3/6

The SHORT WAVE Magazine

VOL. XXIV FEBRUARY, 1967 NUMBER 12

JOYSTICK VFA turns PRO!

History repeats itself!

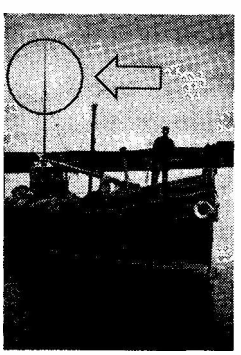
Throughout the development of radio communication the keen private experimenter has contributed largely to the advance of our science. The amateurs of the thirties pioneered reliable shortwave transmission and reception. Basic theories and their practical application are to this day latched in the fertile minds of ingenious men who are the leading amateurs of our time.

The Joystick Aerial System can now be regarded as the perfect example of a purely amateur development "turning professional." Thousands of Joystick variable frequency aerial systems have been sold. The enormous number of enthusiastic testimonials that have accumulated at the Joystick factory are now in themselves calling for a separate filing room! The continuing success of the VFA has not only spread right round the world but has finally penetrated the barrier of professional and official circles. Professional bodies in the U.S.A., Europe, Africa and the Far East have ordered VFA systems for operational use and for experimental work. Security forbids the whispering of names but clearance has been given to mention the Nigerian Police and an Australian fire control organisation.

In the Scottish fishing boats which have installed the system communication with other ships and shore stations has become considerably more reliable over difficult paths.

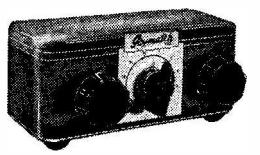
This VFA system is a remarkable invention and its unique quality of high performance at any selected frequency from 1 M/c. to 30 M/cs.—particular from difficult locations—has radically changed the attitude of both the licensed amateur and the shortwave listener towards their aerial problems.

Each Joystick VFA system is complete with a Joymatch matching unit suitable for each type of operation.

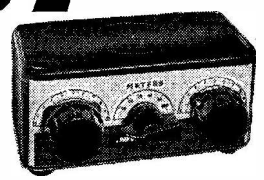


Scottish Fishing Boats. Aerial Problems solved!

The Joystick aerial was successfully subjected to the most rigorous tests under appalling weather conditions aboard the MFV *Crystal Sea* OB104 and the MFV *Margaret Ann* OB79 out of Mallaig. Previously the old-fashioned wires had to be lowered every time the ships' derricks were used. Communication with shore stations and other ships was consistently good.

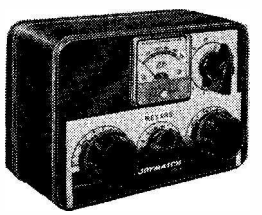


Joymatch Type 2A — General medium wave coverage extending over short wave spectrum.

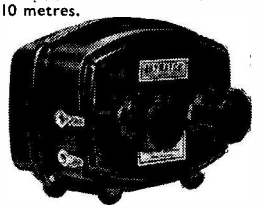


Joymatch Type 3A — General short wave coverage for SWL. Bandswitched for amateur bands.

Joymatch Type 4 — (Similar to Type 3A) For transmission and reception. Bandswitched on 160–10 metres.



Joymatch Type 4RF — For transmission and reception on 160–10 metres. Includes RF meter for peak efficiency.



Joymatch Type 3 — General shortwave coverage SWL (Junior model).

You cannot afford to ignore the potential of the Joystick VFA. The system is simple to use—the Joystick VFA will clip to a chimney, tree or mast, can be laid upon a pelmet, stood in the corner of a room, will even give a good account of itself in a basement.

Mobile Joystick systems are available and a new marine model has been introduced for the nautical types!

You are strongly recommended to contact the Joystick factory immediately (or one of our agents) for a brochure with full details.

U.K. AGENTS:

G. W. Smith & Co. (Radio) Ltd., 3 Lisle Street, London, W.C.2.
Stephens-James Ltd., 70 Priory Road, Liverpool, 4.
Chas. H. Young, 170/172 Corporation Street, Birmingham, 4.
R.S.C. (Manchester) Ltd., 326 Argyle Street, Glasgow, C.1.
(and all branches) or ask your local dealer.

Overseas:

France: Vareduc-Cominex, 2 Rue Joseph-Riviere, Paris, Courbevoie, France.
Scandinavia: Permo, Nygaardsgaten 42, Fredrikstad, Norway.
West Germany: Ing. Hannes Bauer, 86, Bamberg, Hornthalstrasse, 8, Stotz & Goessl, 8 Munchen 15, Bayerstrasse 3.
and World Wide Agencies.

U.S. Patent No. 3274600
S. Africa Patent No. 63/4389
U.K. and World Patents applied for.

Post this coupon in the morning—without fail!

PARTRIDGE ELECTRONICS LTD.

Caister House, Prospect Road, Broadstairs, Kent.

NAME ..... Call Sign .....

ADDRESS .....

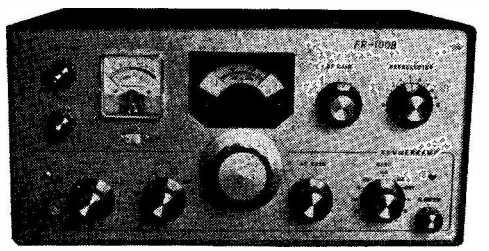
.....

..... SWB

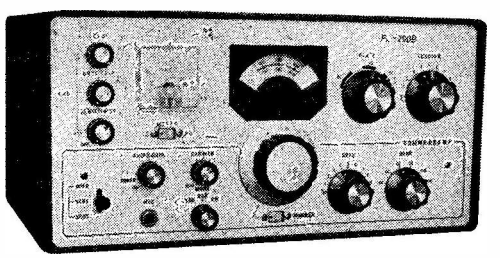
J. B. LOWE

51 Wellington Street, Matlock, Derbyshire

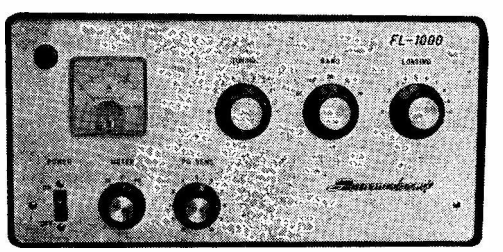
Tel.: Matlock 2817 (or 2430 after 6 p.m.)



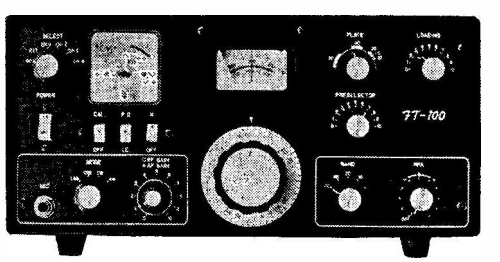
FR-100-B Rx. 80–10, mechanica and crysta filters, 4, 2·1 and 0·5 kc/s. Better than ½ UV for 10 dB S/N. **£112.0.0**



FL-200-B Tx. AM/CW/SSB. 240W. p.e.p., 100W AM. VOX, PTT, Break-in CW. Sidetone monitoring. Connectors for transceive with the FR–100–B supplied. Note :—The 6JS6A finals are the same electrically as the 6HF5 so the power ratings are **conservative.** **£130.0.0**



FL-1000 Linear. 4–6JS6A's for a legal 400 watts p.e.p. OUTPUT. **£90.0.0**



FT-100 Transceiver. 150W p.e.p. all transistor except driver and P.A. 13″ x 6″ x 10″ deep. **£180.0.0**

FULL DETAILS ON REQUEST

As the temporary import surcharge has been removed, I am happy to say that I can reduce the prices of Sommerkamp gear as shown, and I honestly can't think of better value for money.

Also in stock at time of going to press :—

RECEIVERS :

New

LAFAYETTE HA350, HA55A aircraft receiver, NATIONAL NC190Y, special price (£97 normally) **£75**

Second-hand

REDIFON R50—A magnificent thing, but it nearly fills the shop ! The owner wants **£75** for it, but somebody please, please make an offer before it grows roots.

EDDYSTONE 358—I seem to have cornered the market ! I have some good ones at **£20.** I know they are pretty dreadful, but surely must be worth the price.

NATIONAL NC77X—Mint **£20**
NATIONAL NC121—Mint **£30**
HALLICRAFTERS S120—AI **£18**
HRO—Unmarked, 9 coils, a beauty **£25**
MARCONI CR150 double diversity with Marconi I kc/s. and 2 kc/s. filters. Will fit into an average ballroom quite nicely **£35**
RAI—AI **£35**
KW77—AI **£75**

EDDYSTONE 740—At **£25** these must be good value.

EDDYSTONE 840C—Mint. Magnificent looking even if the performance is only average. I always think of an 840C as biting into a large chocolate eclair and finding no cream inside ! ! However, lots of people buy them at higher prices than mine, so who am I to argue **£40**

CR100—Performance O.K. but tuning mechanism occasionally slips **£10**

HALLICRAFTER SX24 SKYRIDER DEFIANT—Tired but still defiant **£10**

HAMMARLUND SP600JX—Very, very few Rx's do I enthuse about, but this is one of them. I have a bunch of unmarked beauties at **£95** each and worth every penny of it.

TRANSCEIVERS :

New

NCX5 Mk. II, Swan 350, KW2000, Tokai 28·5 mc/s. walkie talkies **£10.10.0**—pretty much the same as any other, but maybe a bit better and a bit cheaper.

TRANSMITTERS :

KW500 LINEAR—AI **£50**
HAMMARLUND HX50—160–10 ... ... **£80**
TIGER 100—AI—160–10 ... ... **£45**
HEATHKIT DX100U—AI—160–10 ... ... **£45**
NEW—CODAR AT5

ODDS AND ENDS :

NOMBREX TRANSISTOR SIG. GEN.—Mint **£7**
KYORITSU GRID DIP METERS—New **£12.10.0**
BUG KEYS—New **£4.10.0**
ELECTRONIQUES HAM BAND COIL PACK QP166 Mk. VI, new **£12.10.0**
ELECTRONIC KEYERS—New **£16.10.0**
HANSON TRANSISTOR CHECKER—New **£6**
FILTERS, LAFAYETTE MECHANICAL **£9.19.6**
KVG 9 mc/s. crystal XF9A, **15 gns.**; XF9B, **19 gns.**
HYCON 2215 kc/s. 2·5 kc/s. crystal **£10**
MINIATURE TUBULAR TRIMMERS. ½–5pF and 3–15pF, **1/-** each or 5 for **4/-.**
1000 pF feedthrough, **6d.** each, **5/-** dozen.
N1500 neg. temp. 1 pF. Stop drifting **6d.** each, **5/-** a dozen.
Disc ceramics 500 volt ·01, **6d.** each, **5/-** a dozen. ·001, **4d.** each, **3/6** a dozen.
Try me for odd valves—such odd ones as 6KE8 or 6GH8A that nobody except the manufacturer has heard of ! A s.a.e. will get you stock lists which include lots of useful bits and pieces at low prices.
Postage—Please allow plenty, the excess will be refunded. Trade-ins and H.P. a pleasure (particularly to the Credit Company !)

SERVICE DEPARTMENT :

Just as I thought, John is proving worth his weight in gold. Incidentally, I wouldn't mind betting that 95% of Rx's in use could be improved by meticulous alignment. In fact, I'll stick my neck out and say that if you bring your set along and we can't improve it—no charge ! Fair enough ?

73 de Bill. VE8DP/G3UBO.

INDEX TO ADVERTISERS

SHORT WAVE MAGAZINE

(GB3SWM)

Vol. XXIV FEBRUARY, 1967 No. 280

CONTENTS

Managing Editor: AUSTIN FORSYTH, O.B.E. (G6FO/G3SWM)

Advertising: **Maria Greenwood**

Published at 55 Victoria Street, London, S.W.1, on the last Friday of the month, dated the month following. (*Telephone: ABBey 5341/2*)

Annual Subscription: Home and Overseas 42s. ($6.00 U.S.) post paid

Editorial Address: **Short Wave Magazine, BUCKINGHAM, England**

AUTHORS' MSS

Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets, with diagrams shown separately. Photographs should be clearly identified on the back. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT-WAVE Magazine

EDITORIAL

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!

Austin Forsyth, G6FO.

WORLD-WIDE COMMUNICATION

DISCUSSING SINGLE SIDEBAND

TRANSISTORS IN SSB CIRCUITS EXPERIMENTAL TRANSCEIVER— 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) 6·2 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 6·2 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

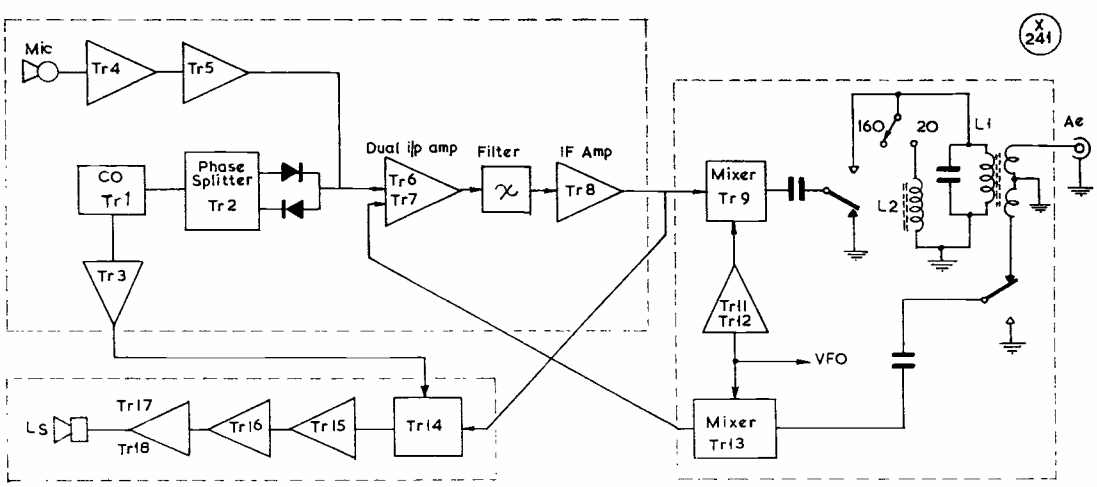


Fig. 1. Block diagram of experimental transistor transceiver.

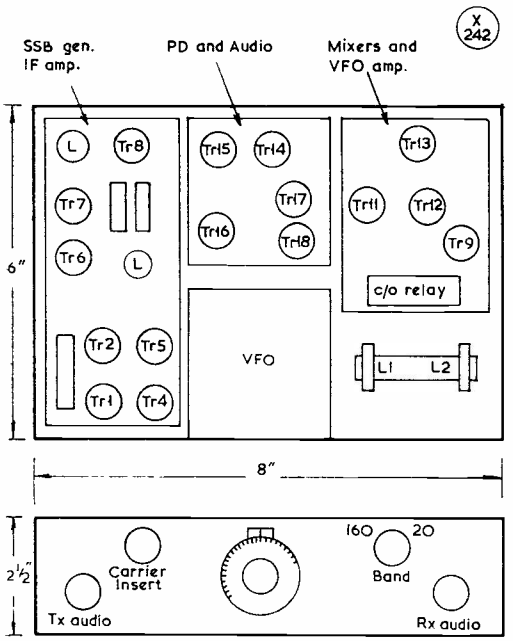


Fig. 2. Layout of experimental transceiver.

