st of February is the set time, and tea and biscuits will be in evidence part-way through the evening.

Interesting Visits

The next letter on our clip comes from a group who seem to specialise in going places—last month to see the new gear at the Post Office Radio Station, Rugby, and now this month to look at the local STD Telephone Exchange. Members meet outside the Northampton Exchange door at 7.30 p.m. on the evening of Thursday, February 16.

Change of evening is notified by Reigate, to the second Wednesday in each month, at the George and Dragon in Cromwell Road, Redhill, and hence the February show will occur on February 8. In addition, on the 24th, at "Lakers Hotel," comes the main social event of the year, in the form of the Annual Dinner and Dance.

Now to Saltash, and here again is the fortnightly meeting theme—on February 10 a lecture is to be given by a Club member (your scribe will take short odds the victim doesn't know yet!), while fourteen days later their Steve Rance is to hold forth on Top Band Aerials.

The British Legion is "home" to the Chilterns group, who are in session on February 24 to hear Mr. G. T. Peck on Direction-Finding Techniques. If you want to look in on this one, and get the real gen, then the British Legion Club is to be found in St. Mary's Street, High Wycombe, and the start will be at eight sharp.

Wolverhampton seem to run their meetings in all sorts of places, and this month they have a talk on Mobile Techniques by Bob Palmer, G5PP, in the "Golden Lion" at 8.0 p.m. on February 6, while for the 20th, they revert back to the Hq. at Nechells Cottage, Stockwell Road, Tettenhall, for a discussion on Operating Procedure.

Addiscombe Amateur Radio Society has now formed itself, and can be found on the second and fourth Tuesdays in each month, at the Toe H Centre,
158 Lower Addiscombe Road, East Croydon.

Friday night is Grafton Night if you live anywhere in North London—they open at 7.30, start dishing up the tea at 8, and get down to business about 8.30 p.m. This month the programme includes G3KRH doing his “SWL Corner” stint on February 3, but for the rest of the month things are not settled yet.

Publicity Point

The Cornish crowd publish a delightful news-sheet called the Cornish Link, which this month carries a very interesting Club Project. In addition, this month there is a full and up-to-date list of members. Your scribe was saddened to find, from notes on the committee meeting held on December 16, that Cornish felt their publicity was not adequate. The reason we have mentioned in these pages before, and it is simply this—if you do not let us know what you are going to do during the month immediately after Short Wave Magazine comes out—then we cannot write it up! It’s as simple as that, and we hope that not only Cornish but others will try and give us a chance to do our best for them in these columns.

No meeting this month for Midland Amateur Radio Society, as they will be taking part in the Birmingham Boat Show, at Bingley Hall. On the other hand we have a note in from Worcester who are forewarning us of their Mobile Rally, which will be held this year at Upton-on-Severn, on July 16.

A third group from the same area is Bromsgrove, who have recently acquired a new shack—so on January 1 the members were turned loose to decorate the place. Seems a rather drastic way of getting rid of that New Year’s Day hangover! The formal meetings, for which they always endeavour to arrange some form of lecture, are held in the Co-op Hall, on the second Friday in the month. This month’s meeting falls on the 10th, and will be devoted to a talk and slide show, the subject of which will be the programme for the February meeting of the Sutton & Cheam Club, slated for the 21st, at the usual Hq. Aerials; and on the 21st they move to the Capitol ballroom for the Mullard Film Show and Lecture.

A Constructional Competition forms the programme for the February meeting of the Melton Mowbray group convene to hear this one is February 16. Such a novelty once in a while is nearly always the sign of a flourishing and active group; but your scribe suggests that a visitor or prospective new member would possibly be courteous were he to ring the Club secretary at the address shown in the Panel before joining this particular party. The Melton group, like any others, always are pleased to enrol new members.

It only remains for us to mention once again that when you write in February, you should give details of the March programme—which is what the readers are keen to find out—and always ensure that the name, address, and, if possible, telephone number, of the honorary secretary, are clearly marked, not just so that we can put them in the Panel for the issue concerned, but also to make sure we have our files as near up-to-date and as comprehensive as may be.

Deadline for the next issue is Friday, February 3, first post, addressed simply: “Club Secretary,” Short Wave Magazine, Buckingham.

Regular readers of “Short Wave Magazine” are in touch with all the latest trends, developments and ideas in Amateur Radio.
THE OTHER MAN'S STATION

THE subject of our feature this time is unusual, in that G8HX—owned and operated by Frank Bewley, at 116 Westfield Lane, Mansfield, Notts.—nowadays works Top Band only, where he is to be found most evenings.

