

The SHORT WAVE Magazine

VOL. XXIV

DECEMBER, 1966

NUMBER 10

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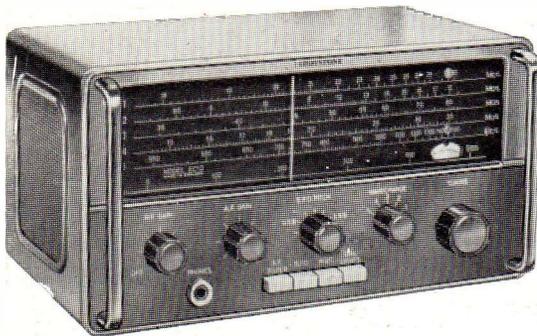
Eddystone RECEIVER

OF MAJOR INTEREST TO ALL RADIO ENTHUSIASTS

EC 10 transistorized communications receiver

A most efficient transistorized communications receiver of light weight, compact dimensions, and capable of a really good performance. Five ranges give continuous coverage from 550 kc/s to 30 Mc/s (545 to 10 metres), and included are the medium-wave broadcast band, the marine (coastal) band from 1500 to 3000 kc/s, and all the short-wave broadcast bands. Also available are the six major amateur bands and many services in between.

The EC10 receiver accepts normal AM telephony and CW telegraphy, a special filter being provided to increase selectivity (and also reduce noise) in the CW mode, as is often desirable. Single sideband signals can



be successfully resolved by appropriate setting of the BFO for carrier reinsertion. A total of 13 transistors and diodes is used, leading to high sensitivity and consistent results on all ranges. The main scales occupy a length of nine inches and are clearly calibrated direct in frequency. The standard Eddystone precision slow-motion drive controls the tuning, which is exceptionally smooth and light to handle. An auxiliary logging scale permits dial settings of chosen stations to be recorded.

An internal speaker gives good aural quality and a comparatively high audio output is available—one can easily believe the set is mains operated. For personal listening, a telephone headset can be plugged into the socket on the front panel, the speaker then being out of action.

Alternative aerial sockets are provided, for dipole, long wire, or short rod or wire. Power is derived from six cells housed in a separate detachable compartment. Current consumption is related to audio output and, for long life, HP2-type heavy-duty cells are recommended.

The receiver is housed in a metal cabinet, and, with robust construction throughout, it will stand up to hard usage over a long period with a high degree of reliability. The finish is an attractive two-tone grey. The dimensions are width 12½", height 6¾", depth 8"; weight with batteries is 14 lb.

Eddystone Radio Limited

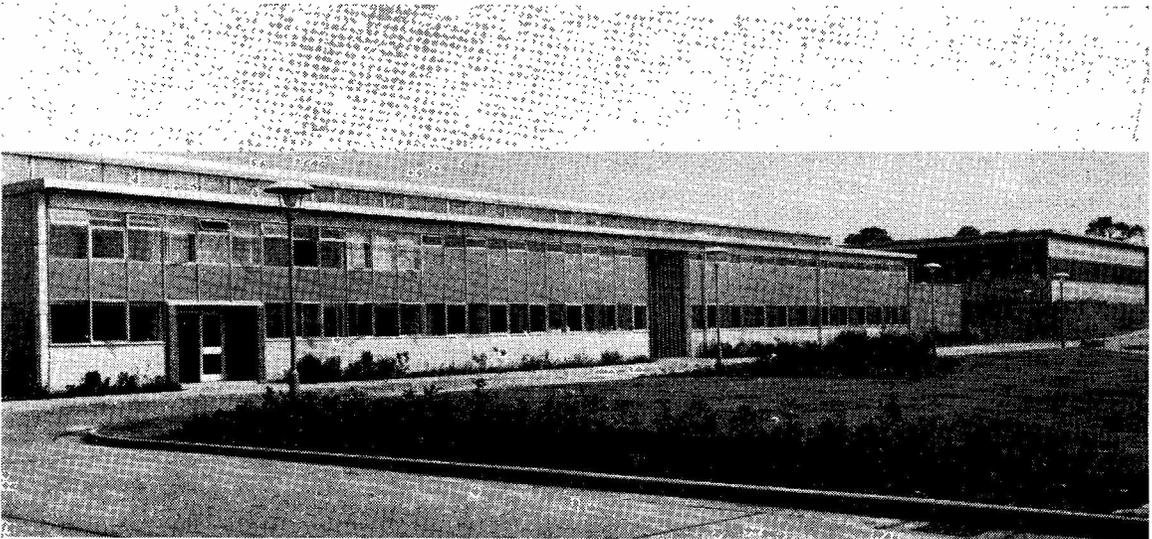
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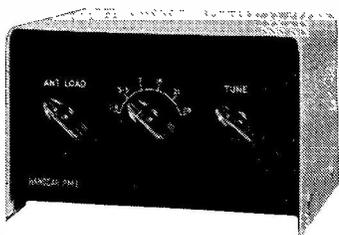
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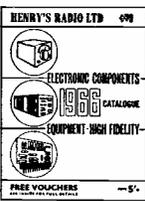
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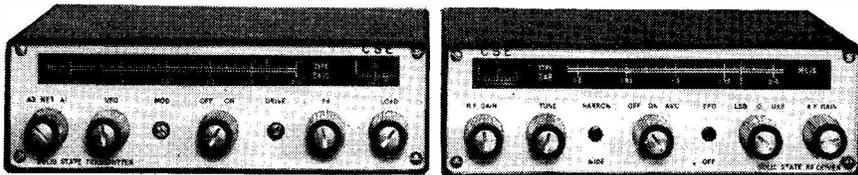
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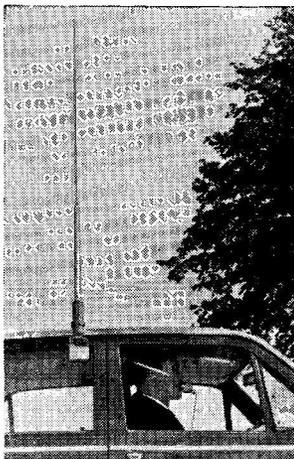


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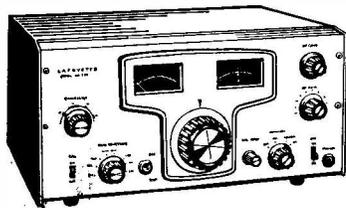
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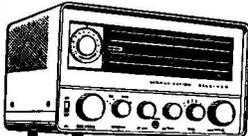
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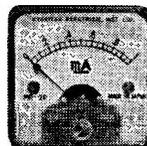
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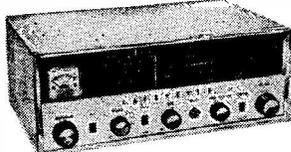
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50.0-50µA	29/6	100mA	22/6	10v	DC 22/6
100.0-100µA	27/6	150mA	22/6	20v	DC 22/6
500.0-500µA	22/6	50mA	22/6	50v	DC 22/6
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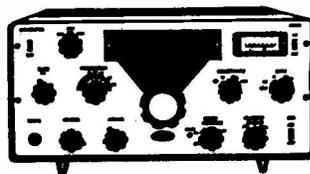
TMRS Receiver	35 0 0
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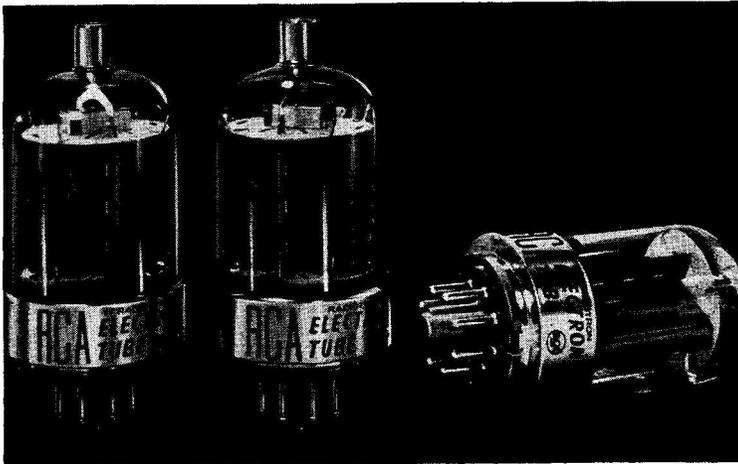
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The RCA-6146B/8298A and RCA-6883B/8032A/8552 have the same built-in, extra RCA advantages, afford higher power input for AM and CW, and are designed for critical mobile applications. The chart lists three popular members of the RCA-6146 family which may be suitable for your rig. And they have all been designed specifically for power tube applications, and rated to do a particular job.

For tabulated data of technical information on specific tube types, see your RCA Industrial Tube Distributor

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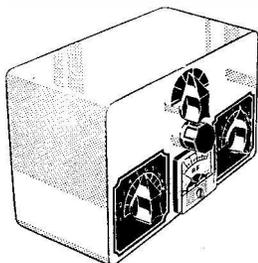
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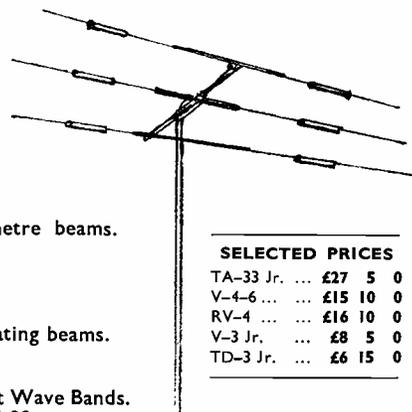
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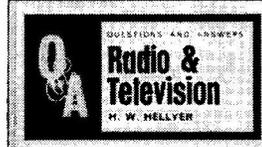
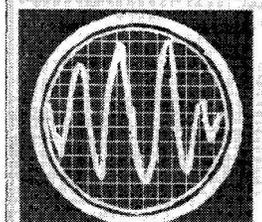
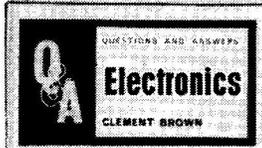
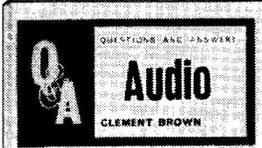
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GB3SWM)

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DECEMBER, 1966

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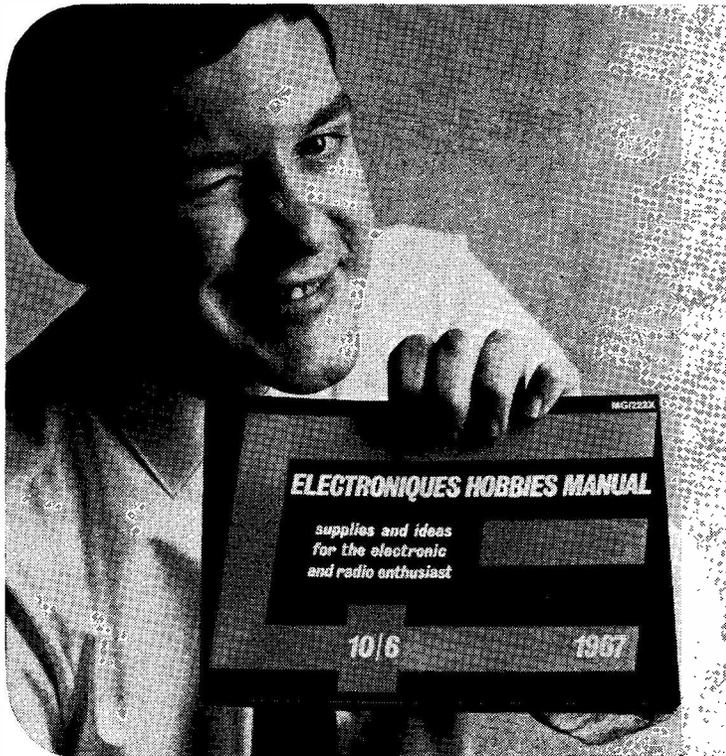
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E D I T O R I A L

Christmas *At this time of year, we put aside all controversial issues and the subjects for dispute and contention—of which there are more than enough in the field of Amateur Radio—so that this space can be used to convey Season's Greetings to all our friends and supporters, at home and overseas.*

And this we do for the 21st consecutive year, by the same hand. Each time, there is the feeling that it could be the last . . . for as the years roll on, the work becomes ever heavier and more exacting. The coverage of "Short Wave Magazine"—even in its own small but highly specialised world of Amateur Radio—now extends from the Arctic to the Antarctic, and from Europe to the Antipodes. And while it is truly said that nothing succeeds like success, it also brings its own problems and difficulties.

But however that may be, as ever our objective will be to maintain the standards and widen the scope of the Magazine. And as always we remain grateful for the support of so many readers and the goodwill of our trade friends.

This is our opportunity to wish them all a Happy Christmas and a Peaceful and Prosperous New Year.

*Austin Forster,
G6FO.*

FIVE-STAGE ALL-BAND SSB EXCITER/TRANSMITTER

Part II

B. A. WATLING (G3RNL)

DEALING WITH CRYSTALS— FILTER ALIGNMENT— CONSTRUCTION DISCUSSED AND ILLUSTRATED—GETTING THE MINI-5 ON THE AIR

The first part of this article appeared in our November issue. It is to be followed by a discussion on a crystal-mixer VFO and suitable Linear Amplifiers.—Editor.

CONTINUING from p.530, November, on the subject of crystals . . . the carrier xtal is not quite so critical, as it only has to oscillate.