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 8in. x 6in. x 2½in. 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 ·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

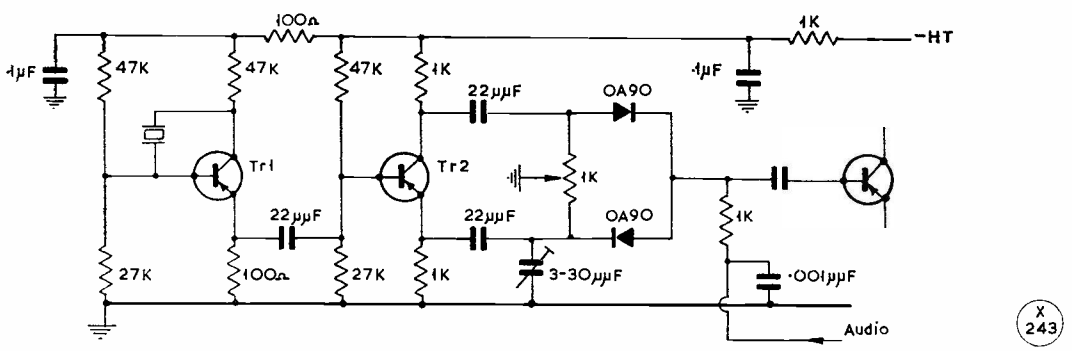


Fig. 3. Carrier oscillator and balanced modulator used in experimental rig.

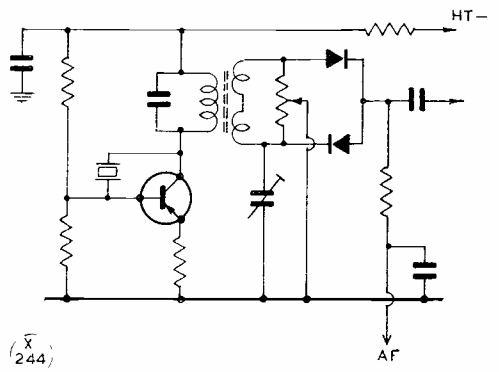


Fig. 4. More conventional method of feeding the balanced modulator.

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 4·7K 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 particulary 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

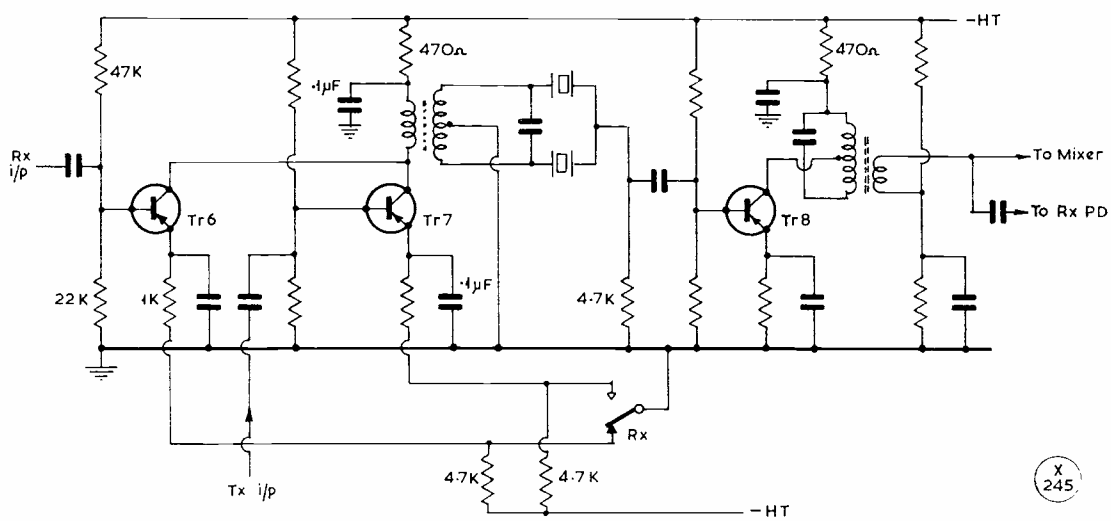


Fig. 5. IF Strip of experimental transceiver.

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

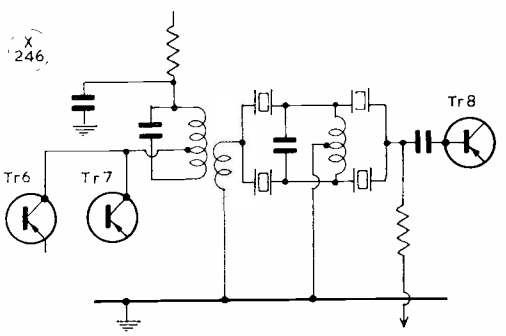


Fig. 6. Method of matching into a two half-lattice section filter.

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 $\mu\mu$F 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

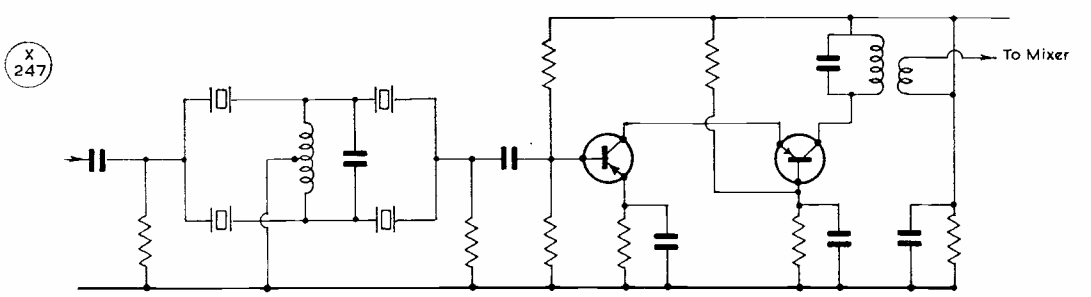


Fig. 7. Alternative IF strip using a cascode amplifier.

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

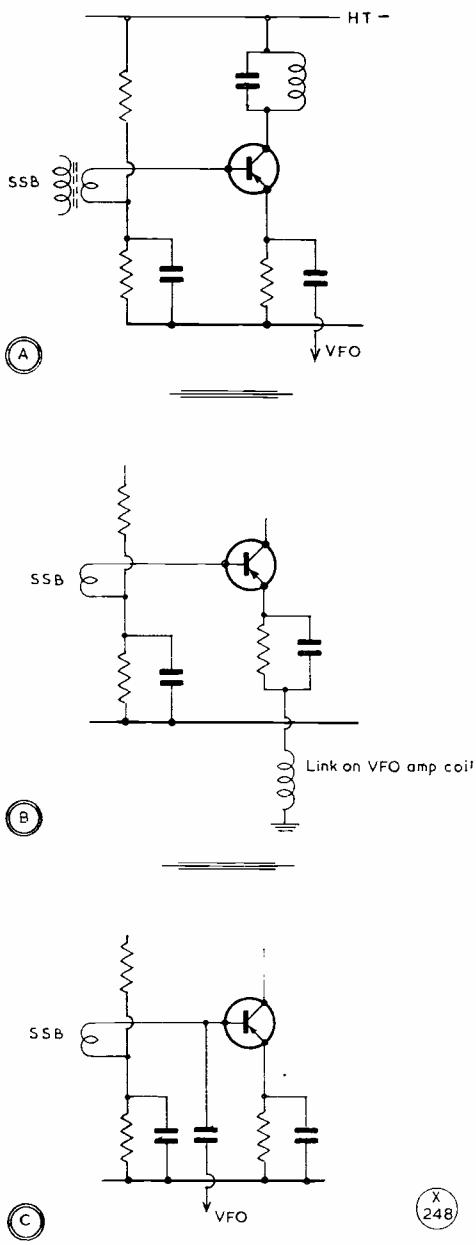


Fig. 8. Single-ended mixer configurations.

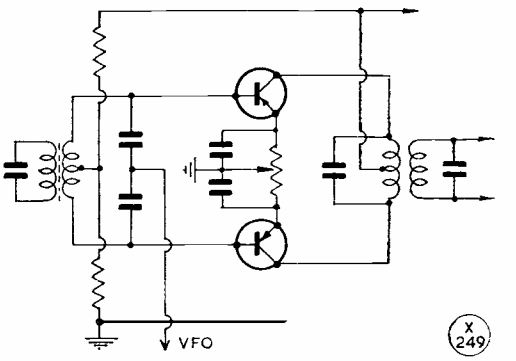


Fig. 9. Balanced mixer using two transistors.

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-

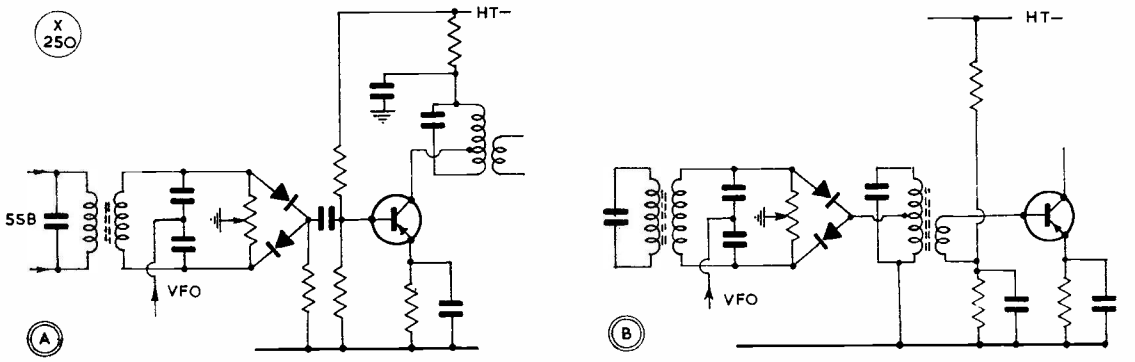


Fig. 10. An economical balanced mixer using two diodes followed by a single stage of amplification. Circuit (B) is preferred.

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

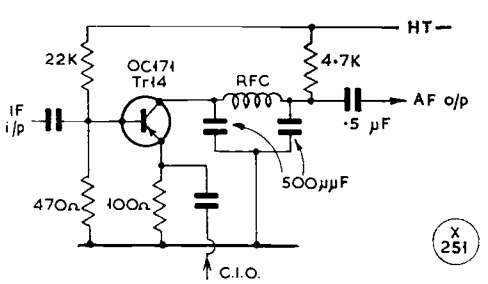


Fig. 11. The product detector used in the experimental transceiver.

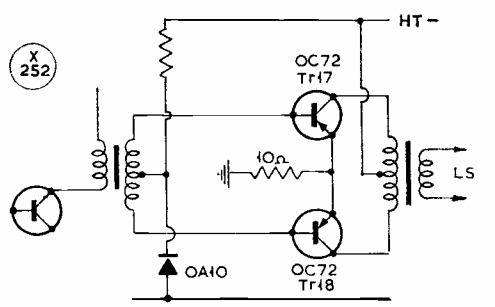


Fig. 12. Audio output stage with temperature compensation.

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 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 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

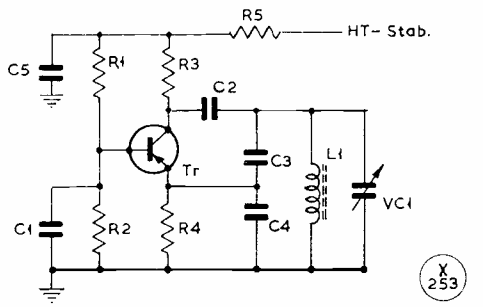


Fig. 13. Using an OC171 as a Colpitts VFO in the grounded-base circuit. C2 should be selected as the smallest value to maintain oscillation and in any case should not be greater than 47 $\mu\mu$F. Other values, for 8 mc, are: C1, C5, 0.1 μF; C3, C4, .001 μF; VC1, 75 $\mu\mu$F; R1, R3, 4.7K; R2, 680 ohms; R4, R5, 1K; L1, Denco D.P. Range 5, blue; and transistor OC171.

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 would be 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 services 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 VO1FB would sign 3B1FB. Two more for the prefix hunters—but apart from that it seems a bit pointless.

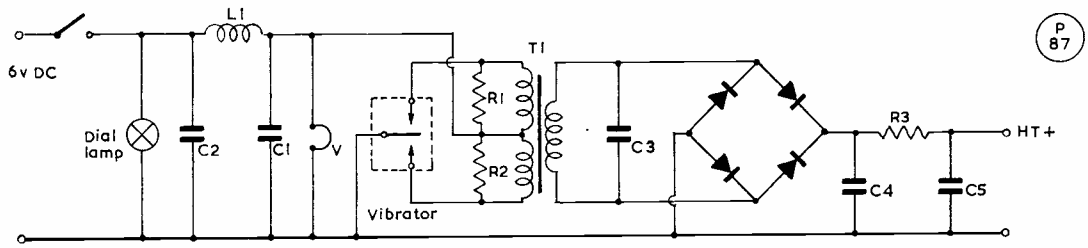


Fig. 1

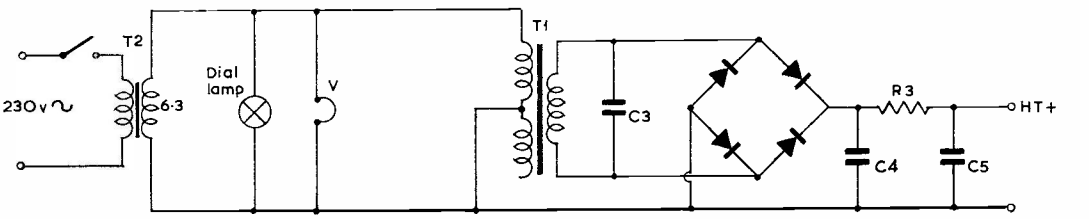


Fig. 2

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 ony additional component required is a 6·3v. 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 orginal 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

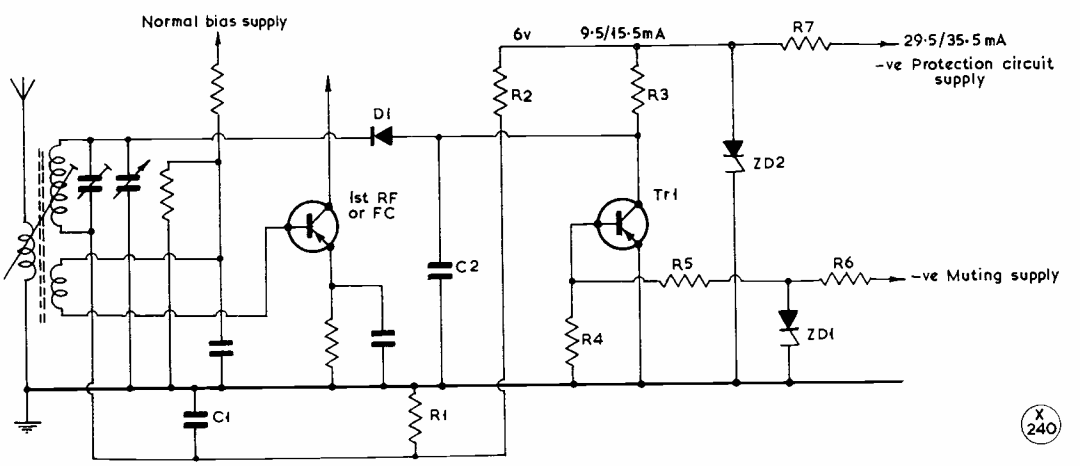
The earthy end of the tuned winding is lifted from earth and connected to a potential divider across the battery supply. This is decoupled to allow proper function of the tuned circuit. At the hot end is connected the cathode of a diode, the anode of which is decoupled and taken to the collector of the 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, .01 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 C1 care should be taken to ensure that the lead length is no greater than before, and that C1 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 C1, 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 $\mu\mu$F, as appropriate. We never write megs, mc/s, Kc/s, kc's, but *always* mc 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 C1, L1, 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 C1, L1, R1 circuit element identification means not only a neater presentation but, what is more important, easy and accurate cross-referring 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.

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 1·7 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 $\frac{3}{8}$in. 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 $\frac{3}{8}$in. 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 $\frac{3}{8}$in. centres were found in a washing machine service department, one of $8\frac{1}{2}$in. 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 $\frac{3}{8}$in. 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 $\frac{3}{8}$in. 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 $\frac{3}{8}$in. 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 $\frac{3}{8}$in. 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 $8\frac{1}{2}$in. pulley wheel to the shaft and to mount the top and bottom bearings on a 12in. square baseboard of $\frac{5}{8}$in. oak.