Becoming interested in 1930 in what we remember as "wireless"—the start was with an 0-V-2 straight receiver—the next move was study for a sea-going operator's ticket, at the old Nottingham Wireless School, where the instructor in charge was G6PZ (now of Weston-super-Mare). Though the required standard was reached, the final examination for the P.M.G. certificate was never taken, and instead a repair job was obtained at a local radio shop. About 1933, the Mansfield Radio Club (of which Frank is now the hon. secretary) came into his field of interest, with GSKG as the prime mover and source of inspiration. Inevitably, this led to an active SWL programme and then an AA ("artificial aerial") licence. The full radiating permit under callsign G8HX followed in 1936—and Frank was on the air on the 20- and 40-metre bands, using all of 10 watts off DC mains.

Came Hitler's War and (like G3BDQ, of "Other Man's Station" in the January issue of SHORT WAVE MAGAZINE) G8HX joined the Royal Air Force, was posted into Bomber Command and in due course found himself i/c the signals section, 106 Squadron, remaining with them till the end of the War—hence, he knows all about equipments like the 1082/1083 and the (good old) 1154/1155.

After demobilisation, he went back to radio and TV servicing and, getting G8HX on the air again, kept busy on the DX bands till 1949, with 44 U.S. states and 99 countries booked into the log. It was at this point in time that G8HX decided to specialise in 160-metre CW operation, and that has remained his main interest in Amateur Radio ever since.

The equipment as shown in our photograph consists essentially of a home-built 10-watt Tx for Top Band only, an AR88LF receiver and a frequency-checking unit. As regards the sky-wire, G8HX has been able to contrive a 150-foot run though he has only 40ft. or so of garden of his own available—the neighbours have been most co-operative in allowing over-flying rights across their property. G8HX adds that he has never had any BCI/TVI trouble.

Another active amateur interest at G8HX is photography—the picture that you see here is his own work. By the way, that nice-looking piece of equipment on the left-hand wall is called "Anita"—G8HX says he has her there because she "gives the station a little tone"—Oh, well!
NEW QTH'S

E4BK, T. Deegan, 7 Casement Avenue, Janesboro, Limerick.
G3VQA, R. Handley, 66 Croft Avenue, Penrith, Cumberland. (Tel. Penrith 2878.)
G3VRZ, H. de Lacy, 4 St. Agnes Road, Moseley, Birmingham, 13.
GW3VSM, W. Forbes, 57 Cwyrt Coch, Aberbargoed, Bargoed, Glam.
G3VSX, R. J. Scafford, 36 Beechcroft Road, Grantham, Lincs.
G3VTA, J. Lonsdale, 189 Broughton Road, Billingham, Co. Durham.
G3VUI, M. R. Harris, 20 Durham Crescent, Bulwell, Nottingham.
G3VUZ, P. Easingwood-Wilson, 28 Plane Street, Anlaby Road, Hull, Yorkshire, E.R. (Tel. Hull 506594.)
GM3YVF, A. C. Ross, 29 Boswell Loan, Edinburgh.
GW3VWJ, G. Westwood, 6 Ogwen Drive, Lakeside, Glasgow.
G3VLW, R. E. Kemp, 10 Pears Avenue, Grange Farm, Upper Halliford Road, Shepperton, Middlesex.
G3VXL, Miss P. A. Lonsdale, British Home, Crown Lane, Streatham, London, S.W.16.

CHANGE OF ADDRESS

G2CKW, J. L. Meddennen, 112 Farnaby Road, Bromley, Kent.
G2IQS, W. Walmsley, The Firs, 3 Trinity Close, Ashby-de-la-Zouch, Leics.
G2OK, D. Briggs, 51 Highlands Road, Fareham, Hants. (Tel. Fareham 4128.)
GW3EJR, J. B. Armstrong, Mayfield, Cardigan.
G3GPE, K. Smethurst (ex-9M6KS [9MSKS]), 8 Westfield, Wadsworth, Hebden Bridge, Yorkshire, W.R.
G3GTR, R. B. McKinty, 3 Rhanbuoy Park, Craigavd, Co. Down.
G3SYW, S. E. Stevenson, 399 London Road, Westcliff-on-Sea, Essex. (Tel. Southend 43118.)
G3HJM, D. Outram, Adaville, Hunwick Station, Crook, Co. Durham.
G3IUU, E. Briggs, 31 Blenheim Crescent, West Ruislip, Middlesex.
G3ILZ, T. E. I. Bromham (ex-GW3ILZ), Greenacres, Moss Lane, St. Michaels-on-Wyre, Preston, Lancs.
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G8LT, R. W. Addie, Spring Hill, Wappenham, Towcester, Northants. (Tel. Blakesley 321.)
MISPRINT CORRECTIONS

In the “Questions and Answers” article in the January issue, a grotesque misprint occurred on p.689, in the expression for Reactance. This should read:

\[ 2\pi fL, \text{where } \pi = 3.14 \]

and not as given. Unfortunately, this was not noticed till too late.