But to get the highest-frequency crystal in the filter on the right spot the etching process must be used. The etching solution can be *dangerous* and therefore *must be handled with care*. Ammonia bifluoride is the corrosive used and can be purchased from a chemist in crystalline form. It *must* be kept (and is supplied) in a *plastic* container. The solution to use is 5 parts of water to 3 parts of acid. This also *must* be in a plastic container—one of the detergent containers is ideal. When making up the solution the correct way to do it is best described by remembering "Always do what you oughter, add the Acid to the Water!" (A suitable measuring tool is one of those plastic spoons you get with ice cream or baby foods.) Don't mix up too much solution. A quantity consisting of five of such spoonfuls of water to three of acid has lasted G3RNL through about 20 etchings and it is still active. If you have a detergent plastic bottle with a screw-top this enables the acid to be poured into the lid, for use as the etching bath. A small container of water should also be close at hand when doing the etching, so that if you do spill any acid it can easily and quickly be washed off.

The object then is to move one of the remaining crystals to between 1.5 kc and 2 kc higher than the lower frequency crystal used in the filter. It is difficult to say exactly how long this will take. It has varied with every crystal at G3RNL. The advice is, then, that you put the crystal in for say two minutes at a time initially and check its frequency. It has been found that some crystals start (somewhat alarmingly!) by going *lower* in frequency, so don't be surprised if this happens. Also, within the first five minutes of etching there can be a period when the crystal hardly changes fre-

quency at all, so again don't get worried if this happens. (It could be due to the muck that has deposited itself on the crystal over the years, from around 1940). It is important to rinse off the acid in cold water and dry the crystal completely before putting it back in the holder. It's not necessary to reassemble the crystal holder each time. Just put it all back including the insulating plate and hold in place with your thumb. Different pressures will affect the frequency slightly but if you press firmly but not too hard the frequency difference will not be significant. If you aim for a 1.7 kc spacing between crystals then the 100 c/s you may be out is not going to make much difference. That's it then—it may sound a lot but once you get started it's quite easy.

Frequency Checking

Before going on to alignment: Some readers may be put off by not having equipment to check the frequency differences. Let's suppose you want the spacing between carried and the lower crystal in the filter. Plug the carrier crystal into your test oscillator and zero-beat the receiver, with BFO on, to it. If you haven't got a wavemeter or frequency meter suitable to check these small frequency differences then set up your audio oscillator to about 600 to 700 c/s and detune the receiver HF until the beat note is the same as the audio oscillator note. If you haven't got an audio oscillator then a piano or any musical instrument can be used. Here are some useful audio frequency points:

- 523.3 c/s—1st C above middle C.
- 740.0 c/s—2nd F sharp above middle C.
- 1568 c/s—3rd G above middle C.
- 2093 c/s—3rd C above middle C.

These frequencies are based on orchestral pitch, where $A=440.00$ c/s.

(Those of you who blow your own B-flat trumpet can make your own corrections! And as for those who have perfect pitch you don't need to lug the piano into the shack!)

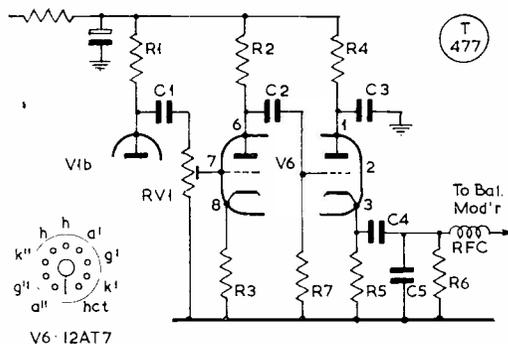
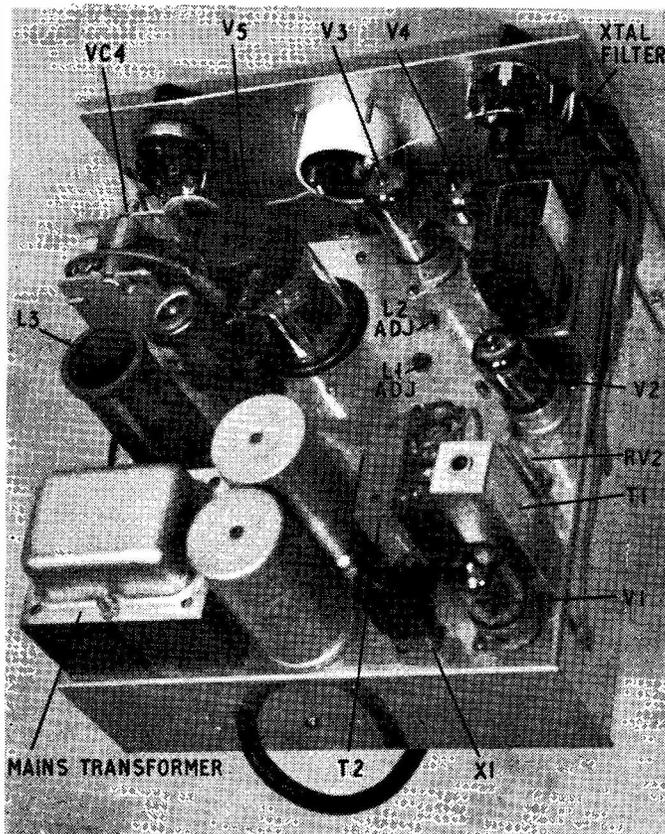


Fig. 5. Alternative audio section—see text. Values are: C1, C2, C3, C4, 0.5 μ F; R1, R2, 100K; R3, R4, R6, 1K; R5, 2.2K; R7, 470K; RV1, 470K potentiometer, gain control; V6, 12A7.



Identifying the positioning of components above chassis.

Filter Alignment Procedure

The alignment of the filter can be carried out exactly as described in Part III of this series (SHORT WAVE MAGAZINE, February, 1966) for low frequency filters. You could alternatively etch a crystal to midway between the two filter crystals, plug this into the carrier oscillator position and peak the coil for maximum.

The setting up and alignment procedure along with various alternative arrangements which may suit your junk box better will be discussed later. For those who may want to get started now the photographs will show the layout for best operation, which can be juggled slightly to suit the available components. The whole lot is built on a four-sided chassis measuring 8ins. by 8ins. by 2½ins. The front panel is spaced off about ¼in. from the chassis so that RF from the PA does not creep around into the microphone leads or front-end circuitry.

The model pictured here is the prototype and therefore various modifications were carried out on it. For instance, adjacent and forward of V1 is T1, then the balanced modulator potentiometer RV2.

These two components (T1 and RV2) could be physically interchanged. The 6146 PA is dropped through the chassis so that the overall height could be kept down to 5½ inches. This does not have to be done but the appearance is enhanced by keeping the height as low as possible. The diameter of the hole to allow the 6146 to drop through is two inches.

As you can probably gather, the model shown in these photographs was constructed almost exclusively from the junk boxes of G3TSI and G3RNL.

The output from the rig is around 12 watts p.e.p. except on 10 metres, where it drops to 9 watts p.e.p. If you're wondering about the usefulness of such a low-output Tx the only thing to be said is that on 20 metres SSB stations around Europe have been worked from G3RNL with a dipole at 15 feet, getting 5 and 7/8 reports, and on 80 metres to an inverted Vee contacts have been obtained around the country quite easily. On 160m. it performs equally as well as any other rig the writer has built although obviously the reports are slightly down on the main rig. Locals on Top Band

say the reproduction on SSB and AM using the *Mini-5* is excellent and the CW note is perfectly T9. For regular CW operation, however, a shaping circuit should be incorporated in the transmitter switching line and a click filter put across the key.

* * *

CONSTRUCTION OF THE EXCITER

As mentioned last month the construction is quite simple. Layout of the main components is suggested by the photographs. A 2in. diameter hole is required in the chassis to allow the 6146 to be dropped through. This, of course, is only necessary to keep the front panel to a height of 5½ inches. It was found that top chassis screening was not necessary. On the underside the PA is in a separate compartment which is sub-divided into two sections keeping the output coil winding away from the grid input lead. Just one screen around the coil base including the change-over relay and output sockets, would no doubt suffice. Also in this compartment, mounted vertically and at the rear, is a piece of *Veroboard* containing the RF output indicator circuitry. This means that the wire to the meter and sensitivity control carries no RF, only DC. (Fig. 3, November.)

The cabinet is made out of 20g. metal and designed in a wrap around fashion with a sloping lip at the front. This again enhances the appearance. A sliding panel to facilitate removal of the plug-in PA coils is utilised with a matching piece, to even things up, on the opposite side. These panels are of perforated zinc and also act as air vents. Some holes in the bottom of the cabinet under the mains transformer and PA are a useful addition to ensure a good airflow.

Circuit Alternatives

There are several circuit alternatives which can be incorporated if desired. Beginning with the audio stage, the transformer can be replaced by a cathode follower to provide the required low impedance input to the balanced modulator. If a double triode is used, additional amplification can be realised. With the basic circuit (p.529, November) one could do with a little more audio gain if a microphone of

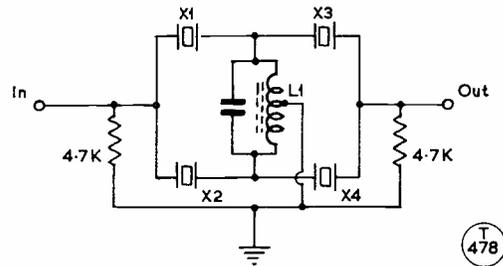


Fig. 6. Circuit for improved crystal filter, in which X1=X3, and X2=X4. For frequencies see text Part I. Inductance L1 in this circuit can be of 55 turns, centre tapped, shunted by 47 μ F.

relatively low sensitivity is being used. This could, of course, be boosted by an outboard transistor pre-amplifier but for a permanent modification the circuit shown in Fig. 5 (p.590) will do. The pentode section of the original ECF80 is still used as the first audio stage and the transformer in the anode is replaced by R1. The audio gain control can be mounted on the chassis and preset to provide the correct overall audio gain to suit the operator's normal voice level and the microphone in use.

For better sideband suppression a filter comprising two half-lattice sections back-to-back is recommended. This is shown in Fig. 6 (above). Etching of the crystals was described earlier and alignment again is similar. Just peak L1 in the centre of the passband.

For those who are not keen on attempting filter construction, a commercial 9 mc crystal unit can be used with certain limitations. The only problem using this type of filter is that sideband switching will have to be performed. Table II (below) gives the frequencies for conversion to all bands, together with the sideband required at 9 mc to provide correct SSB output on the band in use.

If there is difficulty in getting crystals around 5.25 mc, then 6.2 mc can be used as an original generating frequency if you are willing to forego the joys of working 40 metres. Table III gives the conversion oscillator frequencies required to mix from 6.2 mc USB to all the amateur bands (see p.594).

The PA as used in the original Tx as illustrated is a 6146. This could be changed to an 807 or miniature 807 (5B254M) with only one difference from the original circuit—this is that the cathode resistor should be changed from 470 ohms to 270 ohms. The only difficulty that may be experienced using an 807 is that it appears to be more prone to taking off. This can be avoided by swamping the grid tuned circuit with a resistor of around 10K though this will, of course, reduce the drive available. The 6146 used in the original rig proves to be perfectly stable on all bands, providing that the aerial it feeds has a fairly low SWR.

Alignment and Setting Up

Because of its simplicity the "Mini-5" requires very few adjustments to get it going. The filter will, no doubt, have been set up prior to completion but

Table II

Conversion Oscillator frequencies required when using a 9 mc filter

9 mc	Band	VFO—kc
LSB	160 LSB	7000 — 7200
LSB	80 LSB	5200 — 5500
LSB	40 LSB	2000 — 2100
USB	20 USB	5000 — 5350
USB	15 USB	12000 — 12450
USB	10 USB	19000 — 20700

even if not it can be aligned *in situ*. (Refer for the following to the circuit on p.529, November.)

The first thing is to set the band switch to "low" and plug in the 160m. tank coil. Set the PA grid tuning capacitor to maximum and the PA anode tuning condenser to about two thirds maximum. The carrier insertion control should be set to minimum, the transmitter gain to maximum. Set the carrier balance potentiometer to one end of its travel and the balance trimmer condenser to minimum. Connect a dummy load to the low-impedance output socket and set the function switch to "Net." Find the beat note on the receiver and peak the PA grid tune and the PA anode tune for maximum loudness of the beat note. Operate the PTT switch and advance meter sensitivity (Fig. 3, p.530, November) until a reading is obtained. Adjust the grid-tune and PA-tune for highest reading and then peak the core of T1 for maximum deflection on the meter. The balancing of the carrier is the next step. The carrier balance potentiometer (RV2) should be adjusted for minimum reading on the meter. The carrier *null* trimmer should then be tried for a better null and if this does not improve the null then it should be connected to the other side of RV2. When VC2 has been set for minimum, RV2 should again be adjusted. These two adjustments should be alternated until best carrier null is achieved. This should correspond to a reading of 0.05 mA or less on a 1 mA FSD meter with the sensitivity control at maximum. When this balancing has been completed the meter sensitivity control should be set to minimum and the carrier insertion control advanced to maximum. The meter sensitivity can then be adjusted to give full scale deflection.