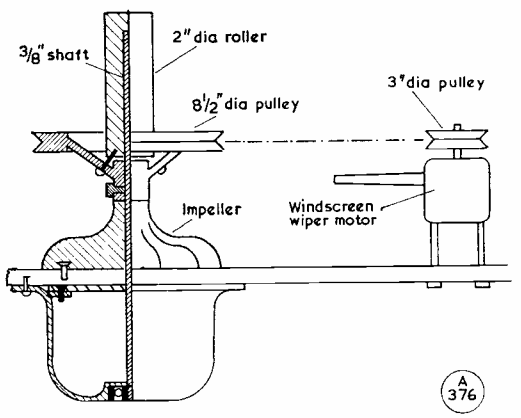
Getting it Going

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 $1\frac{1}{2}$ 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



Cross-section view of the rotator, made from bits-'n-pieces — windscreen-wiper motor (ex-junk yard, 2s. 6d.), and parts from a discarded vacuum cleaner (see text).

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 aluminium 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 section, 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 primarily 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 Transceiver for commercial operation on the HF bands was shown on p.615 of the December issue. The firm of Redifon, Ltd. manufactures a wide range of electronic products, including radio communication equipment for ground, marine and aircraft use; flight and radar simulators; and scientific computing systems. More than 60 per cent of this output is exported, and as well as full coverage of the U.K., the firm has overseas offices for sales, service and maintenance in Canada, the United States, West Africa and the Far East. Redifon, Ltd. is a member-company of the Rediffusion Group, and recently appointed to its board was Air Marshal Sir Walter Pretty who, before retirement, held several important senior signals appointments in the Royal Air Force.

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 to 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 transmitting aerials is 7/22's stranded copper, and the most sensible aerial-earth (or manual Ae. 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 ironmonger 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.

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 Preffered), to qualify for the lowest rates of postage. Cards will have to conform to a size *within* 3½ x 5½ inches-and-4⅛ x 5⅞ 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

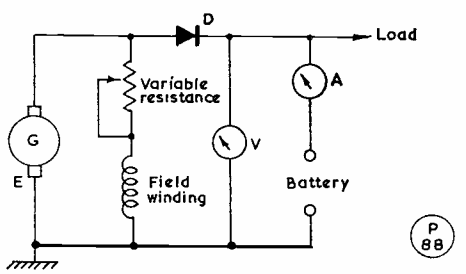
READING the very helpful contribution by G3CGQ titled "Cheap P-E Set for Portable Operation" in the January SHORT WAVE MAGAZINE the writer has various suggestions to make, some of which have perhaps not been considered.

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.



Circuit using diode limiter.

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 14½ 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 wheel-chair. 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.

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 VKØRS. 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 RAFARS 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 " Benelux 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

TOP BAND LADDER

(G3U-- and G3V-- stations only)

Starting Date, January 1, 1966

Station	Counties	Countries
G3UTS	89	14
G3UAN	87	13
G3UBW	76	18
GM3UVL	55	8
G3UVT	44	7
G3VMQ	45	?
G3UGK	43	13
G3UGF	43	8
G3UJS	42	11
G3USE	40	8
G3UMK	39	7
G3UCS	36	?
G3VLT	33	?

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-out-moded " ancient modulation." The current month's crop include ZS's, OD5, VS9's, ZC4, VE's, VK's, ZE1, 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 lunchtime 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 1I to commemorate the Battle of Hastings, or NKØ 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 HI8XAL 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 HI8XAL 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 HI8XAL 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!

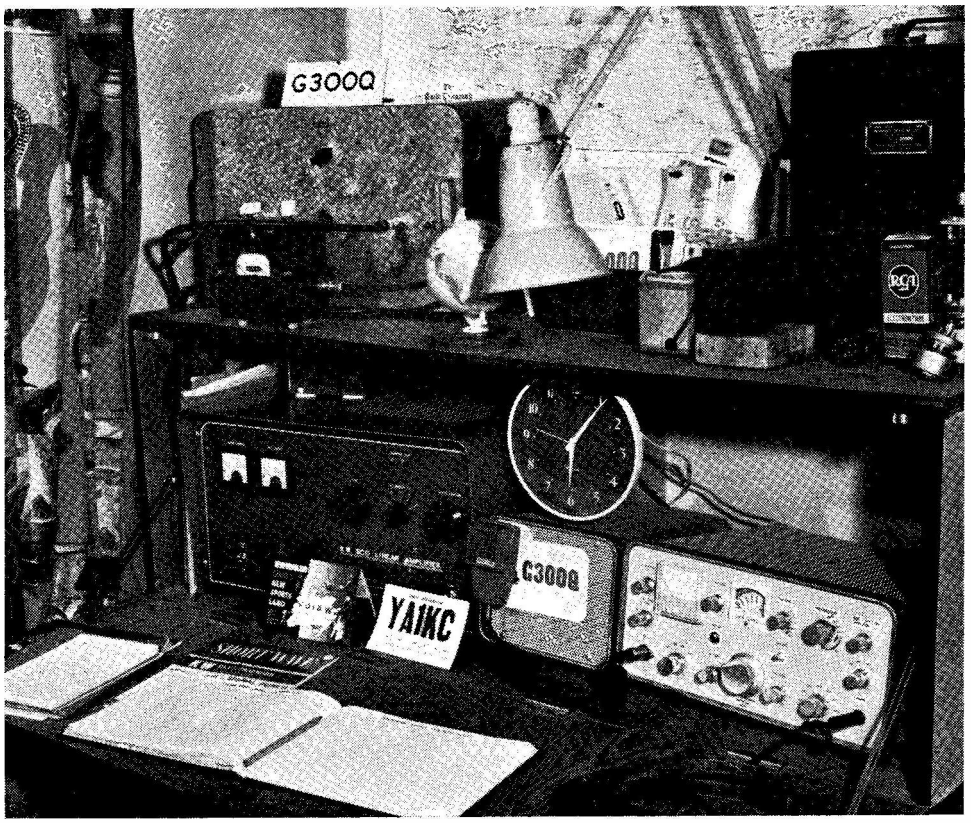
FIVE-BAND DX TABLE

(All Time)

Station	Countries	28 mc	21 mc	14 mc	7 mc	3.5 mc
GI3IVJ	331	192	268	327	104	84
G2DC	331	171	292	319	171	113
G3NOF	297	138	198	281	34	39
G3IGW	197	123	136	161	119	74
G3LZQ	214	79	132	177	63	29
G3UML	235	74	115	221	63	35
G8DI	167	71	113	145	74	44
G3IDG	108	63	77	54	27	18
G3UDR	177	46	97	145	6	43
G3MDW	88	44	57	60	8	10
G3PQF	100	26	25	46	75	46
VP8HJ	182	20	63	178	26	12
GM3RFR	164	15	111	126	79	18
GM3KLA	112	15	79	51	79	51
G3RJB	123	11	26	116	50	32
G3KMQ	237	10	99	212	101	55
G3UBI	115	10	32	93	13	44

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 dipole 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 OE5KE, 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 ¾-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.

GM3IAA 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 GI6TK 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

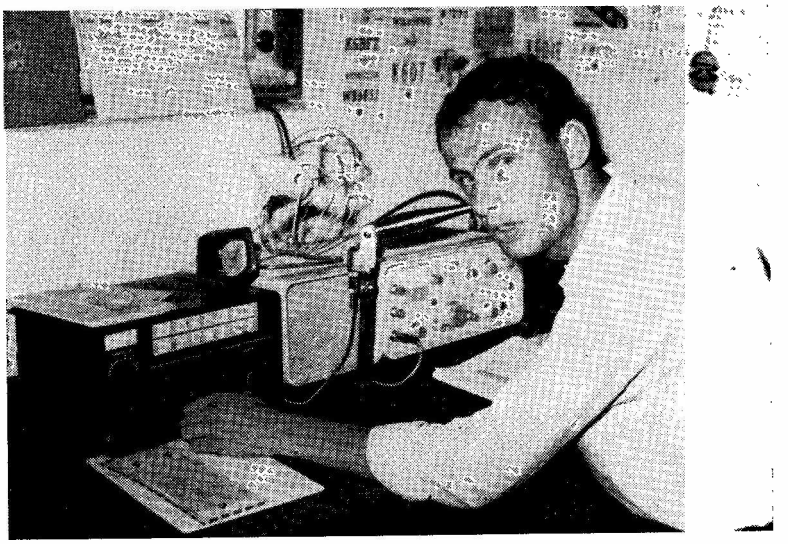
FIVE-BAND DX TABLE
(New Cycle)

Starting Date: January 1, 1966

Station	Countries	28 mc	21 mc	14 mc	7 mc	3.5 mc
G3UML	211	110	107	183	68	45
G3NMH	214	88	122	195	71	—
G3IAR	140	51	89	94	65	47
G3LZQ	161	50	75	135	46	18
GM3SVK	152	38	122	117	65	17
G3VDW	111	29	79	72	26	16
G3PQF	72	21	6	18	58	24
GM3KLA	101	15	79	50	56	40
VP8HJ	102	15	24	100	7	2
9V1LP	35	14	22	24	21	21
G3VDL	104	14	48	76	40	20
G3MWZ	74	14	23	59	24	19
GM3RFR	149	11	103	103	76	13
G3UDR	104	9	43	68	2	20
GM3JZK	66	5	20	16	49	7
G3UBI	70	2	25	52	8	30
GI3GTR	22	1	6	14	10	9
G3VES	36	1	18	27	4	11
G3IGW	110	1	59	68	46	81
G3RJB	59	—	—	59	—	32
G3VPS	54	—	16	30	43	5

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, MP4TBO, 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 W1FZJ /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 GM3VSK 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.

G3TLX feels conditions have been rather down on both bands, making things hard work; however, 80m. yielded CT2, LX2, M1B, MP4, ZL, and Forty: PY, YV, TU2BK, PZ1CP, TI2, ET3, and, on both bands, a good crop of W and VE signals.

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, HI8XAL, hooked within minutes of each other.

GM3JZK " was not excited " about 80; on 40m. the tale is a little different, with VP1DX as the *pièce de résistance*, and such as DJ7XC/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 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, 5Z4JH, 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, UAØKYA (Zone 23) were all brought to book.

GM3JZK, 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 matchwood, and abolished the internal organisation of the telephone, but fortunately left the aerials and the rig all in one piece.

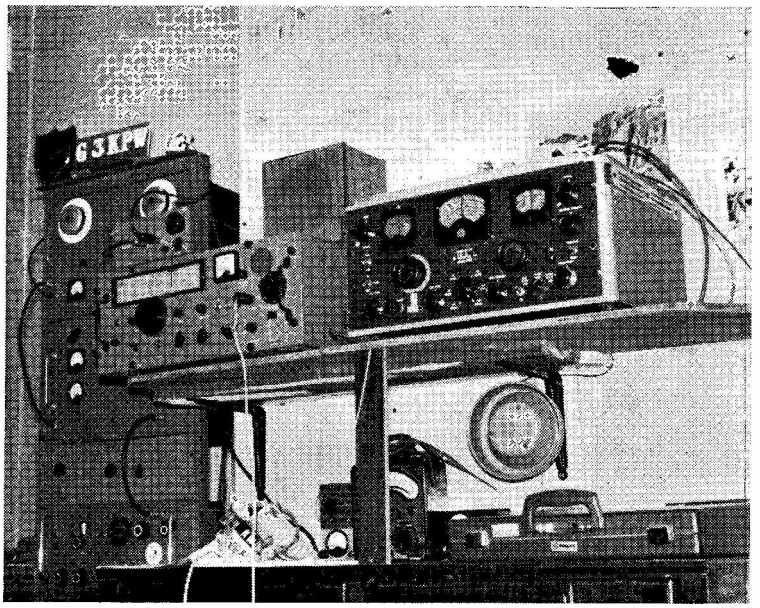
The long and always-welcome letter from GM3IAA mentions, in the present context, only 6O6BW, and sundry W and EU contacts.

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, UI8, UM8, TF2, OX, UA9's in Zone 18 and UAØ'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



Station of C. T. Stagg, G3KPW, of 62 Prospect Place, Grays, Essex, where the main interest is in the design and construction of transistorised Sideband gear for both transmission and reception. The present rig consists of a full-lattice filter exciter generating at 465 kc into an all-band mixer-amplifier (an 807), driving a pair of 813's in the linear, incorporating press-to-talk and BK. This linear is run at 2.5 kV and is tuned by a Z-match unit into an Antenna-Match system for maximum power transfer, the aerials being a 15-metre dipole and an L-shaped wire. The receivers at G3KPW consist of one home-built and the other a modified SX-28. Operating activity is divided between working the DX on the HF side of 3800 kc, with occasional forays on 20 metres for the more exotic stuff.

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
	Phone and CW	
G2NJ	98	98
G3LWQ	98	98
G3NPB	98	98
G3PLQ	92	95
G3SED	85	92
G3TPW	75	57
G3UBW	70	87
G3PPE	68	83
GW3PMR	68	77
G3TPW	57	75
G3IDG	55	59
GW3TLW	55	70
G3KPT	41	70
G3SQX	34	64
G3VLX	3	19
	Phone only	
G3NPB	88	88
G2NJ	75	80
G3PLQ	55	58
G3MDW	52	69
GW3PMR	21	42

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

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, G3VDL 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 ZA1RB 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 6XC in California, *circa* 1914; changed to WA3CKE in 1964, and is now K3AA, running a Hallicrafters HT-44 at 130w., and an SX-117 receiver. He also mentions that at one time he was employed by S. T. & C. in this country and lived at Bromley, Kent, before returning to the States to start up again as WA3KCE. These details span 60 years of radio amateur activity—but even now, as K3AA he is a slick and accurate CW operator, able to use all the tricks to copy, and make himself readable, through heavy QRM. If ever you work K3AA, you are in touch with a real personality.

PSE USE CORRECT QTH

Just 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.

VHF BANDS

A. J. DEVON

HAVING been subjected to some weeks' hiatus, your A.J.D. returns to this feature a little out of touch with what has been going on—except to know that the VHF bands have been somewhat sluggish, with a noticeable lack of activity, all very much in tune with the Wx, though the glass has been running very high at times.

However, as always, there are matters of interest on which to comment. But before coming on to them a word about the tabular matter shown here this time. The opportunity has been taken to get these particular tables up to date, and it is hoped that all interested find themselves in the right slot (if not, *pse* let us know). There must also be a number of keen VHF types with claims in hand for the Annuals, and these we would like to see for the next deadline.

* * *

Now to look at the hard news: First of all, a sporadic-E occurrence on January 8 resulted in ZB2VHF, 70·26 mc, being heard during 1845-1855z by G3JVL (Horndean, Hants.) with signals peaking S9++—all this being tape-recorded by the Plessey boys down there. Certainly, an event of outstanding interest, and much as forecast in this space a little while ago (in the spor-E context). We are also informed by G3JHM, of the same group, that 9H1MB will soon be pumping it out on 70·1 mc.

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 I1CZE (on 144·300 mc) and I1ZUP (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 182S, and in two years on four metres, 550 with 243S—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 Tables, with 15C for the new Annual.

If you hear PA9DHV, on any band, it will be G2DHV (Sidcup, Kent) and he holds the Dutch licence for the whole of this year. He expects to be active with AM/CW mobile—he could also be heard, and probably worked, as DJØAA and ON8IR, for George is one of those who gets about a bit. Unfortunately, as he says, 70 mc is not tolerated on the Continent, so there is no chance of any 4-metre working.

An extraordinary experience is reported by G3UTT (Tunbridge Wells), who had what purported to be a two-metre report, which looked quite genuine, from 9H1AE. However, a check with him proved that 9H1AE knew nothing about it, and certainly had never sent the card . . . We have enough of this sort of nonsense on the HF bands.

* * *

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

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1966

Starting Figure, 14

From Home QTH only

Worked	Station
39	G3COJ
36	G3DAH
31	EI2A
29	G3FIJ
28	G3TQZ
22	G2CDX, G3TDL
20	G3IOE
19	G3FVC
15	G5UM

This annual Counties Worked Table will run till August 31, 1967. All two-metre operators who work 14 or more Counties on the band are eligible for entry. QSL cards or other proofs are not required. After the first 14 worked, simply claim from time to time with counties as they accrue, giving callsign and date for the county worked. Total of stations worked in excess of 50S may also be claimed and will be shown in brackets after callsign. To keep the Table up-to-date, claims should be made at frequent intervals. Operators new to VHF are particularly invited to join Annual Counties.