Another misprint, which was picked up after production had started, was in the callsign with the picture on p.667; in about half the distribution, this c/s went out as “G8YEK,” instead of G8YEK, as intended. (Your copy may have one or the other.)

We much regret both these errors, due mainly to the scramble in getting the January issue through the turmoil of Christmas—when, because of posts running days late and telephone lines being jammed, corners have sometimes to be cut.

CAN YOU HELP IN STAFFORDSHIRE?

Licensed amateurs with reasonable on-the-air experience and a couple of hours or so to spare each week can do a great deal to help local Squadrons of the Air Training Corps—which, provided as they are with R.A.F. signals equipment, need guidance and tutoring in its operation and maintenance. They should also have tuition in Morse. In the Staffordshire Wing of the A.T.C. there are no less than 17 Squadrons urgently requiring competent assistance. The ideal arrangement is where an amateur can go along to a Squadron and set up either his own rig /A or the Squadron equipment on the official A.T.C. network in the 4-5 mc range, for CW operation using the Squadron callsign.

The Signals Officer of the Staffordshire Wing of the Air Training Corps, i/c the A.T.C. W/T network, is Flg. Off. V. J. Reynolds (G3COY), 25 Yoxall Avenue, Hartshill, Stoke-on-Trent, Staffs. (home telephone S-o-T 44875, or Keele Park 371, extn. 128, during working hours). It is to him that those who feel they might be of some use should apply for details. As a footnote to this, it is perhaps worth mentioning that, following the Editorial in the March 1966 issue of SHORT WAVE MAGAZINE (those interested may care to look this up) a number of licensed AT-station operators came forward and are now doing valuable work as radio instructors with Squadrons up and down the country—to their own great satisfaction, as well as that of the A.T.C. boys. We can certainly vouch for G3COY’s own consistency and enthusiasm for what is essentially an out-of-hours and financially unrewarded service to youth and the community. Fortunately for us all, there are still people able and willing to undertake such commitments.

NOTES FOR THE DX FILE

In addition to 4X for Israel, 4Z is now another Israeli prefix . . . The new R.E.F. QSL bureau address (cards for amateurs in France and French territories) is Boîte Postale 70, 75 Paris 12°, France . . . The actual count of W/K licensed amateurs as at October 1966 was 277,604.
Short Wave Listening

PHILIPS PAPERBACK


This book is intended as a guide for the benefit of the increasingly large numbers of regular listeners to short wave transmitting stations and also for radio amateurs who are interested in short wave listening.

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The book, which deals with the possibilities and problems of short-wave reception on the level of popular science will enable the reader to discover a whole new world of his own.

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**JXK CONVERTERS (G3JXK)**

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**SMALL ADVERTISEMENTS, READERS—continued**

**SINGLE-COPY Orders for March Issue, appearing Friday, February 24, should reach us by Wednesday 22nd, with postal order 4s.—Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.**

**WANTED:** Unused vintage Rx. Enthusiast would be delighted to obtain, at any price, a trolleyboard R.1155 in original R.A.F. issue condition! An unpolished, very slightly modified specimen might be acceptable.—Rowbottom, 29 Legion Street, South Milford, Nr. Leeds, Yorkshire.

**OFFERING:** Complete AM/CW/SSB station, comprising Hallicrafters HT-32A/HT-41; Hammarlund HQ-170A; with matching speaker and Shure 4405L microphone. Also National NCX3/NCA and NCXDS station: Withers TW2, 6DS4 converter, neat home-built PSU and modulator. All items with new replacement valves, etc. What offers for Quick Sale? —Box No. 4412, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**WANTED:** A first-class receiver, such as Collins 510-A or 51-1, or the Sommerkamp 951—Any Collins equipment considered.—Kirkbride, 39 Byron Road, Colne, Lancs.

**SELLING:** R.107 receiver, coverage 1-2 to 17-5 mc for three switched wavebands, in really tip-top condition, with manual, at £13 10s., or some reasonable offer in that region.—Welsh, G3NW, 16 Road, Worcester Park, Surrey. (Tel. DEK 7020.)

**SPECIAL OFFER:** An R.C.A. AR88D in excellent condition, at £45. Tiger T.100 AM/CW transmitter, first-class rig in three-tier cabinet, £40. Both together for £75 and will deliver to 50 miles.—Miles, G5KDB, 28 Scotch Orchard, Brownfield Park, Lichfield, Staffs.