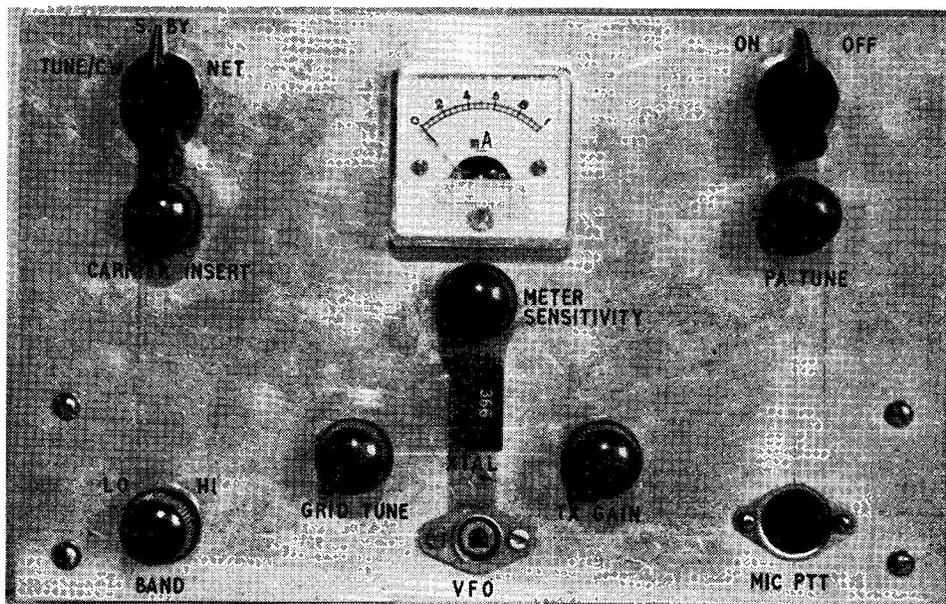
Now back off the carrier insertion control. If the meter reading increases to begin with then it means that either the mixer or PA was being overdriven. Adjust meter sensitivity for FSD on the maximum output point. When the carrier insertion control has been backed off the function switch should be set to "standby." Talking into the microphone should now kick up the meter. Correct operation will be when the meter is kicking to half full scale on peaks.

The signal can now be monitored on a receiver and checked for good "SSB sound" *i.e.*, that it is easy to tune in. The trimmer capacitor VC1 can be adjusted to give the best sounding signal. In the original "Mini-5," where the carrier crystal was about 500 c/s lower than the lowest filter crystal a total of around 47 μF was required from the grid of V1A to earth. Each time the carrier is moved T1 will need to be re-peaked and the carrier balancing process will have to be repeated.

Once the tuning positions on the grid and PA tune controls have been found these should be marked to avoid later confusion. Initially they should always be set up using a receiver tuned to the output frequency because it is possible to tune up on a harmonic of the conversion oscillator. Once the tuning positions have been found and marked on the front panel no difficulty should arise during band changing.

As a follow-up, in some later articles a crystal-mixer VFO will be described for use with the "Mini-5" and a linear amplifier.

It is as well to discuss at this point some of the linear amplifier configurations which have been tried following the rig as described here. This is also a



Front-panel view showing layout of controls for SSB Exciter as described in the article.

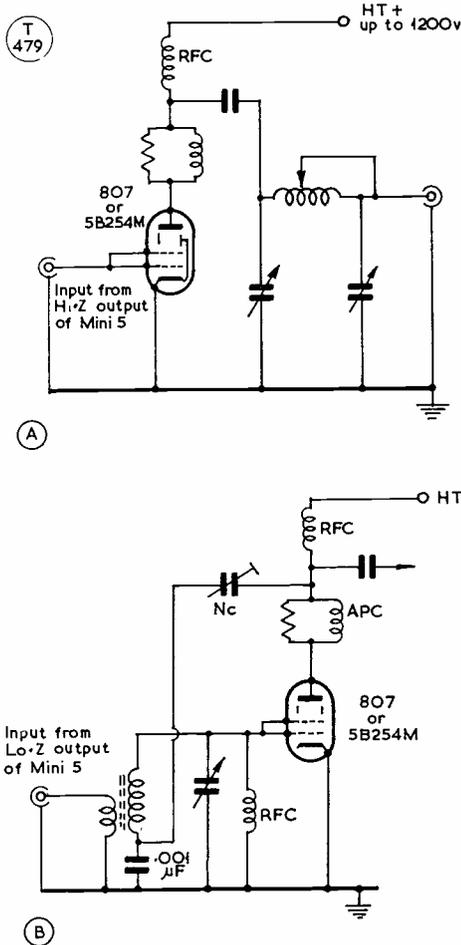


Fig. 7. PA configurations suitable for the "Mini-5". (B) is the preferred method of feeding and should be neutralised as shown. With a pair of 807's, or 5B254M's, in parallel something like 100 watts output can be realised with an HT supply of 1000v.

good time to clear up a misleading point about the grounded-grid linear using 4/807's shown in Part VIII of this series—see SHORT WAVE MAGAZINE, August, 1966.

The subject was raised by G3OGQ. The whole point is that when using 807's in grounded grid instability can occur due to the fact that the beam-forming plates are connected directly to the cathode. This acts as a capacitor between input and output, to produce positive feedback. Tests showed that the instability did not show up on 160 metres using only one 807 or on 80 metres using two, providing the aerial had a very low SWR and the PA was tuned for maximum output. On higher frequencies things were not so good. An article in the *ARRL Handbook* for 1958 describes a grounded grid linear for 80, 40 and 20 metres using four modified 1625's in parallel. These are almost identical to 807's except they have 12-volt heaters; they can be modified by removing the base and separating the beam-forming plates lead

Table III

Conversion Oscillator frequencies required when using 6.2 mc USB as the original generating frequency

Band	VFO—kc
160 LSB	8000 — 8200
80 LSB	9700 — 10000
40 LSB	not available
20 USB	7800 — 8150
15 USB	14800 — 15250
10 USB	21800 — 23500

from the cathode. Unfortunately this cannot be done with 807's as the connection is made internally. In the article the anode supply to this linear is 1200 volts and a 1K resistor appears in the cathode. Some 20 watts of drive is required and the output should be 150 watts p.e.p. or more.

One other method of running 807's in Class-B zero bias is shown in Fig. 7. This arrangement is more stable than the grounded-grid version but really should be neutralised. However, a pair of 807's in this configuration has been used at G3RNL with no neutralising, driven from the high impedance output of the "Mini-5" on 80, 40 and 20 metres. Providing the aerial has a low SWR and the amplifier is tuned for maximum output no trouble occurred. However, on 20 metres the drive was down, to run only about 75 watts p.e.p. input. This was due to the fact that the input of the linear was loading the "Mini-5" PA tuned circuit too much. A better arrangement would be to couple from the grid tuned circuit of the 807 linear as shown in Fig. 7(B).

I.T.U. GENEVA "CHART OF FREQUENCY ALLOCATIONS"

Previously for wall-mounting only, this now comes in a spiral binding with a durable cover, size 24in. by 16in. wide, in twelve pages, well printed on heavy paper. The frequency coverage is the total usable spectrum—10 kc to 40 Gc, i.e., VLF to SHF—for all services (including Marine, Aircraft, Fixed, Mobile, Space and Amateur) in each of the three Regions into which the world is divided for official frequency allocation purposes. Each section is fully annotated and—since this is an authorised I.T.U. publication—the Tables are, of course, right up-to-date as regards all frequency allocations, by bands for the various services. The pages are set out in such a way that the required information is given at a glance. The price of the Chart is 31s. 6d., including postage and packing, with immediate delivery from stock, of our Publications Dept., at 55 Victoria Street, London, S.W.1.

CHEAP P-E SET FOR PORTABLE OPERATION

PRACTICAL APPROACH FOR THE D-I-Y MAN

F. W. TYLER (G3CGQ)

Our contributor, essentially one of those real amateurs who design and build for their own requirements, has for years taken a particular interest in IP work on VHF. His solution of the problem of providing a portable power supply, of high capacity and reliability, will suggest all sorts of possibilities in this particular context.—Editor.

FOR twenty years, mostly since the last war, the writer has been engaged each year in one or more field days, on various sites under portable conditions, and the majority of these have been on VHF.

During these years there has been one constant problem, at an otherwise great variety of sites, with differing equipment and transport, and this relates to power supplies.

In the early days, these usually consisted of a ponderous allotment of heavy-duty batteries—necessary for valve heaters, rotary converters and also lighting if the event involved night working. Generally, this called for a minimum requirement of six staff to perform the handling, though it must be admitted that this formed the basis of a very fine social occasion, for the duration of the event. However, in later years a Govt. surplus 12-volt petrol charging set was obtained and this did wonderful service—but it always required a minimum of two

handlers to lug it around and set it up.

With improvements in the art, made over the past five years, the rotary generator has been succeeded by the transistor DC/DC converter with a considerable improvement in efficiency, and further power-weight savings have become possible with transistorised modulators, converters, and so on—but despite all these great savings, the writer has yet to find how to run a 25-watt PA in the final of a VHF transmitter, on a portable location, from the car battery alone. Portable contests normally run for a minimum of eight to ten hours and some source of auxiliary power supply is still necessary.

This progress, made over the years, has now resulted in one-man expeditions being possible, providing the auxiliary power supply, i.e., the petrol generator, can be tailored for the job. This normally means something that can be fitted in the car boot, and the unit which is the subject of this article has been produced to meet the requirements of a VHF portable operator interested in all bands to 23 centimetres.

The Requirement

The unit had to have the following features, in order of merit:

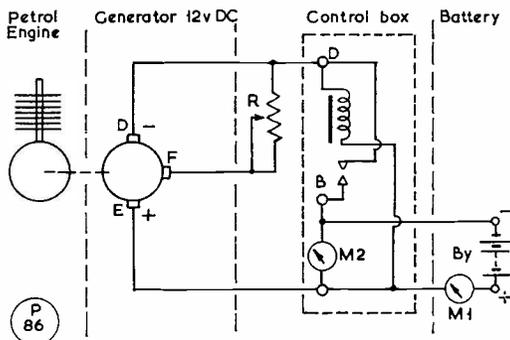
- (1) Initial cost to be low,
- (2) Portability, and
- (3) Power output to be about 100 watts.

It was hoped to keep the cost to £5, but the final bill came to £5 17s. 6d.—though this is a fraction of the cost of a similar machine with equal power ratings. The overall weight is 26lbs., less fuel, and is within the carrying ability of most people.

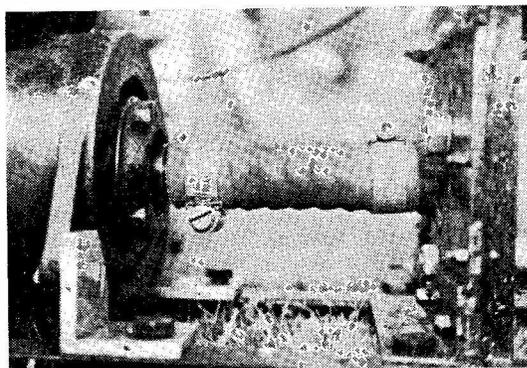
In operation, the power output has been maintained at 120 watts for a continuous period of 10 hours, with a fuel consumption of less than a gallon of two-stroke mixture.

The Solution

The unit is designed around two main essentials: (a) A small petrol engine, and (b) A 12-volt DC

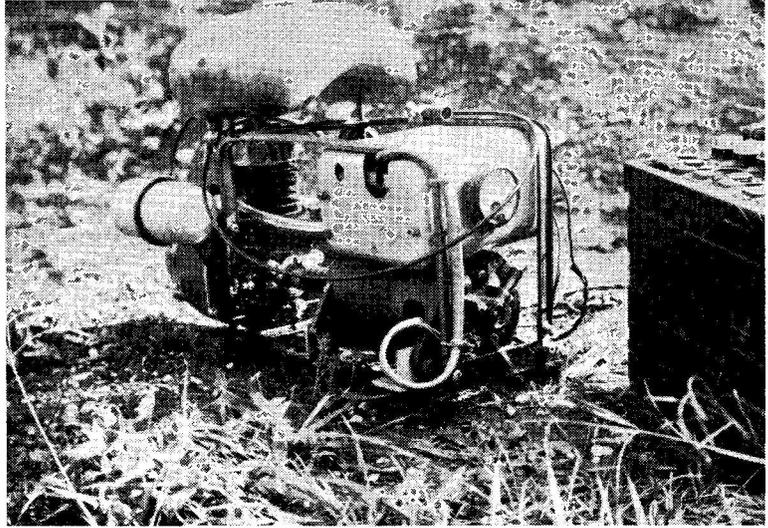


Key to the G3CGQ P-E arrangement: D, dynamo; F, field winding; E, body of generator; control box rheostat R, 10 ohms, 20w.; cut-out, from any 12v. car with pos. earth system; control box connections, D to D on generator; B to 12v. battery neg., E to earth, battery pos. and body of generator; meter M1 0-20 amp., M2 0-20 volts; battery 12v. 80 amp. hour.



Showing how the engine is connected to the 12-volt DC generator, using flexible hose secured by "jubilee clips"—see article by G3CGQ

The portable P-E set complete, as fabricated by G3CGQ. A 34 c.c. J.A.P. (not Jap) engine drives a 12-volt car generator bought, with a cut-out, for a few shillings from a breaker's yard. The whole assembly can be handled easily by one man. Total cost, less than £6. Output, 100 watts continuous.



generator.

There are several small petrol engines on the market, for lawn mowers, pumps, paint sprayers and such. The machine used is a 34 c.c. J.A.P. engine, bought from a London mail order house for less than £5, and complete except for its petrol tank.

The 12-volt generator and cut-out were taken from an old car in a breaker's yard, at a total cost of 10s.

The method of driving the generator is by in-line direct coupling (*see* photograph) and to do this it was necessary to remove the pulley wheel from the generator shaft, and couple the shaft to the engine by means of a flexible drive; a short length of armoured hose from any garage is a most suitable way of doing this. It can be seen that the hose is slipped over the generator and engine shafts, and secured by "jubilee clips," the hose giving the necessary flexibility. (*See* p.595.)

The electrical arrangements are shown in the diagram. In practice it is found satisfactory to have a voltmeter across the battery on load, and maintain the voltage at 12.5v. by means of the throttle control on the engine, setting the rheostat to keep the current at a minimum consistent with maintaining the voltage throughout the period of use at a steady 12.5 volts.