FOUR METRES

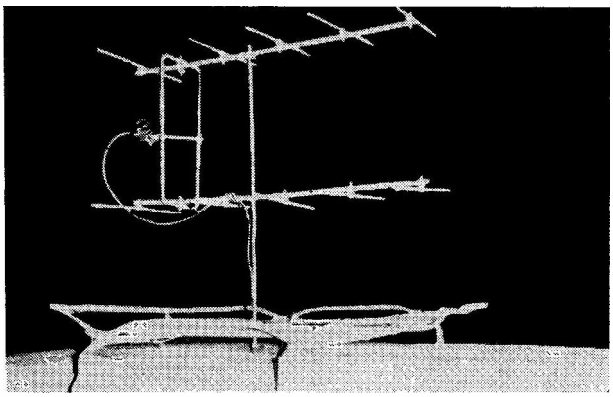
ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8

From Home QTH Only

Worked	Station
65	G3SKR
61	G3OHH (371)
60	G3EHY
52	G3IUD
50	EI2W
43	G3OWA (526), G3TCT
42	G3MOT
41	G3BNL
40	G2OI
39	G3PJK
38	G3JHM/A
36	G3FDW, G3LAS
35	G3BOC, G3HRH, G3PMJ, G5FK (346)
34	G3UYB, G3FIJ, G3LAS
33	G2BJY, *G5JU*
32	G3NUE
31	G3PPG
30	GC3OBM, GM3EGW
29	G3AYT
28	G3OJE
27	G3RDQ
26	G3LQR, G3LZN, GI3HXV
24	G2AXI
23	G3HWR (281), G5UM (243)
20	G3EKP
17	G5CP
16	G3BJR, G3TOT (100)
15	G3UFS, G3UUT
14	G3OKJ
12	G3TKQ, G5DS
11	G3LHA, G3PRQ, G3SNA, G3UOR (110)
10	G2BDX, G3ICO
9	G2DHV, GM3FYB
8	G3NNO, G3TLB, G8VN

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 Parabeam 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

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	TOTAL pts.
G3FIJ	23	5	29	8	6	3	74
G3BNL	13	2	10	3	26	2	56
G3TLB	9	2	39	6	—	—	56
EI6AS	13	6	17	5	3	2	46
EI2A	5	2	31	7	—	—	45
G3EKP	17	5	8	3	6	3	42
G3AHB	—	—	18	3	12	2	35
GW3CBY	2	2	10	4	2	2	22

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 G3BRR was in charge, with the Tx on the left.

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
49	G2XV
44	G3BNL
42	G2CIW
36	G3JMA
35	G3KPT, *G6NF*
33	G3JHM/A, G3LTF, G8ADC
32	G3LHA, G3LQR, GW3ATM
31	G3JWQ, G5YV
30	G3EDD, G3KEQ
28	EI2W, G3HAZ, G3HBW, G3NNG
27	G3PTM
26	G3KQF, GW2ADZ
24	G3AHB, G3HRH, G8ACB, G8ADP
23	G3BKQ, G3VGH, G4AC, G6NB, G5UM (182)
22	G3OBD
21	G3AYC, G3FIJ, G3IOO G5FK
19	G3OWA
18	G2OI, G5QA
17	G3BA, G3MPS, G8ADS, G8AKI
16	G2DDD, G3BYY, G3MED, G8AAC/A
15	G4RO
14	G2BDX, G2HDZ, G3FAN, G3HWR, G5DS, G8APX
13	*G6XA*, G8ARH
12	G3NJO/T, *G5BD*
11	G2AXI, G3EKP
10	G3IRW, G3LZN, G8ACK
8	G8APJ
7	G2HDY, G3JHM, G6AX/P
6	G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G3LTN, G5ML, GC2FZC
4	G3JGY

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

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 Seventycem Annual.

Several two-metre reports to hand, including G3IOE (Newcastle) who has been very busy on the constructional 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 PAØ's across the water and is moving up steadily in the two-metre Annual. He draws attention to the fact that by October last, PAØCML 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.*

EI6AS (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 ½in. Aladdin former (*ex* junk TV set) to make a snug fit in the thimble of a coax plug. One end of the coil winding is soldered to the plug body and the other to the centre pin. *(G3RNI.)*

—— 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. *(G3TCX.)*

—— The plastic spools from *Kodak* 126 "Instamatic" film are ideal for coil formers, these being about 1¼in. by ⅝in., 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 spools are thrown away. *(G3SCD.)*

—— 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. *(G3JNJ.)*

—— 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. *(G3ESP.)*

—— 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. *(A. J. Martin, Hucclecote, Glos.)*

—— 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. *(J. R. Walker, Sheffield.)*

—— 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. *(G3BTC.)*

—— 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. *(G3KH.)*

—— 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. *(G3LYY.)*

—— 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 μA meter in series with a small pick-up loop, feed the output from the sig. gen. across the resistor—and you have a GDO. *(G3KPO.)*

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.

INDEX — VOLUME XXIV

This issue concludes the 24th volume of SHORT WAVE MAGAZINE. A full Index for the year will be inserted, as a free loose supplement, in all copies of the March issue, No.1 of Vol.XXV and No.281 in the monthly series. The month numbering is, of course, reckoned from No.1 pre-war, which was dated March 1937. Time marches inexorably on!

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 4·4 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

Circuit of the Four-Metre Converter

C1, C3	= 3-30 $\mu\mu$F	R2, R5	= 220 ohms
C2, C4	= 3-9 $\mu\mu$F	R3	= 33,000 ohms
C5, C6,		R4, R6	= 2,200 ohms
C7, C8	= .001 μF	R7	= 270 ohms
C9	= 22 $\mu\mu$F	R8, R10,	
C10, C13,		R12	= 22,000 ohms
C15	= .01 μF	R9	= 5,600 ohms
C11	= 82 $\mu\mu$F	R11	= 100,000 ohms
C12, C17	= 27 $\mu\mu$F	R13	= 47,000 ohms
C14, C16,		Xtal	= 33 mc overtone
C18, C19,			(*see text*)
C20, C21	= .0033 μF	V1	= EF95 (6AK5)
R1	= 56,000 ohms	V2, V3	= ECC85

TABLE OF COIL DATA

L1 — 7 turns 20g. tinned, self-supporting, $\frac{3}{8}$-in. i.d. by $\frac{3}{8}$-in. long, turns spaced one wire diam., with tap 3 turns up from cold end.

L2 — 9 turns 20g. tinned, $\frac{3}{8}$-in. i.d. by $\frac{3}{4}$-in. long.

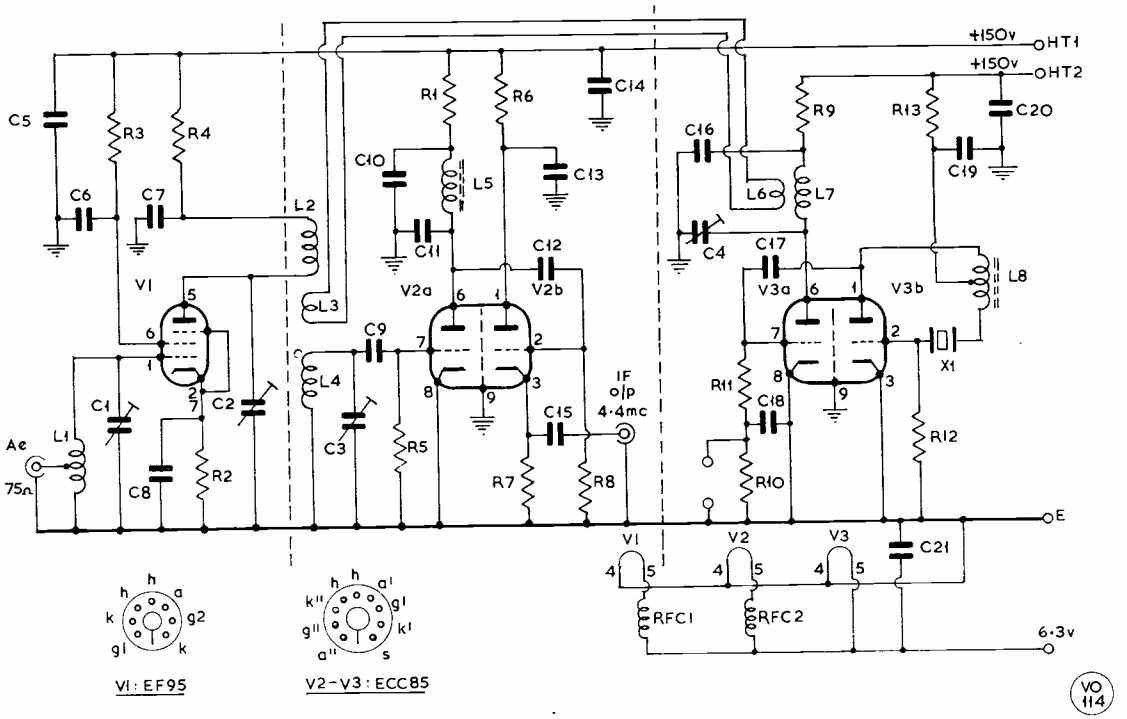
L4 — 5 turns $\frac{3}{8}$-in. i.d., $\frac{3}{8}$-in. long, 20g. tinned.

L5 — 45 turns 34g. enamelled on $\frac{1}{4}$-in. diam. former with iron-dust slug.

L7 — 11 turns 20g. tinned, $\frac{3}{8}$-in. i.d. by $\frac{13}{16}$-in. long.

L8 — 22 turns 26g. enam. close-wound on $\frac{1}{4}$-in. former with iron-dust slug, tap at 6 turns from xtal end.

Notes: RF chokes are made of 40 ins. of 34g. enamelled wound on insulated carbon-resistor body. Link coils L3, L6 are single-turn p.v.c., 24g. Coils L1, L2, L4 and L7 are self-supporting.



Circuit complete of the four-metre converter, by G3TDR, discussed in the article. Basically, it is a straight-forward valve design, the idea being to achieve reasonable efficiency using readily-obtainable parts, to enable anyone not having any gear for four metres to get going with a good first converter. It is a crystal-controlled arrangement, with the IF side tuned across 4.1 to 4.7 mc to cover 70.1-70.7 mc at signal frequency.

be in its most sensitive condition over the whole of the tuning range.

Of course, if you have a signal generator capable of giving ouput over the 70 mc band, it may now be used to advantage, to bring all the fixed-tune 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,

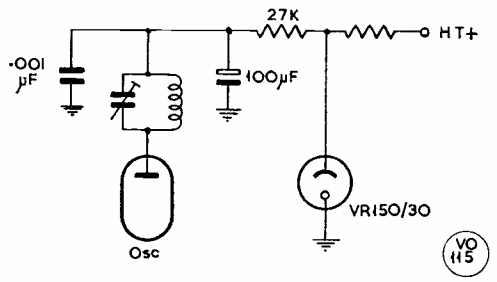
(*b*) Change in operating potentials of the oscillator. Do not assume that a 150-volt gas stabiliser will adequately take care of the oscillator HT supply. Received on a wide band AM Rx, the signal will in all probability sound all right—but try feeding the converter into a decent SSB receiver (or transceiver) with a 2 kc bandwidth of good shape factor and listen to the signal as though it were SSB, *i.e.* exhalted 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 "sharsh," 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 reintroduced—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



Simple splatter-suppression circuit.

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 operators of the stations concerned have never taken a step back and had a good searching look at their own transmissions. If some of the transmissions to be heard on two metres were to be put out on 80 or 20 metres, the perpetrators thereof would soon have the defects pointed out to them in no uncertain terms.

It would appear that Two is being caught up in the struggle that the HF bands went through some years ago when SSB stations were few and far between. Then AM operators could be heard suggesting all sorts of places for SSB stations to go and make their funny noises.

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 sideband 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.

REMINDER — 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.

Worcester Mobile Rally, on *July 16,* at Upton-on-Severn, Worcs, organised by the Worcester & District Amateur Radio Club.

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 (GI3LSM)

The 640 is a well-known post-war design and though 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 worth-while 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 suitable. 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

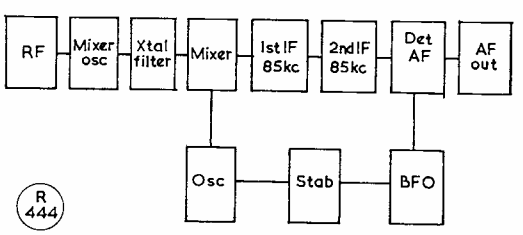
The condenser C47 is removed (*see* Fig. 3) and it will be found that the existing hole will fit an IO valveholder. A 6J5 is fitted here as the BFO valve. An *Electroniques* HSO-85 oscillator unit was used and this can be mounted on a bracket under the valve holder. C47 can be replaced underneath the 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 $\mu\mu$F. 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 mc 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.

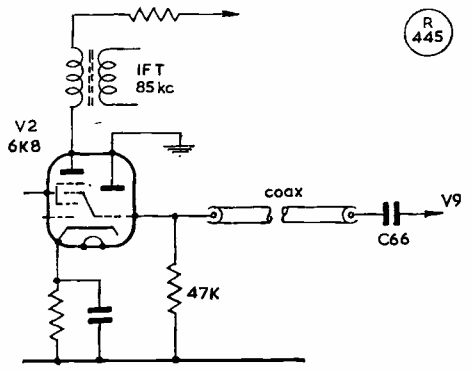


Fig. 2. The second frequency-changer. Components are mainly as shown around V2 in the S.640 manual — and see text.

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 re-arrangement 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.

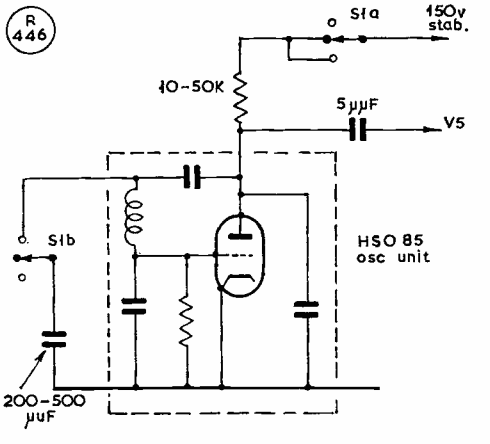


Fig. 3. Using the Electroniques HSO-85 oscillator unit as the 85 kc BFO for the S.640. The switch S1A-B, a double-pole three-way rotary, can occupy the panel position formerly taken by the BFO on-off switch.

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.

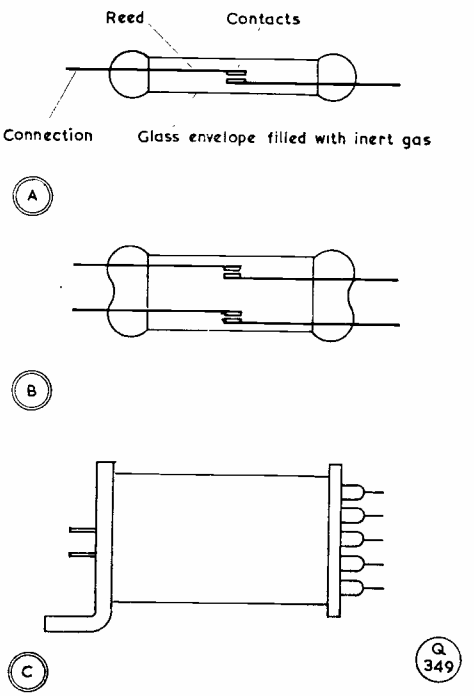
Fundamentally, this is made possible by the simple device known as the reed-relay—which in itself has been available as an electric switch for all of 30 years. The reed-relays at Ambergate supersede the relatively ponderous and slow-moving electro-mechanical switches still in general use—devices which, 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 electro-magnetic 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 telephony. 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.)