**OFFERING:** Heath SB-100E and SB-300E, as new, will separate.—Stagg, 2 Jackson Close, Easthamstead, Nr. Bracknell, Berkshire.

**SPECIAL OFFER:** An R.C.A. AR88D in excellent condition, at £45. Tiger T.100 AM/CW transmitter, first-class rig in three-tier cabinet, £40. Both together for £75 and will deliver to 50 miles.—Miles, G5KDB, 28 Scotch Orchard, Brownfield Park, Lichfield, Staffs.


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**FOR SALE:** National HRO, with SSB and nine tubes, price £20 on much offer—Baulch, 30 LiaS Avenue, Keyworth, Notts.

**SELLING:** Home-built copy KW-500 linear amplifier, with 813 PA, 1750-2000v. PSU, 10 silicon diodes, anode and grid meters, aerial relay, in grey hammer steel cabinet, £9. E.M.I. Audio Oscillator, 300 cycles to 10 kc, in ten switched positions, 40s. Command receiver, 6 0-70 Mcs. £25. Grey hammer receiver cabinet, size 17 x 19 x 12in. 20s. Matched pair OC22S, with 12v. 4-amp. transformer for transistor PSU, 20s. VCR-139A, new 12s. 6d. Collect or carriage extra.—Edwards, GJKGN, 126 Danescroft Drive, Leigh-on-Sea, Essex.

**UNUSED Gift:** Hamgär P.M.I. preselector, with PSU, circuit and instructions, new, price £6. Also Codar CR-45, in good condition, with coils and manual £5—Black, 27 Farmgate Prior, Bransgrove, Worcs. (Tel. Hanbury 235.)


**OFFERING:** Gone SSB: Elizabethan Tx, coverage 600-800 Mcs, complete with PSU, modulator, mic. phone and spares, £20 or near offer. Buyer collects.—Edwards, 2 Newlands Lane, Culvestone, Meopham, Kent. (Tel. Fairseat 508.)

**SOLD:** R-206, Mk. II. In excellent condition, very accurate, with PSU, nearest £25, delivered within 100 miles Bradford. Also "Practical Wireless" 3-transistor short-wave converter, 1-5 to 30 mc, fully built in wooden cabinet £5.—Sands, Highfield, Queenborough, Bradford, Yorkshire.

**FOR SALE:** Heathkit DX-40U, with VF-1U VFO and two xtals. 7025/7125, price £50. (Lines.)—Box No. 442, Short Wave Magazine, Ltd., 59 Victoria Street, London, S.W.1.

**SALE:** Hammarlund HQ-170, as new, £90. AR88D, in excellent condition, with S-meter, speaker, trimmers, tools, handbook and spare parts £100, T.W. two metre Tx, £23; T.W. two-metre nivistor converter, IF 24 to 26 mc, £10; both these as new, together £30. Home-built 100w. two-metre PA unit, simple plate circuit anode lines, £60, built-in PSU, fully metered, provision for plug-in modulator, £15. Aircraft Radio Corpn. VHF Tx type T-11B, brand new and very neat, £5. AVO Valve Tester, with manual, £5. Heathkit Slg. Generator, £12. Heathkit R/C Bridge, £10. Six-over-six slot-fed J-Beam for 70 centimetres, with balun, £3. FB5 multi-band antenna, with coax feeder, 40s. Hallicrafters SX-42 speaker in original cabinet, 30s. Goodmans Sin. speaker, 10s. Offers considered?—All items carriage extra.—Belcher, G3RM, Holmoyas, Courtmead Road, Cuckfield, Sussex. (Tel. Haywards Heath 4233.)

**SALE:** Panoramic Adaptor, type ALA-2, price £7 10s. Command Rx, 6.0-9.0 mc, £3 10s. Heavy-duty 6-phase centrifugal blower unit, £5. G.E.C. BC-349 receiver, 2 to 20 mc, with mains PSU, £20. Tunable IF converter, 23 to 26 mc, output at 1-6 mc. £3. Transistor inverter, 12v. to 250v. at 80 mA. 60s. BC-644 units, modulator, power pack, F.M. and driver, £4. T.T131 power pack, £4. T.T281, £10. T.W. Valves: 811, TZ40, 813, 24G, RG1/240, 10s. Four-band skeleton slot 70-centimetre aerials, 50s. Also a 40-element stack, for use with Type 104 push-on generator, £9.—Sharrock, GSBN, The Poplears, Delville Avenue, Keyworth, Notts. (Tel. Plumtree 2624.)

FOR SALE: Lafayette KT-320, as new, professionally built and aligned, with speaker, price £20. —Marriott, G3VWC, 21 Thorley Hill, Bishop's Stortford (4766), Herts.

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