As regards assembly, the whole unit is put together on a chassis made up of 1in. angle iron, cut to length to accommodate the little engine and generator in line. For the assembly illustrated, the dimensions are only 15in. long by 7in. wide. Both machines are bolted to this chassis, which makes a solid bed for them. From each corner of the chassis a frame, made from brass curtain runner (of the sort you can get from Woolworth's, or your local D-I-Y shop) is built up, on which the petrol tank and control box are mounted. This frame becomes the lift for the whole assembly, as suggested by the photographs.

So we arrive at an easily portable, cheap and

reliable 12-volt DC supply unit, from which all manner of DC/DC converters can be run, up to at least 100 watts output capacity—all transportable in the boot of the car, and easily handled by one (not-so-young) man.

NOTE FOR SWL'S

Not to forget the SLP on Boxing Day afternoon — on the 21 mc band, 1600-1900z. See p.544 and p.547 November issue for the essential details. And get your (fair) log posted in good time.



"... QC, QC, QC ..."

ABOUT FREQUENCY SYNTHESISERS

DISCUSSING THE MODERN
TECHNIQUE FOR GENERATION
AND CONTROL OF ACCURATE
AND STABLE FREQUENCIES—
IN THE AMATEUR CONTEXT—
GENERAL DESIGN
CONSIDERATIONS

E. P. ESSERY, A.M.I.E.E. (G3KFE)

While in professional circles the subject of this article may be familiar, it is fairly new thinking from the strictly radio amateur point of view. The various applications of the principles of frequency synthesising in our particular field will become immediately obvious to all who follow the argument. Our contributor is professionally engaged in work of this sort.—Editor.

PERHAPS it would be in order in the first place to define what we mean by the term "Frequency Synthesiser." In the ideal, we mean a process whereby an infinite number of frequencies can be generated and any one selected at will, all of them being developed from and fully controlled by one master crystal oscillator of extreme accuracy. The practical frequency synthesiser, of course, usually departs to

a greater or lesser degree from the ideal, and may, therefore, be defined as a device which generates a large selection of frequencies in a prescribed band by means of a much smaller number of crystals, and gives any one of the frequencies available, to choice.

A primary form of frequency synthesiser is the mixer/master oscillator type of VFO used in the majority of SSB transmitters, where the final frequency is obtained by mixing the output of a VFO and a CO, neither of which is in the band, to give a sum or difference which is. An example is the use of a VFO on 1.5 mc and a CO at 5.5 mc to give a sum frequency at the output of the mixer which is in the 7 mc region. It is noticed that the drift on 7 mc is the same as the drift of the VFO, say for the sake of argument 100 c/s. Compare this with a VFO on 1.75 mc, multiplying up to Forty, having the same basic drift. The 100 c/s drift has multiplied up as well, so that the 7 mc signal drift in this case is not 100 c/s, but 400 cycles, and if the process is carried on up to ten metres the drift will have multiplied up to 1.6 kc, which is far from being satisfactory. Thus the mixer/VFO technique cuts down the drift quite considerably as compared with the old multiplier-chain system.

However, the system is still far from perfect as far as drift is concerned, and it implies the use of either a variably-tuned mixer anode circuit and/or a considerable risk of spurious signals out of the band. The more we try to sophisticate the arrangement the worse this problem gets.

The Triple-Mix System

Clearly, any elegant solution to the problem must give greater stability, and also produce output on the right frequency or not at all, all spurious signals being so far down as to be negligible, the while using only fixed tuned circuits or simple filters. Such a solution is found in the Wadley triple-mix system, as used in the front-end of the *Racal RA-17* receiver,

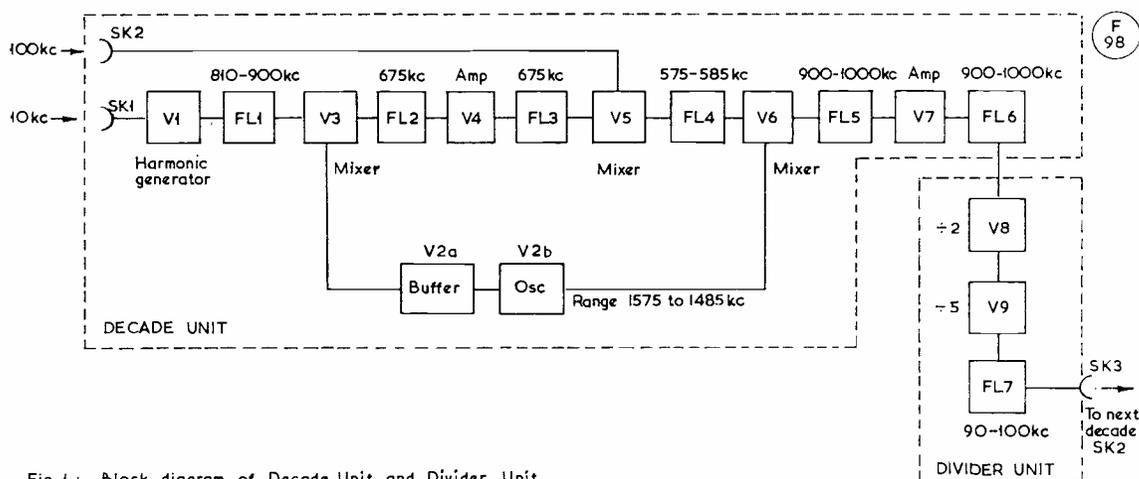


Fig. 1: Block diagram of Decade Unit and Divider Unit

to give for all practical purposes a drift-free receiver. To get the hang of the Wadley system, look at the block diagram Fig. 1.

The input to Skt 1 is at 10 kc, derived by division from a 100 kc or 1 mc crystal, in just the same way as is done in the station crystal calibrator. This signal is fed into V1 which is a double-triode used as a Schmitt Trigger (a standard variety of the multivibrator tribe). The output of the Schmitt circuit, being square-wave, is full of harmonics; these are fed into bandpass FL1, which sorts out those harmonics between 810 and 900 kc, and rejects all others; thus, there are ten frequencies between these limits which can go forward to the grid of V3, where they meet and mix with the signal from V2, a VFO covering the range 1575 to 1485 kc. As the mixer anode has a circuit sharply tuned to 675 kc, a signal will only get through the filter when the difference between the two signals at V3 grid is 675 kc, and at *no other* setting of the VFO. To be on the safe side, the output of V4 is another filter fixed on 675 kc, so that the signal can be amplified in V4 but no other frequencies can appear. When this signal reaches the grid of the next mixer V5 it is mixed with a signal from the standard from which the 10 kc was derived, in this case at 100 kc, coming in at Skt 2. The output at the anode of V5 is passed to FL4 which selects the difference-frequency of 575 kc. However, it will be noticed that FL4 is a bandpass filter passing 575-585 kc, when one would think that a spot-frequency filter is the correct device—the reason will appear later, and all that need be said now is that there is a question of standardisation involved. Output from FL4 at 575 kc is passed to the third mixer, V6, where it is mixed with the other output from the VFO and it is here that the cunning of the circuit becomes apparent. The 575 kc signal can only appear when the VFO is on the right frequency to give a 675 at the anode of the first mixer, no matter what the dial calibration may say, and there will of course

be ten such points on the VFO dial, to coincide with the ten frequencies coming out of the FL1. Thus, when the VFO is at the right setting, it is also putting output to the third mixer to give one of ten possible frequencies, at 10 kc intervals, between 900 and 1000 kc at V6 anode.

Now, a moment's reflection at this point should convince the reader that any drift due to the VFO appearing at the first mixer anode is equal, and in the opposite direction, to any drift due to the VFO appearing at the third mixer anode, and so the effect of the VFO as a drift-producing agency is cancelled out.

Thus there are ten points on the VFO dial where a signal is obtained at V6 anode, and these ten points may be marked on the dial, as 1 to 9 and then 0, in order from the 1575 kc end. If in service the VFO drifts due to one cause or another, it is only necessary to tune to maximum output from V7 at the point nearest to the desired scale marking to obtain the desired frequency (as will be seen later). V7 is in fact an amplifier, and FL5 and FL6 bandpass filters passing the range 900 to 1000 kc and no other.

From FL6 the signal passes out of the decade into a box-of-tricks which divides by ten the frequency fed to it, just like the circuit that is used to obtain the hundred kc pips from a 1 mc xtal in our "calibrator circuits." It is usually done in a crystal marker in one multivibrator stage, but for our purpose it seems to be better to pass the signal to a multivibrator which is set to divide by two and take the output of the latter to another one which divides by five, as the arrangement is more reliable and is less of a bind to set up. The output of the divider is locked to the input all the time, and as the input frequency varies between the limits 900-1000 kc the locking action has to be firm. The output from the divider will then lie between 90 and 100 kc in 1 kc steps, depending on the VFO setting.

Table I
Basic Decade — Filter Data

Filter No.	No. of Sections	Nose Bandwidth (greater than)	Skirt Bandwidth (less than)
1	4	805-905 kc \pm 3dB	755-955 kc @ — 25dB
2	4	675 kc \pm 1.5 kc @ 3dB	675 \pm 6.5 kc @ — 20dB
3	4	675 kc \pm 1.5 kc @ 3dB	675 \pm 5 kc @ — 20dB
4	7	580 \pm 8 kc @ 3dB	580 \pm 21 kc @ — 27dB
5	4	950 \pm 55 kc @ — 3dB	950 \pm 90 kc @ — 20dB
6	2	950 \pm 60 kc @ — 3dB	950 \pm 150 kc @ — 12dB
7	2	90-100 kc \pm 1dB	better than — 25dB @ 180 kc (low-pass filter)

Obtaining Closer Steps

Now let us build another "decade" and divider unit identical to the first, and, instead of putting 100 kc from the standard in at its Skt 2, connect Skt 2 to the output of the first decade divider unit. If now we set the first decade to give output at position 0 of its VFO we will be able to set up the VFO of the second in an identical manner to the first, and at the output of the second divider we will obtain a series of frequencies at 1 kc intervals between 90 and 100 kc, as before. But if we move the frequency of the first decade by one step, the output of the second decade will move by 0.1 kc if the latter decade is not touched, due to the shift in the output frequency of the first unit being fed into Skt 2 of the second one and slightly altering the output frequency of the second mixer in the second decade. The point of interest is that if, say, the first decade is set to 4 and the second to 2, then the output frequency from the second decade will be at a frequency of 92.4 kc.

Further Division

Before going any further, it is as well to be sure that the principle so far has been grasped! When one is sure of this, it is possible to consider a further step, to give a swing of 100 kc. This is done by connecting the output from the second divider to Skt 2 of a third decade unit, which is identical to the first two except for the lack of a divider unit. Its output is, therefore, between 900 and 1000 kc, and if the output of the first two is at 0 on their VFO's, the ten output frequencies from the third unit are in 10 kc steps, and variation of the other two will fill in the steps with increments of 0.1 kc, *i.e.* we have now obtained a 100 kc band at 100-cycle steps. If all three VFO's are set, say, to 5, then the output will be on a frequency of 955.5 kc. See Fig. 5.

The time has now come to consider the reason for FL4 being made bandpass, instead of sharp, over the range 575-585 kc in each of the three decade units. If the first decade were to be made sharp in FL4 it would make no difference to the performance of the unit, but would make it impossible to switch the decades from position to position if it is ever desired to do so, for example when chasing a fault. As it is, if four identical decades and three dividers are built and set up, if a fault arises it is a simple matter to locate which unit is not giving output, and switch it over with the spare, so that one can be back on the band in five minutes, the while the fault unit can be dealt with at leisure on the bench.

Further Extension of Frequency Range

There are two ways of getting the output, thus synthesised, to cover the band. The first is to use a set of five switched crystals to cover the range 3.5-4.0 mc, and similarly with the other bands, by passing both the CO signal and the synthesiser signal through a mixer, as indicated in the block diagram of Fig. 2.

Such a system has been tried on 7 mc and gave a good account of itself, but on the other bands would be rather like taking a sledgehammer to crack a

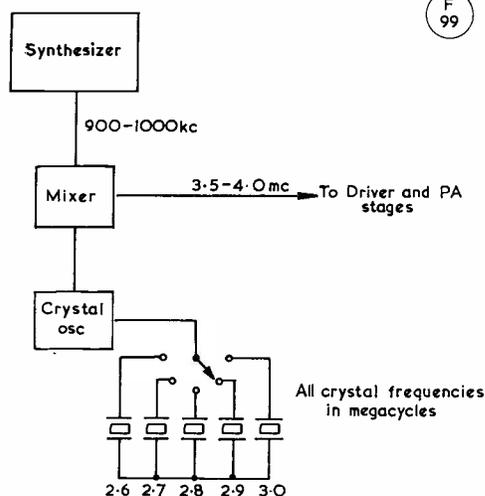


Fig. 2 : Simple method of extending range of basic 3 decade system

nut, and in any case "birdy" trouble would almost certainly be apparent somewhere or other even if one could afford the enormous number of crystals that would be involved.

The obvious best way of tackling the problem is to use the Wadley principle to make a range of one megacycle available, and then to obtain the necessary heterodyne signals to mix into the bands directly from the 1 mc or 100 kc standard, controlling the decades by a process of multiplication. However, we clearly cannot use another identical decade unit to the first three, and the frequencies involved once being changed we have to go all through the rigmarole we have already done on the first three of calculating the possible spurious frequencies. Against this snag is the fact that the whole bag of tricks will be locked to the one basic drive crystal, and if that is continually checked against, say, the 200 kc from Droitwich (which is itself a frequency standard) no trouble at all will give an accuracy of better than 30 cycles long-term at 30 mc—considerably better, in fact. Also, we can use the basic crystal to generate the carrier frequency of a SSB/AM/CW exciter which can be inserted into the Wadley loop of the last decade by use of a fourth mixer, such that the decade frequency relationship is undisturbed. The block diagram of the decade which can do this is shown at Fig. 3.