TRANSISTORISED VOX UNIT

SUITABLE 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 keen 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 control, may be found desirable on some occasions.

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 enamel 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 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.

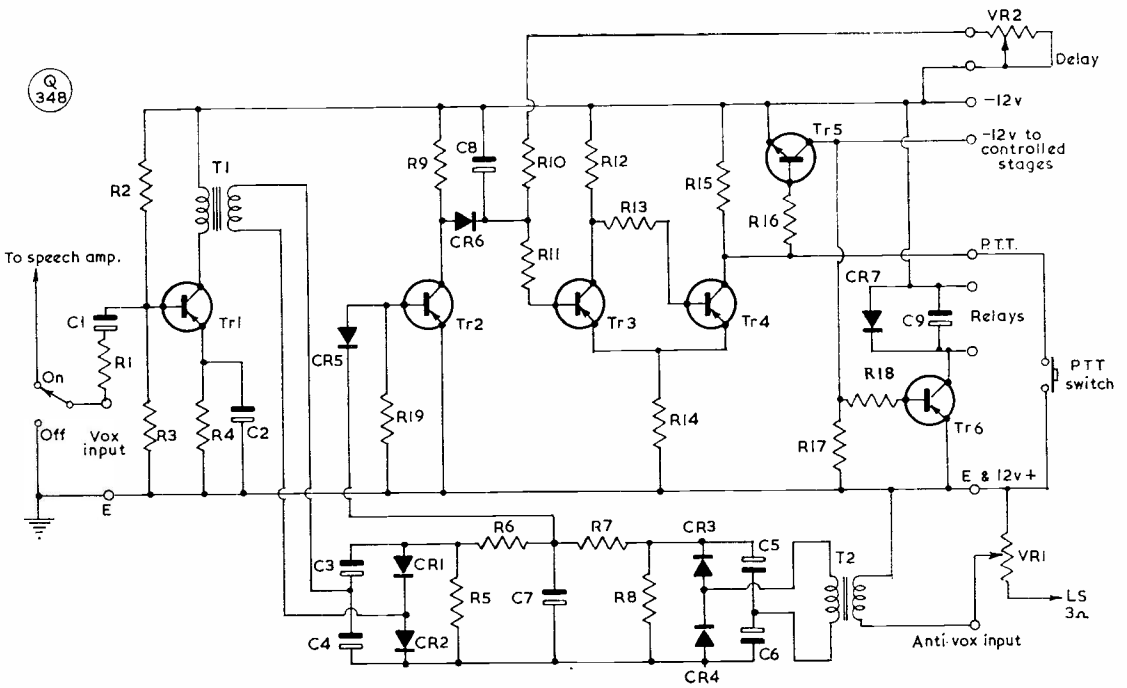
When the microphone is spoken into, usually at a much higher level than the pick-up from the receiver, the voltage at the junction of R6, R7 goes negative and CR5, being forward-biased for this polarity, transistor Tr2 conducts. As Tr2's collector load is fairly high the collector potential falls from 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,

Table of Values

Circuit of the Vox Unit

C1	= 8 μF, 16v.	R18	= 680 ohms
C2	= 32 μF, 6v.	R19	= 10,000 ohms
C3, C4,		VR1	= 10 ohms
C5, C6	= 2 μF, 6v.	VR2	= 330,000 ohms
C7	= 8 μF, 6v.	T1	= TT6, *Radiospares*
C8	= 32 μF, 16v.	T2	= TT4 *Radiospares*
C9	= 32 μF, 25v.	CR1,	
R1, R6,		CR2,	
R7, R16	= 15,000 ohms	CR3,	
R2	= 27,000 ohms	CR4,	
R3	= 8,200 ohms	CR5	= OA81, or similar
R4	= 390 ohms	CR6,	
R5, R8	= 39,000 ohms	CR7	= BY100, or similar
R9, R10,		Tr1	= OC81DM
R12, R15	= 5,600 ohms	Tr2,	
R11	= 150,000 ohms	Tr3,	
R13	= 180,000 ohms	Tr4	= OC171
R14	= 100 ohms	Tr5	= 2N2087
R17	= 3,300 ohms	Tr6	= OC28

Notes: All resistors are rated half-watt. For the transistors specified similar types may be substituted. Construction can be on slips of *Veroboard*.



Circuit of the transistorised Vox unit.

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 2N2087 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 2¾in. 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 *Veroboard* 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 valveholders make convenient push-on connectors for the *Vero* pins.

No troubles have been experienced in operating the unit. Inevitably, there is some slight clipping of the first syllable but in many QSO's this has evoked no comment. A working delay of about two seconds has been found to be about optimum to avoid frequent "drop-outs" during an over but this can be reduced when a slick conversational-type QSO is wanted.

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.

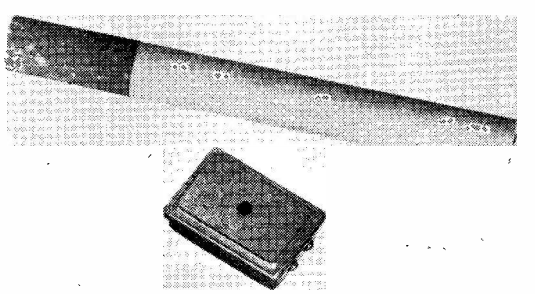
THERE IS NOT MUCH . . .

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"! (*Gurhh.*) 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, pse.") If by "capitals" 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 — *er,* necessary, accompanying the copy. And do please write clearly, with name, callsign 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 equipments." . . .

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.)**

WHEN 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 transmitter who have approached the practical side with a different outlook, from the experience gained in their own, non-radio, daily toil. Some of these chaps are among the past-masters in the art of home-construction, and can give a full lecture on the " 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.

IMPORTANT!

Reports for this feature must reach us by the due date — see head of article every month — and include the full QTH and telephone number (if available) of the honorary secretary, for the Secretaries' Panel. Scribes who undertake regular reporting are asked particularly to watch these points. Reports for "Month with The Clubs" should be addressed: Club Secretary, Short Wave Magazine, Buckingham.

Contest Note

The **Royal Air Force** ARS are running an inter-member 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 W1BB 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* is one of the best for some time; a review of the U.K.

Callbook which had your scribe, as the theatrical types 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 Hq. The January session was devoted to a Technical Topics forum, at which various members were nominated to address the assembled multitude for ten minutes on a specified subject—quite an idea.

On now to the Church Hall, in the High Street of **Shefford,** where on the 2nd, G3VMI talks about Circuit Design; then the 9th is given over to Mobile Techniques; Dr. Williams will "reveal all the dark secrets" of Computers at the meeting on the 16th, while the month will be nicely rounded off by a lecture on Basics on February 23.

This month is set aside for the Open Night by the **Acton, Brentford & Chiswick** lads, to which members and their families are invited. A special film-show of general interest is part of the programme which will be taking place at the Hq. at 66 High Road, Chiswick, on Tuesday, February 21, starting at the usual time, 7.30 p.m.

Very interesting one laid on for the **Port Talbot** chaps this month, in the shape of a lecture on Colour Television, with a demonstration; this is to be on February 7, at 1 Lynvi Road, Maesteg, Glamorgan, starting *sharp* at 7.30 p.m.

[over

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W.3.
ADDISCOMBE: A. Hansen, G3VLJ, 99 Stretton Road, Croydon, Surrey. (*ADDiscombe 6866*).
A.E.R.E. (HARWELL): V. J. Galpin, Building 347.3, A.E.R.E., Harwell, Didcot, Berks.
ARMS: N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10. (*Leytonstone 6700*).
ASHTON-U-LYNE: R. Higginbotham, G3VDS, 1 Bankfield Cottages, Woodlands Drive, Woodley, Stockport, Ches.
BADEN-POWELL HOUSE: A. Watts, 8 Thornycroft Court, Kew Road, Richmond, Surrey.
BRIGHTON (Tech. Coll.): R. A. Bravery, G3SKI, 7 Copse Hill, Brighton, 5.
BROMSGROVE: J. Dufrane, 44 Hazelton Road, Marlbrook, Bromsgrove, Worcs.
CAMBRIDGE UNIVERSITY: J. A. Lush, G3TGY, Queens College, Cambridge.
CHELMSFORD: K. Dews, G3PMW, 14 Baddow Place Avenue, Great Baddow, Chelmsford.
CHILTERN: J. W. Burnham, G3UJK, 304 Desborough Avenue, High Wycombe, Bucks.
CORNISH: M. J. Harvey, Chycarne Farm, Truro.
COVENTRY: R. E. Rogers, 205 Brownshill Green Road, Coundon, Coventry.
CRAWLEY: R. G. B. Vaughan, G3FRV, Tralee, 5 Filbert Crescent, Gossops Green, Crawley (*23359*), Sussex.
CRAY VALLEY: C. W. A. Davis, 6 Braemar Gardens, Sidcup, Kent. (*FOOtscray 5077*).
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23. (*FORest Hill 6940*).
CULCETH: I. J. Sumner, G3VPX, 406 Warrington Road, Glazebury, Warrington, Lancs.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby (*21931*).
EAST WORCS: J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire. (*Henley-in-Arden 2176*).
ECHELFORD: D. Walmsley, G3HZL, 153 Worple Road, Isleworth, Middx. (*POPesgrove 3239*).
EX-G RADIO CLUB: F. W. Fletcher, G2FUX, 53 St. Ives Park, Ringwood, Hants.
GLASGOW UNIVERSITY: C. Weston, GM3VAP, Engineering Library, Glasgow University, Glasgow, C.2.
GRAFTON: E. A. Rudolph, G3SIL, 29 Pangbourne Drive, Stanmore, Middx.
HARLOW: R. Brown, G3TOF, 177 Radburn Close, Harlow (*23517*).
HULL: D. J. Peacock, G3NOP, 336 Cottingham Road, Hull.
LEEDS: M. Goldman, 8 Nunroyd Road, Leeds, 17 (*681871*).
LEICESTER: *Secretary's address wanted.*
LIVERPOOL UNIVERSITY: *Secretary's address wanted.*
MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead, Berks.
MELTON MOWBRAY: D. W. Lilley, G3FDF, 89 Sandy Lane, Melton Mowbray (*3519*), Leics.
MIDLAND: C. J. Haycock, G3JDJ, 29A Wellington Road, Handsworth, Birmingham, 20.
MID-WARWICKSHIRE: K. J. Young, 180 Northumberland Court, Leamington Spa (*26426*).
NEWARK: G. Francis, G3TWV, 93 Balderton Court, Newark, Notts.
NEWHAM: J. S. Cakebread, G3IDI, 20 Lloyd Road, East Ham, London, E.6.
NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax (*64329*).
NORTHAMPTON: B. Hayes, G3JBU, 31 Beverley Crescent, The Headlands, Northampton (*33944*).
NORTH KENT: P. T. Baber, 64 Latham Road, Bexleyheath (*8655*), Kent.
NOTTINGHAM UNIVERSITY: K. L. Taylor, Radio Society, The Union, Nottingham University.
PORT TALBOT: H. Hughes, GW4GC, 20 Austin Avenue, Porthcawl, Glam.
PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey.
RADIO CLUB OF SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow. (*STD 041-339-4080*).
RAIBC: Frances Woolley, G3LWY, 331 Wigan Lane, Wigan.
READING: G. A. Gale, G8APH, 1 Willwyne Close, Caversham, Reading, Berks.
REIGATE: D. Thom, G3NKS, 12 Willow Road, Redhill (*45033*), Surrey.
SALOP: W. Lindsay-Smith, 22 Kingswood Crescent, Copthorne, Shrewsbury.
SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.
SHEFFORD: D. A. Pike, G3VMI, 32 Lawrence Avenue, Letchworth, Herts.
SOUTHGATE: R. Wilkinson, G3TXA, 23 Ashridge Gardens, Palmers Green, London, N.13. (*PALmers Green 4592*).
SOUTHPORT: N. K. Waring, 33 Chestnut Street, Southport.
STOCKPORT: G. R. Phillips, G3FYE, 6 Ross Avenue, Davenport, Stockport, Cheshire.
SURREY: R. Morrison, G3KGA, 33 Sefton Road, Croydon, Surrey. (*ADDiscombe 5982*).
SUTTON & CHEAM: P. Ball, G3HQT, 55 Maycross Avenue, Morden, Surrey.
SUTTON COLDFIELD: A. F. Dennis, G3CNV, 36 Coleshill Street, Sutton Coldfield, Warwickshire.
VERULAM: G. Slaughter, G3PAO, 6 Leggats Wood Avenue, Watford.
WAKEFIELD: E. Price, G3TQV, 23 Elm Road, Horbury, Wakefield.
WAMRAC: Rev. A. Shepherd, G3NGF, 1 North Street, Crewe (*2558*), Cheshire.
WEST KENT: R. Trevitt, G3SSE, 28 Delves Avenue, Tunbridge Wells, Kent.
WIMBLEDON: K. Alexander, 23 Pepys Road, West Wimbledon, London, S.W.20.
WOLVERHAMPTON: J. P. H. Burden, 28 Coalway Road, Wolverhampton.
WORCESTER: G. W. Tibbetts, G3NUE, 25 Greenford Gardens, Worcester (*21083*).
WORTHING: P. J. Robinson, G6KFH/T, 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 year. A novel way to raise funds, at least as far as Amateur Radio groups are concerned, is the Newark football "buster sweep," which G3TWV recommends to other clubs with problems in the way of low funds.

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 conclave 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*); **RAFARS** (*Newsletter*); **Reading** (*Newssheet*); **Mid-Warwickshire** (*News*); **Southampton** (*QUA*); **Wolverhampton** (*Newsletter*); **Coventry** (*Newsletter*); **AERE (Harwell)** (*QAV*); **ARMS** (*Mobile News*); **RAIBC** (*Radial*); **Surrey** (*Monthly News*); **Cray Valley** (*QUA*); **Baden-Powell House** (*Winter Newsletter*); **Wirral** (*Newsletter*); **Crystal Palace** (*Newsletter*); **Radio Club of Scotland** (*GM Magazine*); **Reigate** (*Feedback*); **Cornish** (*Cornish Link*); **Ex-G Radio Club** (*Bulletin*); **Echelford** (*Newsletter*); **North Kent** (*Newsletter*); **Aeronautical 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 Toc 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 Birmingham Post Office Tower.

The next one to come up for a mention is world-wide, catering as it does for members all over the world. The **Ex-G** Radio Club *Bulletin* is one of the nicest sheets to come our way each month, and is equally appreciated by the exiles.

Echelford had us a little worried this time—we thought they had forgotten to pass the word, but we hear they have changed both the meeting date *and* the venue, which suggests someone has had a Christmas headache. The group now get together on the last Thursday in each month; G2CNX talks about "Trouble-shooting" at the February session, March is set aside for RTTY, and in April there is the Annual General Meeting.

Another group with problems of accommodation is **North Kent,** albeit theirs is not too severe—they are expanding out of the old place, due to the rise in the membership. On March 4, the Annual Dinner comes round, but we have no details to hand for the February meeting.

There is no up-to-date information on the doings of our friends in **Wimbledon,** but it is known that, since the AGM, they have ceased meeting at the Community Centre.

Northern Heights have set something of a record—Arthur makes no mention of the programme for February, but *does* say that on March 1 they have a Junk Sale, and on the 15th a talk on RTTY by G3TSA. The month is rounded off by a discussion on Field Day. Forward-thinking, these chaps!

From **Leeds** comes a heart-cry; they seem to be getting desperately close to the bread-line and may have to fold early in the year if some more support is not to be found—oh, dear! The hon. sec. is looking for suggestions, and would welcome any ideas—we would think that the programme is as good as that offered by many a flourishing group, so possibly the trouble may be deep-seated and hard to define. On the first of the month, they are in session on the Club Transmitter project; on the 15th there are no fewer than three speakers to talk about Aerials; and on the 21st they move to the Capitol ballroom for the Mullard Film Show and Lecture.