In Fig. 3, the modulation input is shown as being generated at 400 kc, and as far as the experimental lash-up is concerned this is the weakest point of the design; the 400 kc carrier is no trick at all to produce, but the very small number of crystals available in the junk-box to generate upper and lower sideband filters resulted in an ill-advised attempt to produce

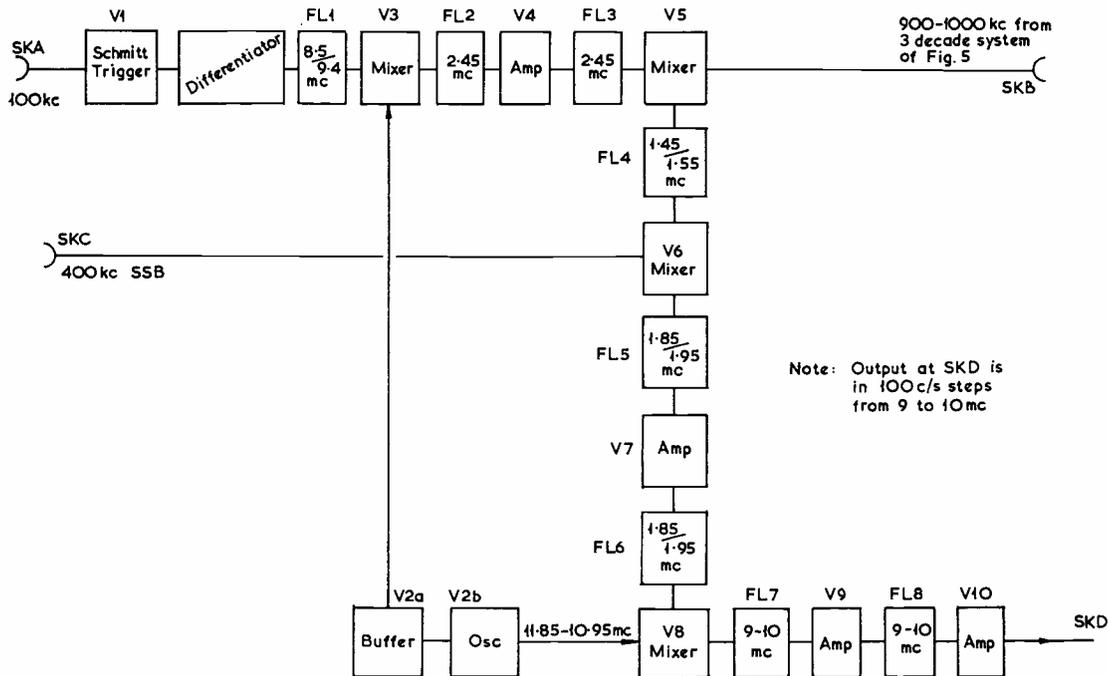


Fig. 3: Block diagram of suggested last decade.

F
100

filters of single half-lattice configuration. Subsequent essays at "adjusting" the crystals to make the response look a bit more civilised were an unqualified disaster. This is not to say, however, that it would be difficult to make a pair of filters to generate either upper or lower sideband on a nominal frequency of 400 kc, given the xtals, but merely that crystal adjustment is not as easy as some would have us believe. It would be best to give up the idea of using surplus crystals and spend the money on new ones at the right frequency—unless a large selection of FT-241 types is available from which a few can be written off in the course of trying to "fiddle" them into a decent pair of filters.

It should be noted that such a sideband generator, if required to give CW operation, must do so by the keying of the 400 kc signal rather than keying a tone generator if the setting of the frequency by the synthesiser dials is not to be thrown out of line by the presence of the offset tone. If this is, for example, 1 kc it will offset all the dial settings by 1 kc, and hence destroy the greatest advantage of a synthesiser, which is its direct and accurate frequency setting. Otherwise the design of a suitable Sideband Generator on 400 kc is a matter to be neglected here as it is given quite adequate coverage in the literature.

The Filters

These form the heart of the system, and deserve a special mention. In Table I a list is given of the

filters as numbered on the block diagram, showing the shape required in each case, together with a note of the number of sections required in each filter to achieve practically the desired response. From this information and the intelligent guessing of the input and output impedances (depending on whether valves or transistors are being used), a little consideration of the Filter Design data in the *ARRL Handbook* or the *Radio Data Reference Book* will enable a filter to be designed around the formers and cores to hand in the junk-box. For this reason specific data on the filters are not given. It is suggested that before any attempt is made to build up a decade, a test jig be made up with a valve in front of the proposed filter and one after (or transistor, as the case may be), to simulate the true conditions as to impedances, strays, etc., so that each filter can be tried out and prealigned in the jig. If response is correct in the jig, it may be assumed that very minor touching-up will be all that is needed when the decade is finally built and, of course, it is much easier to do the mechanical design once the shape and size of each filter is finalised. In the rough lash-up built to prove the system out, each of the three allegedly identical decades is, in fact, different due to the use of any old stuff that was to hand in the junk-box—in the main the formers used were out of old TV sets. In arriving at a design for the inductors, it was found that the best method was to deduce a winding on the basis of the ABAC's given in *Radio Winding Chart* followed

by cut-and-try methods to get to the final result. The value of the inductance can be checked by the use of the GDO if known "standard" condensers are available, the method being to place a standard capacitor in parallel with the inductor under check, measure the resonant frequency with the GDO (checking the GDO setting with the station receiver and wavemeter) and do a simple sum. However, if one is a fairly experienced winder of coils—and what constructor is not?—then the method of cut-and-try after designing from the ABAC's is probably as quick if not quicker.

Attempts at aligning filters using a wobulator and oscilloscope were found to be of doubtful value when the filter response was plotted accurately using spot frequencies; this, it is believed, is due to the need for slow scan-speeds coupled with the shortcomings in the way of LF response of the writer's somewhat rudimentary test gear.

Valve Circuitry

This is perfectly conventional, ordinary Class-A amplifiers, mixers, and double-triode dividers. The latter are standard circuits as are found in any crystal calibrator; the Schmitt trigger circuit also is one that is given in any text-book. However, it should be noted that if transistors are used the Schmitt trigger in the 100 kc divider needs to have a "smart" action, suggesting that VHF transistors would be the right choice. Incidentally, it will be noted from Fig. 3 that this same Schmitt trigger feeds a "differentiating circuit" and this is probably the only one which can not easily be found in the literature normally available to the average amateur. This circuit is, therefore, shown in Fig. 4, which assumes the use of valves. The square-wave on the anode of the Schmitt trigger valve excites the inductor in the anode circuit, and the negative half-cycle is passed through the series diode to the filter as a sort, sharp spike; the positive going half-cycle is shorted by the shunt diode D1 in the main and any residual energy is blocked off from the filter by the back resistance of the series diode D2. The coil can be very easily wound up on any former to hand, such that if the coil (out of circuit) is shunted with 50 $\mu\mu\text{F}$, a check with a GDO shows a resonance at about 7.1 mc. The condenser may then be removed, and the coil

installed. It will be found that the negative-going spike is of the order of 5 volts when looked at on a decent 'scope, but may not be so good when seen on an instrument of quality. Anyway, if the coil and diodes are right, and the following filter is perking, the V3 operation will be quite satisfactory. A coil Q of 70 is more than enough to ensure good operation, even if the Schmitt circuit is amplifying instead of triggering!

Oscillator circuitry may be any reasonable type and the usual VFO precautions should be taken to ensure minimum drift. If the oscillator drifts in use, the frequency will not change as far as the synthesiser output is concerned, but the amplitude of the signal to the divider unit (or the next decade, or the output, as the case may be) will fall until, in the case of a divider, the divider stops operating—thus, output appears on the correct frequency or not at all.

Alignment Procedure

As far as the decades are concerned, the drill is to align the oscillator circuit to cover the correct frequency swing and then to pull out the oscillator valve for the rest of the alignment, only putting it back (when the decade is completely aligned) for the marking of the ten points on the VFO scale at which the unit gives output. If this procedure is not followed, the indications obtained will almost certainly prove to be misleading.

Each frequency required for the procedure should be set up by means of something at least as accurate as a BC-221, zero-beating the generator against the '221 in a receiver having an appropriate frequency range. On the spot-frequency filters, everything is easy—you poke the signal in on the grid of the valve in front of the filter, hang an AC valve-voltmeter on the anode of the following stage, and align for maximum indication on the spot frequency.

As for the bandpass filters, there is a little more to be done, but not much. This time, you inject signal as before, but this time you put the valve-voltmeter across the *input* terminals of the filter, and short-out (with a crocodile-clip lead) the second, and hence later, stages of the filter. With generator at the design frequency, tune the first section of the filter to maximum response on the VV. Transfer the shorting link from the second to the third stage and tune the second for *minimum* response. Transfer the short from the third to the fourth stage and tune the third stage for a maximum response. Continue alternately tuning for maximum and minimum response until the last section is to be tuned, when the short may be discarded and the last coil tuned without its aid. When this is complete, measure the response, by injecting the signal as already indicated, checking output at the anode of the valve succeeding the filter, and touching up the filter first section as necessary to bring the response to the correct shape. This last part of the exercise is forced on you owing to the fact that the stray capacity of the valve-voltmeter is hanging across the filter input whilst carrying out the alignment, so that when it is removed and placed at the anode of the next stage

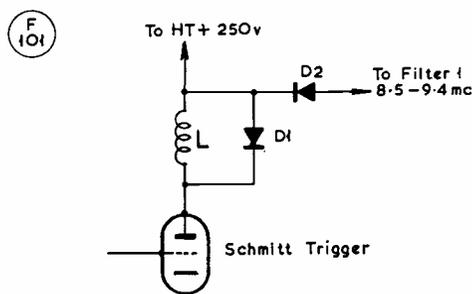


Fig. 4 : Differentiating circuit

the filter is detuned and has to be slightly tickled.

The alignment of the "drive unit" supplying the basic frequency should be relatively simple. The multipliers will be tuned up in more or less the fashion of any other multipliers. Dividers will be more touchy, depending on how far they are to divide, but must be made to give the right frequency output no matter what is done to it. Flick the HT on and off the unit, switch it on from cold—no matter what you do, it must give the right output in terms of frequency. If a drive unit frequency is off the system is off frequency.

Divider units on the end of the decades are fairly simple to deal with. The divide-by-two must have good drive from its decade, and a figure of about seven volts out of the decade ought to be enough. When the divide-by-two is locked solidly to the decade frequency deal with the divide-by-five, which should be set midway between the points at which it divides by four and by six. It also must be locked solidly to the decade frequency. Thus it is necessary to have a preset potentiometer in the circuit of V7 in the decade, in order to set the level of drive, and a variable control in the divide-by-five as well.

Mechanical Considerations

The physical size and shape of the whole thing will to a large extent be governed by the shape of the filters. However, it is best to make the decade units long and narrow, with the VFO knobs on the narrow face. If they are sufficiently narrow the four VFO knobs can protrude from the front panel of the frame supporting the units, in such a way that the setting of frequency is read off direct from the VFO's. The other units can then be put into any remaining space. The important thing is to ensure that the coax cables connecting from unit to unit are no longer than they need be. DC connections to each unit should be run in screened lead, and if valves are used, the heater cable leads must be heavy enough to stand the cur-

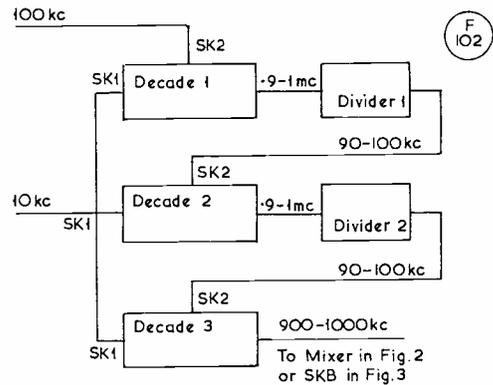


Fig. 5: Decade interconnection chart

rent drain with plenty to spare.

It is when one considers the mechanical construction of an individual unit that the problems start to arise. In the first place it goes without saying that the filter performance will not be achieved if the stages of the filter can "see" each other, so each stage of each filter must be screened. Oddly enough this is an advantage in the long run as it makes the filter much easier to slip in and out of its can; the ploy is to mount the filter so that it is a sub-chassis and screw this sub-chassis to the main chassis with just the input and output wires coming through. Each valve stage must be screened from all other stages and all wires fed through screens by means of stand-off barbs or feed-through condensers, as may be appropriate. Finally, it is essential to give each chassis a bottom plate to keep all signals inside the chassis. This means that the construction of the chassis needs to be of brass so that all the screens can be sweated on to the main body of the assembly.

Table II

Suggested Last Decade — Filter Data

Filter No.	No. of Sections	Nose Bandwidth (greater than)	Skirt Bandwidth (less than)
1	4	8.5-9.4 mc \pm 3dB	8.95-1.3 mc @ - 40dB
2	4	2.45 mc \pm 10 kc @ - 2dB	2.45 mc \pm 90 kc @ - 40dB
3	4	2.45 mc \pm 10 kc @ - 2dB	2.45 mc \pm 90 kc @ - 40dB
4	6	1.45-1.55 mc \pm 6dB	1.5 mc \pm 240 kc @ - 40dB
5	4	1.9 mc \pm 50 kc @ - 1dB	1.9 mc \pm 200 kc @ - 40dB
6	4	1.9 mc \pm 50 kc @ - 1dB	1.9 mc \pm 200 kc @ - 40dB
7	4	9.5 mc \pm 500 kc \pm 2dB	9.5 mc \pm 1.5 mc @ - 40dB
8	4	9.5 mc \pm 500 kc \pm 2dB	9.5 mc \pm 1.5 mc @ - 40dB

General Electrical Considerations

The synthesiser, if properly designed, will be found very tolerant of HT voltages, except that it is best to feed the oscillators from a stable HT line. The same does not go for the heater line, and if valves are used it is definitely a good idea to run the decodes and the two divider units from a stabilised heater line or, as an alternative, arrange an AGC-controlled amplifier at the output of the 100 kc unit, the AGC voltage of which is derived from

the output of the transmitter. The stabilised heater line is probably the easiest method and is preferred by the writer.

Conclusions

A frequency synthesiser such as that described is ideal for driving a SSB exciter or a CW transmitter and is capable, with care, of giving output at an accuracy, in terms of frequency, of closer than one cycle per megacycle.

MAY, 1966, R.A.E.—RESULTS

The report from the City & Guilds of London Institute—the examining body responsible for our Subject No. 55—shows that last May, of the 1,519 candidates taking the Examination, 981 or 58.7% passed. This was the lowest pass-rate in the last three years, the number of candidates being the highest. A failure rate of more than 40%, in a simple pass-mark non-competitive test of this kind, can hardly be regarded as satisfactory. The Examiner's own comments are :

"Overall the results were disappointing. Many good scripts were received but there was a high proportion of very weak ones which failed to show an adequate understanding of the subject. More candidates failed to attempt all eight questions than has been the case for many years . . ."

Let us hope that there will be a better showing in the May, 1967, R.A.E. It is of interest to note that, taking the last three years together, the total of candidates who have passed is 2,597—but nothing like that number of new licences has been issued.

BOOKS FOR CHRISTMAS

One of the best and most useful presents for any amateur or SWL is a good book on some aspect of Amateur Radio. We list a wide range of titles—all selected as being sound in the treatment of their subjects—and it is impossible to describe them all in detail.

However, some of the more obvious choices are the ARRL *Radio Amateur's Handbook* (44s.), of which the latest edition is the 43rd, and still the world's leading reference on all that pertains to Amateur Radio. (To keep up-to-date, you need a new one about every three years.) For the specialist, there is the *Antenna Handbook* (19s. 6d. in the 10th edn.) or the new edition of the *Beam Antenna Handbook* (28s.)—either of the two books on /M working, the *Mobile Handbook* (24s.), by the publishers of "CQ Magazine" or the ARRL's *Mobile Manual*, at 24s. 6d.—the manuals on SSB, such as the 4th edition of *Single Sideband for the Radio Amateur* (22s. 6d.) or the *New Sideband Handbook* (25s. 6d.).

For the beginner or less specialised reader, we can recommend the *Radio Amateur Operator's Handbook* (5s. 6d.), which gives a lot of basic information on the operating side for SWL or recently-licensed amateur; the *Guide to Amateur Radio* (5s. 9d.); the

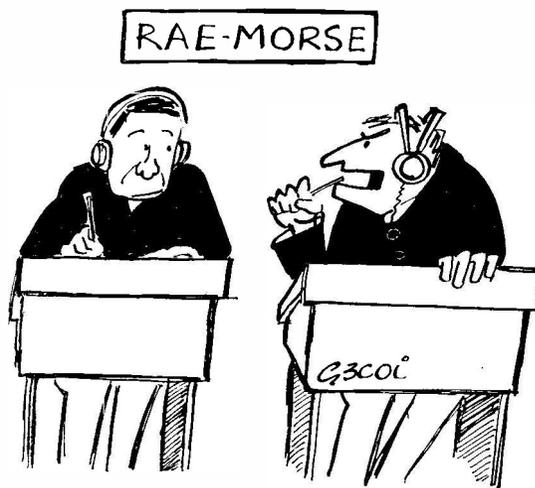
Radio Amateur Examination Manual (5s. 9d.), essential for anyone reading Subject No. 55; *Short Wave Receivers for The Beginner* (6s. 6d.); and the new *Short Wave Listening* (13s. 2d.), described on p.635 of this issue.

Useful general references are *Technical Topics for the Radio Amateur* (10s. 8d.); *Short Wave Radio and the Ionosphere* (11s. 9d.), by the late T. W. Bennington, an authority on the subject of propagation of radio waves; the *Radio Data Reference Book* (14s.); and the latest (8th) edition of *Radio Valve Data* (10s. 7d.) which also includes a large section on transistors.

All prices given are post free, with delivery from stocks—while they last, with the Christmas demand beginning to build up. We aim to give a day-of-order by-return service. Orders should be sent, with remittance, to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WHY NOT BIND IT?

With two more issues, we shall be at the end of another Volume, the 24th in the series. The "Easi-binder" we advertise takes the twelve copies, in an easy do-it-yourself insertion, and makes a handsome book-case volume, with a stiff cover and the name SHORT WAVE MAGAZINE gold-blocked on the spine. The price is but 14s., post free, from stock.



" . . . Psst — what's dit-dah . . . "

INTERNATIONAL RADIO COMMUNICATION EXHIBITION

Seymour Hall, London,

October 26-29, 1966

THIS year's Radio Communication ("Amateur Radio") Exhibition was graced by the presence, for the brief opening ceremony, of H.R.H. The Duke of Edinburgh. His short but felicitous speech was right to the point and showed that, with his usual thoroughness, he had briefed himself fully on what we call Amateur Radio. After the platform proceedings, H.R.H. toured the Exhibition and stopped to have a word at many of the stands—and what he said and the questions he asked showed that he knew what it was all about.

It was a wonderful send-off to what was the best Exhibition we have yet had, in terms of total attendance and general enthusiasm. Certainly on the opening day, it proved that Royalty can be of enormous value even in our comparatively narrow and esoteric world of Amateur Radio.

Looking round the Exhibition as a whole, it is probably fair to say that the best of the commercial stands were those put on by K.W. Electronics, Imhof, J-Beam Engineering, Contactor Switchgear, TW Electronics, Daystrom, Seymour-Philadelphia, Partridge and, of course, Electroniques/STC, the new consortium in the field of Amateur Radio, of which we shall be hearing a great deal more as

time goes on.

For some years now, a feature of the Exhibition has been the award of what is known as "The Manufacturer's Prize." The judging for this is on the basis of who is showing the newest and most meritorious piece of equipment offered as a regular production line. This year Bill Bartholomew, G8CK, of Contactor Switchgear must be a proud and happy man—for to him went the prize for his solid-state Tx/Rx equipment for 160m. operation. He also had a most attractive stand display, and worked very hard throughout the period of the Show—though he must have wondered why, through all the exhibition literature, his firm was described as *Contractor Switchgear*. Never mind, it makes no difference to the value of the award.

Electroniques/STC

During the Show, a most important announcement (already referred to on p.553 of the November issue of *SHORT WAVE MAGAZINE*) was made affecting the firm of Electroniques, Ltd. Briefly, this business has been acquired by Standard Telephones & Cables, Ltd., of Harlow, Essex, and will henceforth be known as Electroniques (Prop. S.T.C., Ltd.). But even more



General view, from the balcony, of our stand at the recent Amateur Radio Exhibition at the Seymour Hall. This picture was taken on Wednesday, October 26, the opening day, which was honoured by the presence of the Duke of Edinburgh. The photograph is of the scene at lunch-time, and it gives a good impression of the interest there was in this year's Show.

The Duke of Edinburgh at the "Short Wave Magazine" stand on the opening day of the Exhibition. H.R.H. showed that, as ever, he was fully au fait with the object of the exercise, and asked many searching questions—to which Austin Forsyth, G6FO, Editor of the Magazine, is seen here (left) attempting to give convincing answers!



important than this is the new step taken by Standard Telephones, by which a one-off same-day despatch service for a very wide range of components—not only S.T.C. and Electroniques, but those of many other manufacturers, more than 80 in this country and abroad—will be offered to amateurs and home constructors. This is a development of the already-established S.T.C. Electronic Services Division. All items available—and they cover an astonishingly wide range, more than 11,000—are listed and priced in a new illustrated catalogue shortly to be available from the Harlow address. The apparatus offered includes a number of modules (ready wired and tested assemblies) which can be regarded as "building bricks," enabling the home-constructor to put together high-grade equipment which, in the ordinary way, would be beyond the scope of the kitchen-table type who usually possesses only a multi-range meter as his basic test gear.

This is a very important departure for the U.K. radio amateur—if only for the reason that it has the backing, and the background organisation, of a large and powerful manufacturer in the radio and electronics industry.

Here, it is only possible to outline the general scheme. All the details are set out in the literature and catalogue available from: Electroniques (Prop. S.T.C., Ltd.), Edinburgh Way, Harlow, Essex. And it is of interest just to add that the manager of the Electronic Services Division is Jack Evans, G3BAZ.

New Amateur-Band Receiver

We were glad also to notice yet another new item from the K.W. Electronics stable. For years now, this progressive and go-ahead firm, under the

leadership and direction of Rowley Shears, G8KW, has been showing the way in the highly-specialised field of equipment designed for amateur-band operation. (And nobody knows better than G8KW how difficult and exacting that market can be.) His latest offering is the KW-201, a communications receiver to cover 10-160 metres, with many attractive features in the modern context of Amateur Radio. And its price is sensible, too.

Among what might be called the non-commercial exhibitors, we ought to mention the magnificent stage display by Royal Signals, staffed by all ranks, in uniform, and mainly holders of call signs. While the R.A.F. was conspicuous by its absence—things seem to be getting worse and more difficult for what used to be a very alive radio amateur organisation—the Royal Navy had an interesting stand, with a keen staff. The Post Office put on an efficient and impressive professional demonstration, both in the Hall and up in the balcony (missed by many visitors).

Oh, yes, we were there, too—as we have been every year since what is really the Amateur Radio Exhibition has been held. According to our visitors' book, we met more readers and friends, old and new, than ever before. We certainly did more counter-business than at any previous Exhibition.

The attendance generally was up, and probably a record. So Phil Thorogood, G4KD, who is the proprietor of this annual Exhibition, as well as its organiser and manager, must feel pleased with the results of all his work and effort. We understand that next year's Show will go back to the Royal Horticultural Hall, Victoria, S.W.1—which at least will be more convenient from our point of view!

NOTE ON EARTHING

INDOOR EARTH FOR TOP BAND— SUGGESTIONS FOR THE FLAT

DWELLER

A. R. WILLIAMS (G3KSU)

WE have all heard of the indoor aerial, but what about the "indoor earth"? Much has been said in past issues of *SHORT WAVE MAGAZINE* regarding the necessity for a really good earthing system for Top Band. (A necessity, that is, if the aerial is to work efficiently.) This becomes all the more important when the aerial is of low impedance, current fed and "tuned against ground." Those of us who are able to lay down a vast area of wire netting on virgin ground have no problem. Similarly, buried counterpoises, or an enormous hole containing a varied assortment of old water tanks, bicycle frames, prams and such can also satisfy the requirement. Where possible, of course, all such "hallowed ground" should be kept well watered, thus ensuring a low earth resistance.

However, there must be many, who, like the writer, are unable to accomplish any of these feats. Most of us who require an RF earth probably depend upon that old and trusted friend the cold water pipe—but always ensure first that it does go to earth, and that it is metal all the way. Wherever practical, all such connections to the c.w.p. should be made immediately above the point where the pipe enters the ground, even if this does involve rather a long run—and use heavy gauge wire. If you do end up with a longish earth lead (in terms of wavelength that is) it's worth trying a "shortening capacitor" in series with the lead. Text books tend to specify "50 or 100 $\mu\mu\text{F}$ " but in the writer's experience a 1500 $\mu\mu\text{F}$ variable condenser (ex-aged broadcast receiver type) is the best way of determining the optimum value. To do this, start with the maximum capacity, load up the Tx, and observe aerial current on a suitable thermo-couple RF ammeter. (Beware—these burn out very easily. A 0.05 amp. one should be satisfactory for 10 watts into a low impedance.) Reduce the capacity in steps, and re-load as required. If the current just drops off with decreasing capacity, forget the idea and re-connect the earth lead normally.

Indoor Earths

Failing a direct earth connection, recourse must be had to an "indoor earth." This proved necessary in the writer's case, as the shack is located in a flat, about 100 feet above a garden, in which it is impracticable to dig large holes, and where the main cold-water feed is inaccessible at ground level.

Unable to dig a hole, a floorboard was lifted (still

100 feet up, remember). This action revealed the following:

- (a) The mains earth lead,
- (b) A cold water pipe,
- (c) A hot water pipe,
- (d) A waste water pipe, and
- (e) A gas pipe.

All five "earths" were at the same potential, but each produced different aerial currents, and each required a different value of loading capacity. In this case, the hot water pipe responded to the "shortening capacitor" treatment, while the others did not. The h.w.p. also produced the highest value of aerial current, about 300 mA into 150 feet with 10 watts input to the PA.

But, no two h.w.p.'s are the same, and few floorboards, when lifted, reveal such a varied collection of apparent "earths." The reader's choice may not be as great, but the mains "earth" should *always* be avoided. This can be a source of receiver noise and a cause of BCI/TVI. The gas pipe "earth" is also suspect, as many are insulated between pipe joints. (This also conjures up unlikely visions of high earth currents leading to gas explosions . . .)

Of the remaining "earth" possibilities, it is the waste water pipe which normally has the most direct path to true ground. The hot and cold water systems tend to do a tour of the house and roof first, before heading in the right direction. Trial and error is the only answer, and an investigation may well prove rewarding—you never know *what* you might find under the floorboards!