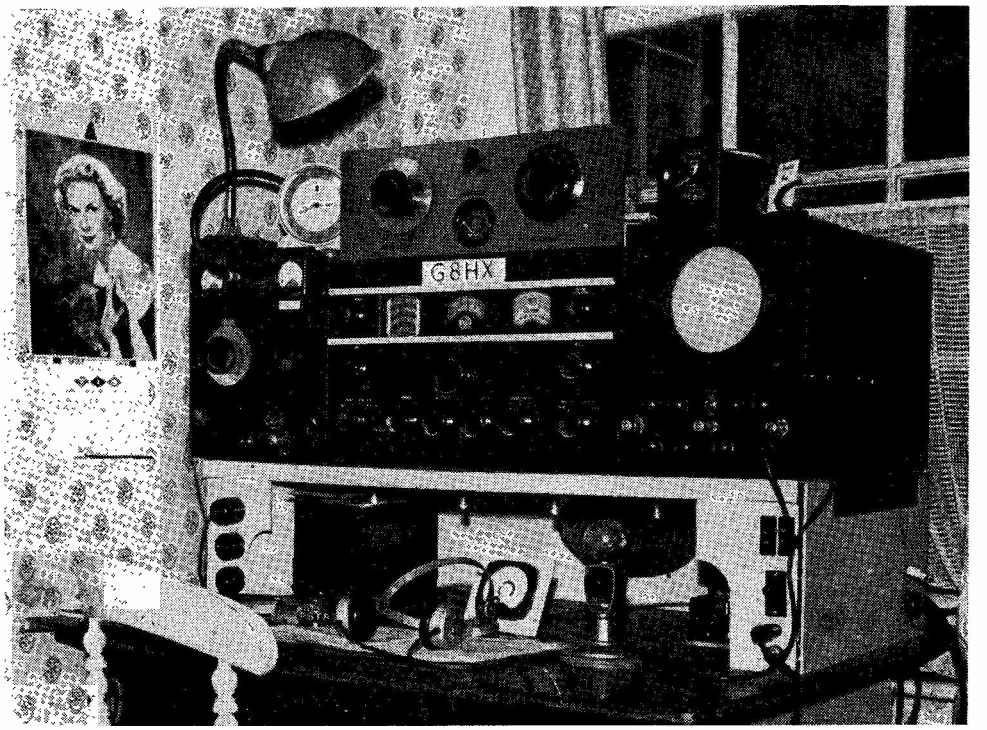
A Constructional Competition forms the programme for the February meeting of the **Sutton & Cheam** Club, slated for the 21st, at the usual Hq. March is set aside for a lecture on Computers, and a film.

Not Very Usual!

The final letter in the pile brings to light a real novelty—a talk on the "Registration Service, Births, Marriages and Deaths," by R. Winters, L.I.R., G3NVK, which will take place at G3NVK's office at the White House, High Street, Melton Mowbray. The date on which 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.



THE OTHER MAN'S STATION G8HX

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 G5KG 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

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

EI4BK, T. Deegan, 7 Casement Avenue, Janesboro, Limerick.

GM3VPJ, D. Hamilton, 670 Hawthorn Street, Springburn, Glasgow, N.1.

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, 37 Cwyrt Coch, Aberbargoed, Bargoed, Glam.

G3VSX, R. J. Scoffield, 36 Beechcroft Road, Grantham, Lincs.

G3VTA, P. Royle, 466 Warrington Road, Glazebury, Warrington, Lancs. (*Tel. Leigh 73988.*)

G3VUB, T. McLean, 18 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.*)

GM3VVF, A. C. Ross, 29 Boswall Loan, Edinburgh.

GW3VWJ, G. Westwood, 6 Ogwen Drive, Lakeside, Cardiff, Glam.

G3VWL, 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

DL5XR, J. C. Clinch, Hq. R.A.F. Germany, B.F.P.O. 40.

G2CKW, J. L. Meddemmen, 112 Farnaby Road, Bromley, Kent.

G2HIO, A. Walmsley, The Firs, 3 Trinity Close, Ashby-de-la-Zouch, Leics.

G2QK, D. Briggs, 51 Highlands Road, Fareham, Hants. (*Tel. Fareham 4128.*)

GW3EJR, J. B. Armstrong, Mayfield, Cardigan.

G3FRE, W. H. Frith, 56 Ring Leas, Cotgrave, West Bridgford, Notts.

G3GPE, K. Smethurst (*ex-9M6KS /9M8KS*), 8 Westfield, Wadsworth, Hebden Bridge, Yorkshire, W.R.

GI3GTR, R. B. McKinty, 3 Rhanbuoy Park, Craigavad, Co. Down.

G3GYW, S. E. Stevenson, 399 London Road, Westcliff-on-Sea, Essex. (*Tel. Southend 43118.*)

G3HJM, D. Outram, Adaville, Hunwick Station, Crook, Co. Durham.

G3IJU, E. Briggs, 31 Blenheim Crescent, West Ruislip, Middlesex.

G3ILZ, T. E. I. Bromham (*ex-GW3ILZ*), Greenacres, Moss Lane, St. Michaels-on-Wyre, Preston, Lancs.

G3JFC, B. M. Stone, 39 Purrett Road, Plumstead, London, S.E.18.

G3LBT, R. G. Storey, 145 The Knares, Castle Mayne, Basildon, Essex.

G3LSR, D. Rumble, 18 Wihtred, Bapchild, Sittingbourne, Kent.

GW3MPB, A. R. Smith (*ex-G3MPB*), 12 Alyson Way, Pencoed, Bridgend, Glam.

G3NQX, W. H. Brown, 21 Princess Street, Leyland, Lancs.

G3NRI, H. C. Hopkins, 42 Whalley Drive, Bletchley, Bucks.

G3NVM, D. G. Arigho, 6 Freasham Close, Yateley, Camberley, Surrey. (*Tel. Yateley 2174.*)

GW3OAY, R. N. Graham, Little Began, Began Road, St. Mellons, Mon. (*Tel. Cardiff 77293.*)

G3OKJ, J. G. Wilkes, 151 Hill Lane, Southampton, Hants.

G3OMU, A. Bradbury, 2 Lower Chestnut Drive, Basingstoke, Hants.

G3OS, F. Green, 2 Fleets Lane Cottage, Stow, Lincoln.

GW3OXE, J. G. Lewis, Cedar Ridge, Somerset Close, Cefn Coed (Breconshire), *via* Merthyr Tydfil, Glam.

G3PBW, K. B. B. Cunningham, 30 Manor Farm Crescent, Stafford, Staffs.

G3POZ, D. Lane, 34 Manor Road, Harrow, Middlesex. (*Tel. Underhill 2583.*)

G3PPE, M. J. Eccles, 82 Seabank Road, Wallasey, Cheshire.

G3PQF, D. H. Dell, 6 Rye Close, Manor Farm Estate, Cove, Farnborough, Hants.

G3PYB, P. Blakeborough, 197 Lichfield Road, Four Oaks, Sutton Coldfield, Warks. (*Tel. FOU 4330.*)

G3RBZ, Lymington and District Amateur Radio Society, c/o A. H. Trigell, 77 High Street, Lymington, Hants.

G3RDC, A. F. H. Wood, Electrical Section, R.A.F. Little Rissington, Cheltenham, Glos.

G3REL, B. Woodfield, 538 Rosemary Lane, Blackwater, Camberley, Surrey.

G3SHL, J. Harlow, Dixie Arms Hotel, Vaughan Way, Leicester. (*Tel. Leicester 22655.*)

GW3SUH, K. Hughes, 58 Whiterock Drive, Graigwen, Pontypridd, Glam.

G3SXK, B. J. Doel, 2 Spring Cottages, Galleywood, Chelmsford, Essex.

G3TBT, R. S. Hodgson, 18 Clayhill, Lyndhurst, Hants. (*Tel. Lyndhurst 2127.*)

G3TQS, P. A. Patrickson, 48 Fairfield Road, Priors Wood Estate, Taunton, Somerset.

G3UMK, T. W. Jones, 1 Chaseview Road, Alrewas, Burton-on-Trent, Staffs.

G3VMD, F. C. Reid, 34 Carlton Avenue, Hayes, Middlesex.

G3VMI, D. A. Pike, 32 Lawrence Avenue, Letchworth, Herts.

G5ML, F. W. Miles, 32 Birches Lane, Kenilworth, Warks. (*Tel. Kenilworth 52149.*)

GM6RI, W. Robertson, Schoolhouse, 18 Church Street, Newtyle, Angus. (*Tel. Newtyle 232.*)

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:

$$2\pi fL, \text{ where } \pi = 3{\cdot}14$$

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 W8YEK, 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 Boite Postale 70, 75 Paris 12°, France . . . The actual count of W/K licensed amateurs as at October 1966 was 277,604.

SMALL ADVERTISEMENTS

(" SITUATIONS " AND " TRADE ")

9d. per word, minimum charge 12/-. No series discount. All charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, London, S.W.1.

TRADE

EXPORT SERVICES available to manufacturers. World-wide coverage and know-how.—Spark, G3UOX, 1 Daver Court, Mount Avenue, Ealing, London, W.5.

QSL CARDS: One economical design, 15s. per 100, plus postage. Send s.a.e. for sample.—GW3LXI, QTHR.

WANTED: AM-913/TRC Amplifier-Converter, 100-225 mc, £20 paid for unit in good condition. Also Wanted an AM/FM Signal Generator, coverage 50-500 mc, first-class instrument essential. SALE: Heathkit DX-40U, £20; VF-1U, £10. Command receivers BC-455 and BC-454, £3 each. Hudson R/T equipment, modified for 4 metres, for AC mains, price £25; similar for mobile, £20; both with microphones, Tx xtal, tunable Rx and suitable PSU's.—Box No. 4427, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

QSL Cards and Log Books, GPO approved, cheapest and best. Prompt delivery.—Samples from: Atkinson Bros., Printers, Looe, Cornwall.

QSL CARDS: Attractive two-colour designs, 25s. per 100. Send s.a.e. for samples.—G3OYI, Cotswold Banks, Honley, Huddersfield, Yorkshire.

QSL Cards: In two colours, printed both sides, only £4 per thousand. Samples s.a.e.—McHenry, GI3NSM, 54 Orby Road, Belfast, 5, Northern Ireland.

BARGAIN Offer: Burgess miniature Microswitches, 1in. by 1⅛in., 3-terminal, six for 10s., post 1s. 6d. Pye or Marconi speakers in metal cases, ex-radio telephone gear, price 7s. 6d. each, post 2s. 6d. American power meters, 60-watt, Type ME-11A/U, £5. Other bargains, s.a.e. for list.—Worthing Radio, 7 Coronation Buildings, Brougham Road, Worthing, Sussex. (Mail Order Only.)

SALE: Walkie-Talkies on 28 mc band, at 10 gns. the pair.—Teleradio, 325-7 Fore Street, Edmonton, London, N.9. (Tel. EDMonton 3719.)

EXCITING New Illustrated Catalogue No. 17 of Government and manufacturers' surplus electronic equipment. Also a large selection of new miniature components and semi-conductors. Ready end of January. Send for your copy now, price 3s. post free.—Arthur Sallis Radio Control, Ltd., 93 North Road, Brighton, Sussex.

VHF Rx required in EXCHANGE for, or will Sell, top-quality Hi-Fi amplifier system (stereo-mono). E.M.I. stereoscope, preamp. self-powered, every facility, two power amplifiers, Armstrong A10 Mk. II, and Goodsell custom-built Mullard 20-watt. All in mint condition. Offers or proposals?—Newstead, 79 Pinnacle Hill, Barnehurst, Kent.

NORTH OF ENGLAND Firm invites contact with all potential Trade suppliers of amateur and electronic equipment.—Box No. 4434, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

AVAILABLE: Eddystone EC-10's from £35; HRO-MX receiver, complete and mint, £25; Honda E(IV) 300 generator, brand new, £63; NCX/D, £35; other equipment available. Appointed "Electroniques" dealer. Exchanges and Enquiries welcomed. Write or call.—Moecan Electronics, Westbury Road, Cheltenham (24217).

UNITS from K.W. ELECTRONICS: Vanguard, 10-160m., as new, £60. Vanguard, 10-160m., £47 10s. Viceroy Mk. I with AC/PSU, £65. KW-160 (Top Band AM/CW Tx), £18. KW-2000, DC/PSU Mk. I, £20. KW-2000 DC/PSU, as new, £28. K.W. Viceroy, Mk. II, £90. **Eddystone Receivers:** 888, £45; 680X, £65; 750, £35; 740 with speaker, £32 10s. **Lafayette** HA-350, with calibrator and 160m. coverage, new, £79. **National:** NC-109, £45; HRO with PSU and Coils, £20. **Drake** TR3, with AC3 and RV3 VFO, £265. **Star** SR-550, new, £40. **Hammarlund:** HQ-170, 110v., £90; another HQ-170, 110v., £110; HQ-145X, 240v. AC, £85. **Hallicrafters** SX-117, £120. **Labgear** LG-300, with AC/PSU and Modulator unit, £65. **Clegg** Interceptor VHF Rx, covers 2m. and 6m., including HF band converter 3-31 mc, for AM/SSB, £105. HP available on all items over £45; one-third deposit with balance over 12, 18 or 24 months.—**K.W. Electronics, Ltd., Vanguard Works, 1 Heath Street, Dartford (25574), Kent.**

SMALL ADVERTISEMENTS, TRADE—*continued*

FOR AN Informative, Friendly DX Club, try "The World Communication Club of Great Britain." Details from:—Sydney Green, 26 Tolhouse Street, Great Yarmouth, Norfolk.

GRID DIP Meters, Type TE-15, fully transistorised, 440 kc to 280 mc, no trailing mains cables, sensitive 0-50 microamp. indicator, also useful as Phone monitor and field strength meter, complete with 9-volt battery, headphone, six coils and instruction book, price £11 7s., postage 3s. 6d. COAXIAL RELAYS, Magnetic Devices Type 951, 12v. DC operation, impedance 50 ohms, VSWR 1·1:1 to 450 mc, wire-in connections, 37s., post 9d. FET Transistors, 2N3819, 100 mc, 25s. 6d.; TIS34, 200 mc, 37s. 6d. POWER Transistors: BUY10, 90 mc, 10w., 35s.; 2N3053, 100 mc, 5w., 9s. 6d.; BFY17, 245 mc, 2·5w., 17s. 6d.; 40290, 500 mc, 7w. (two watts output at 145 mc), 62s. UHF Transistors: 40235, 1200 mc, NF 3 dB at 145 mc, 10s.; ME3011, 800 mc, 5s. 6d. VALVES Transmitting: 6146, 31s.; TT21, 35s.; 6DQ5, 39s. 6d.; QQV03-10, 27s. 6d.; 2C39A, 65s. TUNERS, transistor, "Electroniques" Type HB166T and GC166T, £15 15s., post/packing 5s. IF strip, 1·6 mc crystal filter, IFA-1·6 mc-SSB, £8 17s. 6d., post/packing 3s. PZT Filters, 455 kc to 470 kc, 2·3 kc bandwidth, suitable Rx or SSB generators, £4 10s., post 1s. ONE ONLY BC-221, perfect, and with stabilised PSU, price £23; prefer buyer collects. Send stamp/s.a.e. for full lists.—Elliott, 3 Sandgate Avenue, Tilehurst, Reading (28603), Berks. (Ring after 7.0 p.m.)

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Add 25% for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 1/6 Extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, London, S.W.1.

READERS

WANTED: A knowledgeable amateur to build a receiver to certain broad specifications. Advertiser will pay for components and give a good Marconi 52 Set in exchange for work.—Ring Pank, Potters Bar 58333, 6.30-9.0 p.m.

SALE: R.C.A. Model AR-8516L Radiomarine Communications Receiver, coverage 80 kc to 30 mc in 18 continuously tunable bands, all bands above 1·2 mc being covered in 2 mc sectors. Triple-conversion 18-valve superhet, with self-contained PSU for 230-115v. AC. Receiver is as brand new and can be seen by appointment. Price £75, complete with instruction book.—Webb, 35 Woodfield Road, Solihull (2731), Warwickshire.