Some final points: An earth current of similar magnitude to the aerial current is, of course, to be expected in any system tuned against ground. Furthermore, don't expect "instant DX" as a result of locating an efficient earth. It *should* improve the local ground-wave quite noticeably, but may only have a small effect at greater distances—but any increase is better than none!

GIFT SUBSCRIPTIONS

For those who contemplate making a present to somebody of a subscription to *SHORT WAVE MAGAZINE*, the cost is 42s. for a year of 12 issues, post free, home or overseas, starting any month. The average charge for 2nd class airmail is 5s. *per copy* (a good deal more than the cover-price of the *Magazine*)—so don't just enclose an extra few shillings and ask us "to send it airmail." For most parts of the world we would need at least £3 more.

LOSSES IN THE MAIL

In a recent survey of the mail system in Britain, conducted by one of the national newspapers, the conclusion was that about 6 per cent of it is either mis-sorted, wrongly delivered, delayed in delivery or just lost. It appears that this figure has not been seriously challenged by the Post Office—indeed, a 6 per cent failure might be considered not unreasonable having regard to all the human factors involved—and it explains a lot!

Q 346

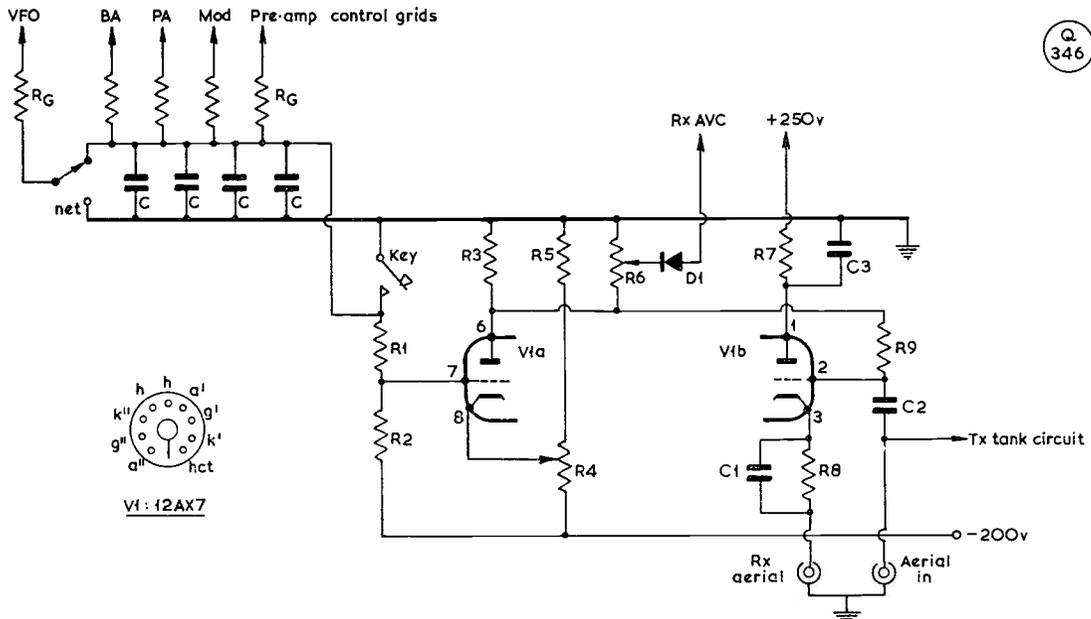


Fig. 1. Circuit of the T/R switch, for which values can be : C1, .0015 μ F; C2, 500 μ F; C3, .01 μ F; R1, R2, R3, 100K; R4, 10K pot.; R5, 20K, 2w.; R6, 500K pot.; R7, 50K; R8, 2.2K; R9, 1 megohm. RG are existing grid resistors; condensers C are .001 μ F, decouplers; D1 is a germanium diode, GD3 or similar, and the valve is a 12AX7.

SIMPLE T/R SWITCH

SUITABLE FOR USE WITH
QRP TRANSMITTERS

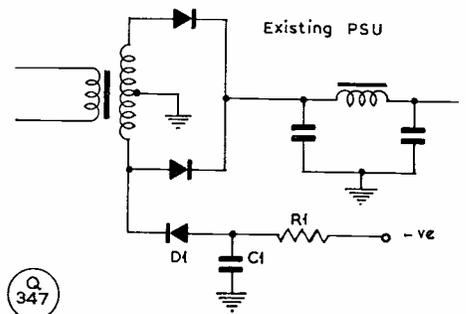
By G3RSF and G3RSP

AS both of the writers' main interest is CW, it was decided to install break-in facilities on their transmitters. The principal requirements were that the system should be : (1) Of small size; (2) At minimum cost; and (3) Relayless.

After trying several methods, the circuit shown in Fig. 1 was adopted. When the key is up, V1A is cut off. The voltage at the anode is therefore zero. V1B is an ordinary cathode-follower in the aerial circuit of the receiver. When the key is pressed, V1A conducts and the voltage appearing at the anode falls to 100v. negative. This negative voltage is fed to the AVC line in the receiver and to the grid of V1B. The receiver is therefore muted according to the level set by R6. V1B is cut off, thus isolating the receiver from the aerial. The diode D1 prevents the T/R switch from affecting the AVC line on receive.

Power Supply

There are several ways of obtaining a negative feed from an existing transmitter power supply. One suitable method is shown in Fig. 2.



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Fig. 2. Using the existing Tx PSU to get power for the T/R Switch. C1 is 6 μ F, 350v. DC working; R1 can be 10K 2-watt but should be adjusted to give 200v.; and D1 is a 500v., 100 mA rectifier.

Setting Up

With the key up, R4 is adjusted until the voltage at V1A anode just drops to zero. This is then left set. R6 is then adjusted for the required monitor level. For telephony operation the key may be used as the on/off switch, or if desired a foot switch, or something similar, can be wired across the key terminals.

INTERESTING THOUGHT

On the mainland of the United States there are 3,030 counties, corresponding roughly in size and administration to our own county system. It would be quite a feat to work even half the U.S. counties!

VHF BANDS

A. J. DEVON

WELL, were you up to see the *Leonids* meteor display in the early morning of November 17, when it was expected that there could be the fire-works show of the century in the eastern sky? No?—well, your A.J.D. was keeping a look-out but at the moment of writing it is not possible to say if anything much did happen, because for him the eastern sky was blanketed by scudding cloud, driven by northerly Force 8 winds. However, the astronomers were on the watch for what was expected to be a remarkable display of natural forces just outside our atmosphere. For some years now, the *Leonids* have been used very successfully for working EDX by the MS technique—often discussed in this space. The astronomical pundits expected that this year this particular *Leonids* appearance would be of more than usual interest, because the great streams of particles, drawn nearer to the Earth, would impinge closely on our atmosphere and so would show up more clearly as they died in it. It is only at long intervals that this phenomenon can occur.

* * *

Though there is not much to talk about this month in the way of operating news—the Wx and the general pattern for DX propagation over Northern Europe

has been right against EDX or even GDX working—there is always something interesting to discuss. The first reception in this country of the ZB2VHF beacon on 4 metres was recorded on October 5 by G3JHM (Worthing). This was before ZB2VHF was moved to a better site, right at the top of the Rock, and since October 28 it has been heard almost daily, at varying degrees of signal strength. Results have been tape-recorded by members of the Plessey (West Leigh) Radio Club. The frequency is 70.26 mc, continuous CW operation with an easily-recognisable call sign sequence, and of course reports (either to ZB2VHF direct, to G3JHM, or *via* your A.J.D.) would be very welcome. There is enough variation in propagation conditions around 70 mc, even at this time of year, to make reception possible.

* * *

The *Oscar* work still goes forward with unabated zeal, though it is fairly certain that *Oscar V* will not go into orbit this year. But when it does come, the fifth in the *Oscar* series—and how fortunate Amateur Radio has been to secure this sort of support from the American military authorities—it will be a two-metre translator with far better RX sensitivity than *Oscar III*. This means that *Oscar V* will accept signals at the LF end of the two-metre band and re-transmit them

at the HF end. Ground tests suggest that running about 100 watts with a long-Yagi should energise the system for a good return-signal. In fact, if anyone tries to drive *Oscar V* with excessive power (as has happened with previous amateur satellite experiments) the only result will be that AGC action on the Rx side will block all signals. The tracking and telemetry channel will be 145.950 mc.

And, just for the record, it is reported that *Oscar III* and *Oscar IV* are still in orbit, but not now transmitting—just hurtling round, in due time to be drawn into our atmosphere for final incineration. It seems a wasteful end to all that work and planning. . . .

The contact-man for all information regarding the *Oscar* experiments is G2AOX (Hendon), who has worked very hard on the project ever since it was first mooted.

* * *

And that is it for this month. All Table claims have been taken in and your A.J.D. hopes that, even if you did not succeed with the *Leonids*, you may catch the *Geminids* meteor shower during December 10-13. To be with us for January's issue, put in your piece by **Wednesday, December 14**, the sufficient address being: *A.J.D., SHORT WAVE MAGAZINE, BUCKINGHAM*. Have a good Christmas and don't forget to save a drop for the New Year. *Urs* *ever*, A.J.D.

THREE-BAND ANNUAL VHF TABLE

September 1966 to August 1967

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL pts.
	Counties	Countries	Counties	Countries	Counties	Countries	
G3FIJ	23	5	29	8	6	3	74
G3TLB	9	2	39	6	—	—	56
E12A	5	2	31	7	—	—	45
G3EKP	17	5	8	3	6	3	42
G3AHB	—	—	13	3	12	2	30
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.

COMMUNICATION and DX NEWS

ONE way and another, Things have been Happening during the period under review. Top Band news includes the Antipodean DX, and much in addition—the HF bands have been giving forth DX for a large (relatively) proportion of the time—and even Ten has been letting the waiting world know it is still in being, and capable of going well open.

All this being the case, we have a bagful of mail to discuss, quite apart from the MDT reports, so it behoves your E.P.E. to cut the cackle and get on to the 'osses.

Eighty Metres

The first thing to do here is to retract the suggestion that HI8XAL was in any way a phoney. Those S9 signals were, in fact, quite genuine, and, what is more to the point, this lad is (as G8DI puts it) not only genuine but generous—he sends his cards by direct airmail! This is confirmed by others, including G3VDW, who also had cards in this manner.

In the opinion of G3TLX (Edgware), 80m. has been doing quite well; Ron mentions outstanding signals from VE1ZZ (59 plus), and ZL4BO (589) during the VK/ZL contest. As for the rest, W1, 2, 3, 4, and 8, VE's, VO, 6X5BB, ZL1AZ, and ZL4IE, seem to add up to a proof that he is right.

VE3CY, W2HC, 4X4AS, CN8AW, YV's, ZD8ARP, and East coast W's is the story from G3UML, as far as Eighty is concerned. But the long-awaited "sensation of the month"—to wit, the Vee-beam at GM3SVK, which will really knock 'em sideways—has had to be deferred yet again owing to the weather conditions, which have been such as to discourage aerial parties except in emergencies.

Forty Metres

G3UML (Ilford) sent his usual long list in this month and has

an impressive collection on 7 mc to show for his pains; VO1BD, PY7APS, all W call areas except 7 and 9, at 59 plus during the CQ Contest, ZD8ARP, IØRP/4U, XE1CCW, YV5AKP, 9Y4TX. Nothing to complain about there!

From Cove, G3PQF writes in to say that by the time this piece appears he will have completed his removal to the new QTH; if all goes well Dave has hopes of being "back in business" soon after. In the meantime he has filled in time by building a KT-340 up from the kit.

G3VPS (Hailsham) seems to have dived in off the deep end with his new call, and, as far as 40 metres is concerned, comes up spluttering somewhat. However, the exercise has not been without its value, and, on CW, resulted in contacts with TF5, 4X4, and W4NH who was running a mere nine watts to a groundplane for reports of 579-379.

Another one who is thinking along QRP lines is G3TLX (Edgware), who remarks that conditions have varied from very good to "chronic" with a very fine opening on October 22-23 during which the W's were, in general, over the nine, and even the W6 chaps were pushing the needle towards the "8½." As an example, Ron cites his being called by four of the W6 stations on the run during this period. W7 still neither heard nor worked but all other W call areas raised, also VE, VO, VK, ZL, CT2YA, SV1CC, 9H1AM, 4X4UH, SV1BH. In addition, he tried some QRP tests at the 10-watt level and managed contacts over the pond with no trouble at all.

G3RPB (London), obviously more interested in Top Band than Forty, as a sideline mentions contacts with KL7JDO, ZD7IP, VK's and ZL's, all the W areas apart from the elusive W7, CT3AU, EL2AF, XE2AAG.

A crop of doubtfuls is the sad

tale from GM3SVK, among which in particular he mentions "VP4FY," at 0900z, who apparently must be a little out of touch with the new callsign formats. (Incidentally, it will soon be difficult to find out whether a chap is signing or ragchewing about his receiver!) Fred mentions 4Z4NAZ, believed to be the new prefix for Israel, and VQ9TC heard, with CT2YA, UD6BD, UF6LA worked.

Top Band Trans-Atlantic Tests

In view of the amount of news of this band in the file for this month, our reminder about the Tests must be correspondingly brief. It is all in the October issue, on p.482, with the exception that somehow we managed to confuse the "odd five-minute periods" with the "even" ones, which caused a certain alarm before the knowledgeable ones sorted it out and passed the word round. As an avid Top Band man, who should have known better, your conductor is covered with confusion. The other main point is that the "First-Timers" are to have sessions to themselves on December 18 and February 5, as far as the European and African sides are concerned. On those dates it is understood that all those who have already worked Stateside on 160m. will QRT and let the first-timers in on the fun.