FOR SALE: Eddystone 840C, £35. Codar Preselector, £5. Eddystone Type 935 speaker, new, 35s. Eddystone doublet aerial, 40s. PCR-3 Rx, with PSU and headphones, in new condition, £8. Sell whole lot for £45, or separately. Owner emigrating.—Crockett, 92B Earls Court Road, London, W.8. (Tel. WEStern 4041.)

SELLING: Top Band AM/CW Tx, with ATU. Stabilised PSU, 0-350v. at 125 mA, and 6·3v. Also a Monarch typewriter. The lot for £25, or will EXCHANGE all items for good Communications Receiver.—Turk, G3PQC, 102 Manor Road, Farnborough, Hants.

SALE: QP-166 Quoilpax, Eddystone 898 dial, stabilised PSU, including 100 kc crystal marker unit, all fitted in aluminium cabinet, price £12 10s. Q-multiplier, 1·6 mc IF, self contained in ali. cabinet, with power supply, £4.—Jamie, G3TKM, QTHR.

SELLING: Converter for 70 cm., Model 3N70, with built-in PSU, IF tunable 26 to 28 mc, price £8 10s. Pre-amp. for 70 centimetres, transistor AF186, 40s. Postage extra.—Perrin, G8ALY, 30 Franchise Street, Kidderminster, Worcs.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: Eddystone 888A receiver, recently overhauled by makers, price £75.—Bushell, GW3OSV, Park East, Clarbeston Road, Pembs, West Wales.

WANTED: Met. balloons, your price paid.—Fish, G4MH, 28 Banks Avenue, Golcar, Huddersfield (54650), Yorkshire.

WANTED: Air Ministry Power Unit Type 247 (giving 600v.), also transformers 300-0-300v. at 150 mA, 6·3v. 6A. Also two TU units, or their cases in good condition. SALE: K.W. low-pass filter, 30s. —Jagger, GW3KAJ, 27 Penmaen Walk, Culverhouse Cross, Cardiff, South Wales.

SALE: Veritone CR-150 receiver, 550 kc to 30 mc in four bands, with bandspread, S-meter, BFO, in almost new condition; will demonstrate. Price £17, buyer to view and collect.—Winwood, 26 Somervell Road, South Harrow, Middlesex.

SELLING: In excellent condition, an Eddystone 680X receiver, price £65 or near offer.—Krailing, 21 Bailey Close, Frimley, Camberley, Surrey.

FOR SALE: Oscilloscope, Erskine double beam type 13A, £15, with handbook. Marconi CR-300 receiver 15 kc to 25 kc, £8. ASB7, ASB8 receivers for 70 cm., £3 each. Minimitter 160m. receiver, transistor type TR7, £6. 1000 mc unit, 4/2C39's in cavities, £6. Driver and PA stage, suit 70 cm., complete with 4X150D, £5. Marconi mobile trans-ceiver, suitable 4m., £3. Marconi vibrator pack, 40s. 4m. 50-watt transmitter, crystals, QQV06-40, £15. 4m. 4-element J-Beam, as new, £3. R.220 receiver, tunable 4m., £3, with circuit and crystal. Hallicrafters rotary /vibrator power unit, 12 volt DC input, 250v. 70 mA "receive," and 350v. 165 mA, 255v. stab. "transmit" outputs, £4. Eagle RF45 field strength meter, 40s. Cavity wavemeter, 350 to 450 mc, £4. Command Rx, coils for 160m., 80m. and 10 to 12 mc for 2m. converter, £3. Two-metre converter, 40s. Command Tx, pi-output, 160m., with built-in modulator, £3. Command Tx, 80m., 40s. 80m. to 10m. PA, 829B, 6L6 clamp, £3. 85 kc IF's, 4s.; BFO's 3s. 813 and base, 25s.; 2C39A with some plumbing, £1; 4X150D, £1. R.C.A. 8121, 235 watts at 470 mc, offers? 803, 807's, 1616, TZ40's, 816's, 832's, 829B's, 6L6's, and lots of other valves—state your wants and name your price. Also transformers, all voltages. Power units from 250v. to 500v.; state your needs.—McCann, G3AZI, 105 Todd Lane North, Lostock Hall, Preston, Lancs.

SALE: Hammarlund Super-Pro receiver, 18 valves, outside appearance rough but electrically sound, separate bandspread tuning, price £30 or offer.—Ring BLUebell 9882, after 8.0 p.m.

WANTED: Transistor Test Set and Grid Dip Meter. For SALE: Mullard High-Speed Valve Tester, Model E.7600/4, price £30.—Box No. 4421, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Marconi 52 Rx, aligned and overhauled December '65, price £7, with handbook. Buyer views and collects.—Clark, 9 North Bridge Street, Shefford, Bedfordshire.

WANTED: R.216 Receiver, with mains PSU and handbook or circuit.—Jones, G3PIX, 24 First Avenue, Foresthall, Newcastle-on-Tyne, Northumberland.

OFFERING: An R.107, coverage 1·2 to 17·5 mc, in good condition with manual, at £11. Buyer inspects and collects, evenings or weekends.—Thompson, White House, Tollerton, York.

FOR SALE: Eddystone EA-12 receiver, £145 or near offer. Also 4-metre converter, IF 28 to 30 mc, £5. —Phillips, G3PXX, QTHR.

SALE: R.C.A. AR88D in good condition, with headphones, vibrator PSU and manual, price £35 or offer.—Green, Tanglewod, Poolhead Lane, Tanworth-in-Arden, Solihull, Warwickshire.

WANTED: A good GDO, also coax aerial changeover relay for 12v. or 24v. working. Please state condition and price.—Critchley, G3UTK, 63 Rachael Gardens, Park Hill, Wednesbury, Staffs.

SMALL ADVERTISEMENTS, READERS—*continued*

SELLING: Marconi 52 Set, with case and built-in PSU, £10. Type 22 Set, Tx/Rx, with 12-volt PSU, £7 10s. Heathkit balun coil set, 50s. Four-metre Tx, with PSU, leads, crystal, Ae. changé-over unit, etc., £5. Top Band Tx, with PSU, £5 10s. Teleprinter Type 7B, set up for 45 bauds, £12. F.S. 10 T.U. set to drive 7B, £7. F.S.1.1.X T.U., working, £8. G3LOK Rx, as per specification, double conversion, crystal-controlled 2nd mixer, S-meter, noise limiter, mains PSU, Eddystone drive and dial, needs calibrating, price £10. Rack mounting 'Scope, 33 valves, datum meter, wideband Y-amplifier, a laboratory 'scope with circuit details, etc., £35. Two-metre Tx RF section, requires PSU, 50s. WANTED: Heathkit RA-1 Rx for amateur bands only, or similar, or bits. —Tynan, G3SJR, 29 Elm Walk, Stevenage (51297), Herts.

FOR SALE: Codar A.T.5 Tx, £14. AC/PSU, £6. Codar PR-30X Preselector, £6. Eddystone EC-10 Rx, £35. RF-40 field strength meter, 30s. Olympic 75-watt Z-match, £5 10s. Class-D Wavemeter, AC, 65s.—Box No. 4422, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Codar CR-45 TRF receiver, coverage 150 kc to 30 mc, £5.—Smith, 39 Cherry Tree Road, Rainham, Kent.

SALE: Drake 2B receiver, with Q-multiplier, calibrator, full coverage of Top Band and 10 metres, matching speaker, new July '64, serial 10706, price £95. Also Eddystone 940, new January '64, serial D00518, price £80. Both receivers perfect electrically and mechanically. Carriage paid U.K. — O'Kane, GI3OTV, 15 Shandon Park, Belfast 5, Northern Ireland. (Belfast 653821.)

FOR SALE: K.W. Vanguard, coverage 10-160m., immaculate '65 model, blocked grid keying, price £55. RX-60, in good condition, £10. R.1155, not so good, but working, no PSU, 40s. All carriage extra. WANTED: Good specimen of a KW-160.—G3TSS, QTHR.

WANTED: Three Ch.44 crystals for G2DAF receiver. — Cox, 59 Berkeley Road, Shirley, Solihull, Warwickshire.

WANTED: Urgently, manual, circuit or any notes on R.106, HRO. Will buy, or copy and return ; all postage repaid. — McLachlan, 66 Haigh Street, Halifax, Yorkshire.

SELLING: Mosley TA-33Jr. antenna with 55ft. of coax feeder, all in perfect condition, £15.—Delamothe, G3VIE, 17 Clifton Road, Wokingham, Berks.

OFFERING: Three URC-4 Walkie-Talkies, modified and working on 145·2 mc, at £5 each or 70s. less xtals. AM/CW table top transmitter, running 50w. on 10 to 160 metres, fully self-contained, size 18in. by 10in. by 18in., professional appearance, price £20 or near offer. Heathkit Mohican, in good condition and unscratched, £20 or offer.—Sylvester, G3RED, 10 Ivy Grove, Gunthorpe, Peterborough (72282), Northants. (Ring after 6.30 p.m.)

FOR SALE: Brand new Codar T.28 transistor mobile receiver for 80/160 metres. Duplicated Christmas present! Never used. Price £14, no offers.—Box No. 4424, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BARGAIN; A Gonset GSB-100 SSB Transmitter. This high-quality American Tx is new, was acquired under special circumstances, and is surplus to advertiser's requirements. Coverage 10 to 80m., and self-contained, price £110 (Middlesex area).—Box No. 4425, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: National HRO-MX receiver, in very good condition, with PSU, ten coils, spare valves and speaker, price £17 10s. Four-metre nuvistor converter, IF at 12 mc, £3 10s.—or the two together for £20. WANTED: Vibrator transformer for B.44.—Griffiths, 34 Ebbisham Road, Worcester Park, Surrey.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Linear Amplifier. SELL: a Hallicrafters SX-140 receiver, as new, with handbook, £20.—Box No. 4423, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING UP! For super-duper bargains in amateur UHF equipment and good quality components, phone NORth 3456, visit or write G8AHT, QTHR (after 7.0 p.m.).

URGENTLY Required: Copy "QST" for June 1959.—Whelan, EI6AU, 44 Synge Street, South Circular Road, Dublin 8, Eire.

SALE, for £25. Unmodified HRO-5T, with PSU, nine coil packs and ATU, also latest edition "Amateur Radio Handbook." Buyer to collect. — Bowker, 8 Lytham Drive, Heywood, Lancs.

OFFERING: Brand-new Eddystone 940, complete with matching plinth speaker, 6in. matching Hi-Fi set top speaker, spare set of new valves, one pair Brown headphones, at £90. Also complete home stereo Hi-Fi kit, with VHF radio, Mullard 10-10 amplifier, two and three cu. ft. speaker cabinets, Labcraft trans. deck, and B & O balance arm, at £80. Will deliver to 100 miles.—Wilson, 188 Anns Hill Road, Gosport (81303), Hants.

FOR SALE: KW-2000, in mint condition, £165. Heathkit Q-multiplier, £5. Heathkit reflected power meter, £5. Minimitter LP filter, £3. Hallicrafters mobile PSU, 250v. at 70 mA and 300v. at 165 mA, £3. Redifon RTTY terminal unit Type ZA.39384, new, £7 10s. Mosley TA-33Jr. beam, £15. Prefer buyer collects.—Foggo, G2COP, Lovely Cottage, Wichenford (301), Worcester.

SELLING: Lafayette HE-30, factory built, bargain at £22, or EXCHANGE for a good AR88D, with cash adjustment. Morse tuition Course, three LP records, two unused, 55s. Eleven vols. "Basic Electrics & Electronics," suitable R.A.E. study, in mint condition, price 85s.—Pryse, 36 Hart Road, Byfleet, Weybridge, Surrey.

OFFERS? National HRO-MX, with coils, PSU and speaker, asking £13 10s. or offers.—Greene, 29 Oxford Road, Calne, Wilts.

SALE: Canadian Marconi 52 receiver, £10, carriage paid.—Taylor, GM3UNJ, 23 Haughgate Terrace, Leven, Fife, Scotland.

WANTED: One or two valves type 6FM8. State price and condition.—Gibbon, 11 West Chapelton Crescent, Bearsden, Glasgow, Scotland.

WANTED: Radio direction-finder, covering 200 to 400 kc, aircraft beacons, etc. on medium-wave, preferably portable.—Pearce, 11 Pipers End, Wolvey, Nr. Hinckley, Leicestershire.

SELLING: K.W. Viceroy Mk. IV SSB transmitter, coverage 10 to 80 metres, with built-in PSU and aerial c/o relay, extra half-lattice filter, Vox and p-t-t, 180 watts p.e.p., in new condition; cost £165, accepting £120. Also KW-77 receiver, 10 to 160 metres, with built-in xtal calibrator, slot filter, etc., in new condition; cost £120, accept £95.—Garrett, 21 Meadow Road, Tonbridge (61656), Kent.

FOR SALE: KW-160 Top Band AM/CW Tx, £10. Eico 60-watt CW Tx, 10-80m., with auto-transformer and provision for VFO input, £12. Both these in excellent condition. During business hours 9-12, 2-5 telephone Hooton 3458.—Noakes, 359 Chester Road, Little Sutton, Wirral, Cheshire.

DISPOSAL: New Top Band transceiver, £15. Top Band transmitters, new ex-marine units, £4. CR-300 receiver, requires attention, £4. Pair field telephones, 40s. Must clear meters, valves, transformers, etc., any offers? Unused transistorised tape recorder, £11. Offers invited for a Hammarlund SP-600 JX6 receiver.—Cain, G3DVF, 18 Oaky Balks, Alnwick (2487), Northumberland.

FOR SALE: Swan 270 three-band Transceiver, with Swan AC/PSU and a p-t-t ceramic microphone, all in excellent condition, price £129.—Porter, High Street, North Thoresby (268), Lincs.

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 trawler-band R.1155 in original R.A.F. issue condition! An unbutchered, 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 440SL microphone. Also National NCX3/NCXA and NCX-D PSU's and mobile microphone. 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 75-A or 51-J, or the Sommerkamp. Any Collins equipment considered.—Kirkbride, 39 Byron Road, Colne, Lancs.

SELLING: R.107 receiver, coverage 1·2 to 17·5 mc in three switched wavebands, in really tip-top condition, with manual, at £13 10s., or some reasonable offer in that region.—Welsh, G3NQW, 16 Lloyd Road, Worcester Park, Surrey. (Tel. DERwent 0720.)

SALE: R.107 and RF-24, coverage 10 to 160m., with PSU Type 234A, a complete Rx station, in excellent condition, price £14, delivery in Birmingham or Derby areas.—Chadderton, 45 Harewood Road, Allestree, Derby.

WANTED: Heathkit SB-10U, will collect over reasonable distance. Offers, price?—Gadsden, G3JZW, 17 Drovers Way, Dunstable (64086), Beds.

OFFERING: Heath SB-400E and SB-300E, as new, will separate.—Stagg, 2 Jackson Close, Easthampstead, 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, G3KDB, 28 Scotch Orchard, Brownsfield Park, Lichfield, Staffs.

FOR SALE: Home-built two-metre Exciter, 15-watt, no valves. Two-metre to 70-centimetre tripler for pair QQV02-6 (not included). Inverter transformer, 12-volt 100w., unused. All items on offer.—Jarvis, G8APX, Royal Masonic Senior School, Bushey, Herts. (Callers by arrangement only.)

OFFERS, Aerial Opportunity: Hy-Gain TH3 Tri-Bander Beam, cost £40. CDR Rotator Type AR22, with 80 feet of cable, cost £19. Tower, in five sections, each 8ft. by 18in. by 12in., to build to 40ft., no guys. Beam carriage, slides on track, complete with shaft, hand-winch, cable and rotator brackets, cost £75.—Faulkner, GC3MLR, Sentosa, Sous l'Eglise, St. Saviour's, Guernsey, Channel Islands.

FOR SALE: Eddystone 840A, less than 100 hours use, in mint condition, £28 or near offer?—Mills, 2 Barnhey Crescent, Meols, Wirral, Cheshire.

SALE: Steel tower, 40 feet, by Francis & Lewis, in as-new condition, £30 or offer? Buyer collects.—Cheffings, G3NGE, Grimoldby, Louth, Lincs.

QUICK Sale: One AR88LF, needs slight attention, otherwise FB; also R.206, less connectors but with AC/PSU. First £30 takes both.—Oliver, G8ANJ, QTHR. (Tel. 018 88 8729.)

EXCHANGE: Any make of camera, projector, enlarger, binoculars, etc., new or second-hand, for communications receiver and Tx equipment.—York Photo Service, 51 Fossgate, York (56176).

IMPECUNIOUS Student selling (October 1966) KW-2000 and AC/PSU, £170. Complete two-metre station: Withers TW2, 6DS4 converter, neat home-built PSU and modulator, BC-454, all wiring and Londex relay, £32. QQV06-40A, 20s. Neat 160-metre Tx, £4.—Mellett, G3PIJ, c/o Ellerslie, Derby Road, Sandiacre, Derbyshire.

SMALL ADVERTISEMENTS, READERS—*continued*

OFFERING: Beginner's mini-station complete. Comprising mint Codar A.T.5 transmitter with recommended microphone, mains PSU, Joymatch ATU, Class-D Wavemeter (mains modified), plus lively Eddystone EC-10 receiver. Faultless service, but owner now going Transceiver. Test and take away as package deal for £52, no offers.—Mayall, G3VPH, Droitwich 3089.

SALE: Marconi Crystal Calibrator, 10/100 kc/1 mc, with PSU, £10. Plessey QRO 70 mc PA unit, with QQV06-40A, £15. VHF Command Rx, 118-148 mc, FB receiver, £10. Brand new 4X150 valves, with bases, £6. Ditto 4/250 with base, £9. Twomobile, with speaker, £20. Two-metre converters, FB performers, £10 each. Tiger 70-cm converter, IF 14-16 mc, £12. Eight-over-eight 70 cm. beam, with balun, £4. New type two-metre 6-over-6, £5.—Box No. 4428, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Eddystone 680X, with angle mounts and speaker, £60. National HRO, with nine coil packs and PSU, £20. Twomobile, £20.—Box No. 4429, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

GETTING MARRIED! So selling AR88LF, modified BFO for SSB, S-meter, new grey-hammered case, completely rewired with p.v.c., using new components, now perfect and in as-new condition, probably the best "LF" in the North, price £40; prefer collection, if possible. Also two 230v. power Selsyns, suitable for beam rotation, 40s. each.—Ollerhead, G8ALA, 36 Park Drive, Ellesmere Port (3854), Cheshire.

SALE: Trap vertical, Type 14AVQ, with 80-metre coil, £14. Woden transformers: UMØ, 40s.; UM1, 55s. Pair TT21 Tx valves, 27s. 6d.—Meaden, G3BHT, 14 Aulton Road, Sutton Coldfield (021-308-4764), Warwickshire.

FOR SALE: LA-600 linear amplifier, as new, £50 or offer? **Heath HW-32** transceiver and 250v. PSU, in perfect condition, £55 or offer? **T.W. Twomobile** two-metre receiver, £25, and **T.W. Topmobile** 160-metre receiver, £15. Both these excellent and in as-new condition.—**Fisher, G3UBI, 264 Caldene Avenue, Mytholmroyd, near Halifax, Yorkshire. (Tel. Calder Valley 3166.)**

SELLING: R.C.A. AR88D, in excellent condition, with S-meter, spare set valves, and manual, price £40.—Sanders, 63 Plumptre Way, Eastwood, Nottingham.

FOR SALE: Marconi Attenuator, Filter Unit Type 7539A, attenuation 7 to 13 dB at 3·6 to 4·2 Gc by vernier control. In immaculate condition, offers?—Box No. 4430, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

CHANCE OF A Lifetme! Complete two-metre Station, for fixed and mobile (this gear has worked 10 countries) comprising TW2 Tx, Twomobile Rx, mains and 12v. PSU's, halo aerial, switchery, speakers, etc., only £45, all in. Also complete HF Station: Harvey-Wells matching Tx/Rx, 90-watt AM/CW, coverage 10 to 80m., with full BK and p-t-t. This rig has made it a winner in the States. With handbooks and microphone, terrific value at £50. Also Hallicrafters SX-110, a beautiful general-coverage receiver, with calibrated bandspread over amateur bands, xtal filter, etc., with handbook, price £45.—Francis, G3LOV, 35 Downs Wood, Epsom Downs, Surrey.

SALE: BC-342, as new and unmodified, with manual, £24. Pve "Ranger" high-quality mobile equipment, in excellent condition, £15. T.W. nuvistor two-metre converter. IF 4·0 to 6·0 mc, new, £10. QQV03-20A and QQV06-40A, both unused, 50s. each. New U.S. Navy Bausch & Lomb binoculars, 7 x 50, with case, £23. WANTED: VHF converter Type AM913/TRC; AR88D in mint condition; Hallicrafters S.36A; TV/7U Valve Tester. Offers or exchanges?—Box No. 4431, Short Wave Magazine Ltd., 55 Victoria Street, London S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

SELLING UP! R.C.A. AR88, new cabinet and rewired in p.v.c., price £30. Codar Q-multiplier, unused, £5 10s. Codar preselector, £5. Type 10 Crystal Calibrator, £5. Buyer of all this lot gets remaining contents of shack free, including headphones, Morse keys, 100's unused components, transistors, RSGB and ARRL "Handbooks," etc., etc.—Bailey, 38 Bennett Road, Cleethorpes, Lincs.

FOR SALE : National HRO, with PSU and nine coils, price £20 or near offer ?—Baulch, 30 Lias Road, Street, Somerset.

SELLING : Home-built copy KW-500 linear amplifier, with 813 PA, 1750-2000v. PSU, 16 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 to 9·0 mc, 20s. Grey hammer receiver cabinet, size 17 x 19 x 12in., 20s. Matched pair OC28's, with 12v. 4-amp. transformer for transistor PSU, 20s. VCR-139A, new, 12s. 6d. Collect or carriage extra. — Edwards, G3KGN, 126 Danescroft Drive, Leigh-on-Sea, Essex.

UNUSED Gift : Hamgear P.M.I. preselector, with PSU, circuit and instructions, new, price £6. Also Codar CR-45, in good condition, with coils and manual, £5.—Bluck, Elms Farm, Stoke Prior, Bromsgrove, Worcs. (Tel. Hanbury 235.)

FOR SALE : Eddystone S.750 receiver, in excellent condition, complete with S-meter and matching speaker, price £35. Carriage extra. Exchanges. WANTED : Heathkit DX-40U, Panda Cub.—Griffiths, G2DFH, 4 Westbourne Terrace, Saltash, Cornwall.

OFFERING, Gone SSB : Elizabethan Tx, coverage 10 to 80m., complete with PSU, modulator, microphone and spares, £20 or near offer. Buyer collects.—Edwards, 2 Newlands Lane, Culvestone, Meopham, Kent. (Tel. Fairseat 503.)

SELLING : 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, Queensbury, Bradford, Yorkshire.

FOR SALE : Heathkit DX-40U, with VF-1U VFO and two xtals, 7025/7125, price £30. (Lincs.).—Box No. 4432, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE : Hammarlund HQ-170, as new, £90. AR88D, in excellent condition, with S-meter, speaker, trimming tools, handbook and spares, price £45. T.W. two-metre Tx, £23 ; T.W. two-metre nuvistor converter, IF 24 to 26 mc, £10 ; both these as new, together £30. Home-built 100w. two-metre PA unit, silver-plated anode lines, QQV06-40 with clamper, 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, £6. Heathkit Sig. 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 5in. speaker, 10s. Offers considered ? All items carriage extra.—Belcher, G3RLM, Hollyoaks, Courtmead Road, Cuckfield, Sussex. (Tel. Haywards Heath 4233.)

SALE : Panoramic Adaptor, type ALA-2, price £7 10s. Command Rx, 6·0 to 9·0 mc, £3 10s. Heavy-duty 3-phase centrifugal blower unit, £5. G.E.C. BC-342 receiver, coverage 2 to 20 mc, with mains PSU, £20. Tunable IF converter, 23 to 26 mc, output at 1·6 mc, £3. Transistor invertér, 12v. to 250v. at 80 mA, 50s. BC-640 units, modulator, power pack, PA and driver, £4. T.1131 power packs, £3 10s. Valves : 811, TZ40, 813, 24G, RG1/240, 10s. Four-bay skeleton slot 70-centimetre aerials, 50s. Also a 40-element stack, £4. Telequipment type WG4 pattern generator, £9. — Sharrock, G3BNL, The Poplars, Delville Avenue, Keyworth, Notts. (Tel. Plumtree 2624.)

SMALL ADVERTISEMENTS, READERS—*continued*

SELLING: Two-metre crystals 8040 and 8044 kc, 5s. each. Class-D Wavemeter, with headphones and spares, 60s. 807's at 2s. each. SCR-522 driver transformer, 3s. **Books in mint condition:** "New RTTY Handbook," 20s.; ARRL "VHF Manual," 14s.; "Surplus Conversion Manuals," Vols. I and II, 15s. each; SCR-522 manual, 200 pages, 20s. Pse add 10 per cent for postage. **Send s.a.e. for lists of components, valves, variable condensers, books, etc., at give-away prices.** Must sell to make space.—Box No. 4433, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Lafayette KT-320, as new, professionally built and aligned, with speaker, price £20. —Marriott, G3VWC, 21 Thorley Hill, Bishop's Stortford (4796), Herts.

SELLING: Two-metre 10w. Tx, complete with modulator, in cabinet 6 x 6 x 8in. deep, with companion PSU on similar chassis, £20. Two-metre mobile Communicator, comprising Withers Two-mobile Rx, 25-watt Tx running QQV03-20A in PA, with high-efficiency modulator, two inverters 500v. and 300v., 12v. positive earth, all self-contained in cabinet 10 x 10 x 8in. deep, numerous 50-mile contacts using halo only, £48 complete. Pair 4X150A's, 30s. Cossor 'scope Model 1039M, new, price £10. G6JP-type two-metre converter, A.2599/A.2521, IF 24 to 26 mc, with PSU £9.—Spackman, 175 Marlborough Road, Swindon (5949), Wilts. (Ring evenings.)

SALE: Jap Bug Key, as new, £3. Prefer buyer collects, or post-packing extra.—Kemble, G3UYK, QTHR for weekends, or Dunston Hall, Dunston, Stafford on weekdays.

FOR SALE: Treco 'Scope, as new, £15. Gardner transformer, 450v. 500 mA, 6v. 10 amp., 5v. 6 amp., perfect, £4. Two-metre converter, VQ4EV type on copper chassis £3. Copies "Short Wave Magazine," 1952-62; "QST," 1952-63; RSGB "Bulletin," 1952-62; offers? Buyer collects equipment.—Francom, 216 St. Helier Avenue, Morden, Surrey.

WANTED: BC-221 in really good condition, with original charts, etc. All letters answered.—Higgins, 23 Ayres Road, Brooks's Bar, Manchester, 16.

AMATEUR Prices for the Amateur. AR88D's, re-aligned, working, £27 less case; one only, original case, re-sprayed, £32; with brand new crackle case, £36. Scopes: Erskine Type 13 tested to specification, £17; ditto, 13A, improved version, £19; CT52 miniature, working to specification, £16; Mullard GM5152/65 3in. working FB, ideal for hamshack, £11; Cossor 339A, working, £10; Cossor 1091, as new (cost £85), £25; Dumont 224A, £15. Test Set 37, TF410G, £7. Pye PTC 262 Base Station Tx/Rx in the 125 mc range, 5 off for £20 as-is. Type 1392 VHF Rx, £3; mains PSU for ditto, 30s. Rx R54/APR4 c/w TN16 Tuning Unit 38-95 mc, £10. Test Osc. TS170/ARW5, £10. P58 Rx, £5. Rectifying Unit RA34H, £10. Ex-BBC Tx, xtal controlled, Hi-Fi FM, 260-350 mc, easily modified, made by General Electric U.S.A., lumpy, 3/off, £50 the lot c/w handbook. Marconi Wave Analyser TF455D, £20. Signal Generators, TF144G 85 kc to 25 mc, £16 working FB; GR605B 9 kc to 30 mc, £25. Hewlett Packard TS535A/U, 7/160 kc, £18. Marconi Xtal Calibrator, £7. Marconi Valve Voltmeter TF428B, £7. Xtals 500 kc, 10X, 7s. 6d. 10XJ 4500 and 5000 kc, 10s. 6d. Headphones: Amplivox low imp. lightweight c/w boom mike, £2; ditto less mike, 25s.; ex-RAF, chamois earcovers, 25s. RTTY desks, ideal for shack, aluminium construction, lino tops, new condx. sizes 36 x 28 and 42 x 28in., price range £5 to £10. Silence that 7B with cover and baseboard, re-sprayed, £3. All prices carriage extra. Few special valves, new, send for details or give me your requirements. Offers required for Club Heathkit SB-10U. WANTED: Q-Meter, TF329G. Details s.a.e. a pleasure.—G3LSD, Netherton Cottage, The Elms, Stoke Damerel, Plymouth (51245).

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Heathkit DX-100U, with SB-10U Sideband Adaptor, price £75. Lafayette HA-350, £55. All as new; adaptor and receiver seven months old; will deliver to reasonable distances. Transformers: 2 off, 550-0-550v. 500 mA, new, at 45s. HRO S-meter, unused, 30s. Advance Signal Generator, Model P1, 100 kc to 100 mc, little used, price £15.—Thompson, G3RCZ, 134 Royal Oak Road, Manchester, 23. (Tel. Wythenshawe 2897.)

FOR SALE: R.C.A. AR88LF, with manual, de-luxe type Joystick, and ATU, price £40.—Howieson, 188 Tresta Road, Glasgow, N.W., Scotland.

WANTED: K.W. Valiant, will collect from around 50 miles.—G3RFG, QTHR.

SALE: KW-77, in mint condition and as new, best offers over £70?—White, G3HCU, QTHR. (Tel. Abinger 215.)

WANTED: National HRO Senior receiver, table top model, complete with nine bandspread coil packs, PSU, speaker and manual. Must be in good, clean condition. Write with price and full details; all letters answered. (Lancashire area.)—Box No. 4435, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Hallicrafters S.36, coverage 27 to 143 mc, slightly modified to increase bandwidth, guaranteed in good working condition, and complete with transformer and manual, price £33 or offer? Also Hallicrafters S.95 receiver, 154 to 174 mc, working but needs trimming up, £15 or offer? Delivery within 75 miles of Leeds.—Box No. 4436, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Eddystone 940, as brand new; Eddystone 840A, grey; Heathkit RG-1; both latter mint. WANTED: Receivers EA-12, 888, SX-140, all in mint condition.—Andrews, 34 Rawcliffe Lane, Clifton, York (59035).

REQUIRED Urgently, Manual for the R.C.A. AR77E. Borrow or buy.—Aylett, 6 Manor Close, Burgess Hill, Sussex.

SELLING: BC-221, with charts and AC/PSU, perfect, £20. R.C.A. transformer 2250-0-2250v. at 500 mA, 70s. New boxed valves: 813, 40s., 7360, 30s.—Marshall, G2MA, 57 Godstone Road, Rotherham, Yorkshire.

BEST OFFERS Accepted for latest model Minimitter Mercury Tx, pair TT21's final; Heathkit OS-1 'scope, new and unused. Enquiries s.a.e.—Lawn, G3HLY, 20 Croft Road, Godalming (3606), Surrey.

SALE: Geloso crystal-controlled VFO G4/105, as new, with crystals and valves, £17 or offer? Eddystone plinth Cat. No. 690 and suitable speaker, 25s. (Herts.).—Box No. 4437, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Printed by The Courier Printing Co. Ltd., Tunbridge Wells for the Proprietors and Publishers, The Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. The *Short Wave Magazine* is obtainable abroad through the following: Continental Publishers & Distributors, Ltd., William Dawson & Son, Ltd. ; AUSTRALIA AND NEW ZEALAND — Gordon & Gotch, Ltd. ; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. *February 1967.*