Top Band—Spectacular

This band carries by far the greatest amount of the news this month; not because nothing has happened on the others (which have in fact been "giving" rather better than usual, if anything) but rather because the interest has been greatest on 160 metres.

Top of the pile is the letter from G3RPB, in which he mentions a contact with ZL3RB on October 2 and hearing the same station again on the 9th, the ZL being 569 and 559 respectively on the two occasions. In addition, G3RPB contrived to hook WOGTA/8FA on October 19. This is really quite spectacular

news in the context of Top Band, and all concerned are to be congratulated on a fine effort.

Second in the clip is the one from Bob 9V1LP, who is, of course, WOGTA/8F4 when he puts on his "other hat," even if the distance does seem a trifle excessive for a change of headgear! Bob has a 144ft. broadband vertical up for this band and 80m., which has accounted for contacts on 160m. with G3RPB, G3SED, G3FPQ, G3FGT, G3LIQ, G3RFS—out of which the strongest signal was G3RPB who, in spite of the QRN, was 579 as far as Bob was concerned, in contrast to an average report of nearer 359. As to the picture of 9V1LP activity, not so much success, not quite so much on the air as last year, about sums up his situation; in the context of 160m. from 9V1LP the only G heard was G3SED, early in October, but he escaped. . . .

G3SED himself mentions that WAC has in fact been achieved on Top Band by at least seven G stations, and there may in fact be more. He adds by way of news a corroboration of the picture as given so well by 9V1LP, seen from the point of view of an amateur who has always been kept aware that Top Band has DX possibilities. This is fair enough in the U.K.—where so much has been done over the years (by the *Magazine*, it is not immodest to say)—to keep 160 metres alive and kicking. But it has to be remembered that in most parts of the world what we call Top Band is just not reckoned in terms of DX, and the amount of stirring-up that has to be done to create the present high level of activity is a credit and more to the work of chaps like 9V1LP, W1BB. On the other hand, Mike is too right when he says that a lot of stations just do not come on and try their hands at the right times, because they have the feeling that "it's just not possible from my QTH."

Another WAC-on-Top-Band type is G3FGT and he writes in to mention that his set of cards were on show on p.193 in the June, 1963, issue of *SHORT WAVE MAGAZINE*. As to band conditions G3FGT says "Nothing much,

worked ZB2AP, WOGTA/8F4 and several W's, heard 9V1LP." It took him ten years to make his WAC, the ZL contact being the really difficult one.

Just to prove that it is not all that impossible, we have a letter from G3VGR (Southend) who bewails the fact that he heard WOGTA/8F4 but could not hook him because one end of the Top Band wire was down so as not to foul the erection-party putting up the ten-metre beam. . . . By the time this reaches you, Dave will be on 160m. with a home-brew SSB (filter-type) rig.

G2NJ (Peterborough) is always brief and to the point; this time he mentions OH2BC, near Helsinki, on November 5, on the key. How the man can do such a thing on Guy Fawkes night is almost past belief, when so many others have to be out at the fireworks by order, and wondering whether the aeriels are going to survive! It has to be admitted that your E.P.E. is somewhat biased, insofar as an evilly disposed five-bob rocket did not go in the intended direction. . . .

G3NPB has decided to reactivate as far as 160m. is concerned, and re-enters the Table, at the 98/98 level on CW, and 88/88 Phone, after a couple of years of inactivity. G3NPB's Phone score adds considerable interest to that half of the table.

From GM3UVL (Bearsden, Dunbartonshire), who writes to report that after a couple of months of activity on the band he has 55 counties and 8 countries, of whom the vast majority have queried the spelling of the county as Dunbartonshire while the town is spelt *Dumbarton*—which is a confusion that has always existed. Bill is not having a lot of luck with the out-of-UK DX; he says his poor aerial tends to put him at a disadvantage, and several times the prize has been swiped from under his nose by the stronger signals. He hopes to get a half-wave up ere long, and may well have done so by now. Another haggis-eater in foreign parts is GW3PMR (Bangor) who reclaims his Table score just as your scribe had the blue pencil poised to remove it.

Dave, G3UEG (Nottingham), has been on and off the band at various times owing to the calls of a sandwich course which is to last a total of four years. Various lodgings have had equally various poor aerial possibilities, but at last something reasonable has been erected, by way of a half-wave between two houses, at the home QTH. When Dave is not at home (which is most of the time) the other end is used by the SWL who lives in the house there, for his listening. Incidentally, now that G3UEG has a KW-2000, and this half-wave, he would like to have a bash at the Trans-Atlantics over the Christmas vacation period, and would share with anyone similarly-inclined but lacking, maybe, an adequate aerial.

GM3SVK (Unst), will be remembered from last month as having lost his aerial in the breezes that blow up there, but soon put the wire back up, and comments to the effect that the DX is about but is disappearing under the noise which has afflicted him. However, VO1FB at 579 and 9H1AF at 449 have been heard. The stuff worked includes such things as OH2BC (AM) and DJØITU, EI9J, PAØGMU, DJ6TK, and an increase in U.K. counties worked to 64.

Twenty Metres

The consensus of opinion seems to be that the band has been a little down this last month, although your scribe would suggest that to some extent this could be because of the tendency of the troops to fan out over the three HF bands now available, due to the general lift in conditions.

G3NOF (Yeovil) always has something interesting to record, and this month is no exception. Don has been noticing how the Pacific seems to have faded out in the early mornings, although VK by the long path has been good, as have the JA's over the same route. The band seems to have been closing a little earlier in the evenings. On November 5, Don Miller, under the guise of VQ9AA/F on Farquhar, (see article pp.616-617 this issue), was stirring things up, although G3NOF did not, himself, ring the

Ian Body, 9M6MG, R.A.F. Labuan, BFPO 660, Borneo, came on first as "9W6MG," because the c/s was allotted incorrectly. 9M6MG is utterly legit., is on the air almost daily from 1130z, 14.20-14.30 mc, and looking for G's. The Tx is a K.W. Viceroy and the Rx a KW-77, into a dipole. A great deal of DX has already been worked.



bell. Other contacts mentioned include VEØMY, VP2KC (Anguilla), VP8IK (Graham Land), VP8JC (Falkland Islands) and VQ9BC/D.

The report from G3GIQ implies that a few new ones are being booked in still, about ten this month, in fact: FY7YL, HM2BD, KG6IC (Iwojima), KL7's, KS6, KW6, KX6, OX5's, VK9AG, and sundries, about sums the situation up.

One who felt things to be rather better this month was G3VDL (Chalfont St. Giles), who offers VP6, UG6, OX5, KZ5, as well as the more usual stuff, and seems to be making steady progress up the tables.

9M6MG (Labuan, Borneo) is an R.A.F. Club station with only one operator, who previously held the call VS9AIB. Ian writes a report on the first fourteen days of activity from the station, which says that they are getting out very well on the present dipole, and will do better when they have the proposed Quad up. The time to look for Ian is about 11.30 and onwards through their evenings; Ian indicates that he will not close down until the callers have all been dispensed a QSO. His frequency will be in the area 14:2 to 14:3 mc, using a K.W. Viceroy and KW-77 receiver.

Down in Hailsham, G3VPS is clearly keen on the medicine; he has been keving with OD5, UF6, PY, W's, UA9, YV, CN8, the first

four also being booked in by SSB as well.

Only one contact is considered worth a mention by G8DI, this being his QSO with HR2BK during the CQ WW Phone Contest. Bert is obviously getting fussy!

Another one who has been selective in his listings this time is GM3SVK; Fred's writing is usually very easily read, but this month we have, with regret, to report "a slight 'squiggle'" which baffles us. However, Fred mentions CN8, M1, CR6, IØRB, JA3, JX5CI, KH6, PZ1CL, VP8IN and 'JD, VS9, TA1AV, TR5TP, 9X5PS. In addition he worked a "ZA1AB" but has grave doubts, in view of the conflicting reports, and mentions that he is also not too sure about the KM6 mentioned last month.

Laurie of G3UML does not seem to have been spending so much time on 20 metres as on Fifteen and Ten, to judge by his lists, but he does mention FL8RA, VO9BC/D, FH8GF, and VQ9AA/F who was brought to the bank successfully while the writing of his letter was in progress—after, as Laurie puts it, "waiting for him to stop bleeping and come on SSB!" Another interesting one was ZL3MG, because he was worked using the mobile rig.

Ten and Fifteen

The general trend of the correspondence this month seems to be

to lump these two bands together for the purposes of reporting events, and so your conductor proposes to do likewise.

G3VDW (Coalville) has been on 15m. CW, and worked W's, JA's, VE3's, UD6AM, ZL3IS and HP1BR, the last three all being new countries for Terence; in addition, AM Phone brought in the first Phone W6 in the form of K6AGU, all the other W areas except the elusive sevens, VE's, JA's, SU1IM, ST2SA, EA8, KP4MO, and ZS1KZ. As to the ten-metre patch, AM again was the mode, and the first W's ever heard on the band yielded to G3VDW, plus ZE1JBY, 9H1X, CR7's, MK4BGD, ZE1, ZE8, ZS1—all of which, we would think, adds up to a very pleased operator!

From London, N.12, we hear at rare intervals from G3MBL, who has a two-element beam, with 25 watts AM and a CM-1 receiver. Alan was on 21 mc and offers VE3CQG, MP4BBA, SU1CM, ZL1CA (over the long path), ST2SA, VS9APW, with YA5RG and CR4AY heard but not worked. All these, no doubt, slipped in between the TV hours, as the times given suggest.

After a couple of months hiatus, another epistle from G3LZQ (Hull), who is still complaining about work as a source of ORM. However, John was on for the recent contests, when the 10-metre band was more or less boiling over. However, the bands

subsided to a great extent for the rest of the month, at least at the times when G3LZQ was around. The pick of his crop appear to be : ZD8ARP, CR6, 9G1, 9J2's, ET3WH, VQ9BC/D, ZD8WZ, MP4TBO, WØGTA/8F4, CX3BH, and a lone CW contact with CO2BO, all on 21 mc, while 28 mc yielded, among others, PZ1CF, 4M5AA, SVØWU and 'WL (on Rhodes and Crete respectively), TN8AA, EL2AK, KP4, KZ5, HC1TH, ET3WH. All this lot was collected by way of a Quad, rather than the groundplane usually favoured, at a height of only 20 feet. As is to be expected after such a spell plans are feverishly going ahead to give the new Quad a lift to the 45ft. level.

The first word of the report on Ten from G3IDG (Basingstoke), is "Wow!" and one cannot but agree with him. On the Sunday of the CQ Contest, 28 countries were logged, while the tally for the month was no less than 44. One of the interesting things to your scribe here is the length of the list of CW stuff—as long as the SSB one, which seems to be a bit of a change of heart on the part of the occupants of the band as compared with the last peak, when it was quite definitely a "Phone-orientated" sort of band where CW calls were either ignored or answered on Phone.

The list from G3UML covering these two bands this month was nothing short of gargantuan, covering a whole sheet of paper close-written! At that, the vast majority are under the heading of Ten; so sorting out a few would be invidious in the extreme. Let us instead count them—103, all different and all DX in any man's language, plus W's, VE's and such-like up to the grade of "equal-to-a-W6." The list for Fifteen is of the same calibre, but shorter, with only 44, excluding the W's, VE's and such. The entire list on both bands was worked using SSB, and, of course, results in a rise in Laurie's position in the Table.

On a different plane, but equally of interest to the student of Amateur Radio, comes the letter from G3LZO (Maidstone), who lashed up a little QRP rig with a 28.4 mc crystal and a QV04-7 as

a PA stage, as a "gadget" to assist in tuning up his home-brewed 3-element beam. After so doing, it was felt that modulating the gnat-power rig and attempting to have a contact might be interesting. The results were in the log after this fashion : UB5BLB, UA3LQD, ZS6RO, VE3FBP, W4NAL, VE3COV, VE3AXF, VE3BUA, XE1JJA, WA2NPD and a couple of G's. All this taken in during one session and with only the QRP rig, crystal-controlled in use! G3LXO draws the conclusion that high power is not necessary to enable operation effectively on the band—this undoubtedly is so, but your conductor would suggest that the beam had a good deal to do with it.

G3VDL (Chalfont, Bucks.) usually has some comment to make which can be compressed into a single sentence; this time he is in a good mood. He says "Conditions seem to be getting better all round." And that, after all, does sum up the situation as compared with the way things were a year ago. G3VDL offers SU1DL, 6O6BW, ZD8J, ZB2, 4X4, 9H1, ZS, CR6, and KP5, all hooked with 60 watts to a dipole, on 21 mc.

G3NOF (Yeovil) always analyses the band conditions on the HF bands in detail, which is a thing that only the beam-users can do effectively. As for Ten, it opened up most days for Don to somewhere-or-other. Nothing from the Central Pacific area has been booked in during the period under review, and all the VK and S.E. Asia contacts were over the short path. The list mentions, among others, CR6DX, EL8B, HC6GM, VP2AA, VP5RB (the latter being on Grand Turk Is.), VP8's, WØGTA/8F4, ZD8SKI and the usuals, such as all W areas. As to Fifteen, the situation was in many ways similar, and the list here includes CP6GA, CR6IK, CR9AK, HL9TH, JA's, MP4BBW, VP5RB, VQ9AA/D, VQ9BC/D, VS6FS and WØGTA/8F4.

G3VPS (Hailsham) is keeping a regular sked with MP4BDF on 15m., and is moved to remark on the courtesy that prevails in this context, with no-one calling MP4

during the overs, or CQ's on the frequency of an unanswered call to the DX. We cannot help the feeling that Someone has been Lucky so far!

G3GIQ says that during the contests the band was "giving" to such a degree that he managed to work 80 W's on the trot from one CQ call. G3GIQ's next project is to work just one with the newly-completed 25-milliwatt transistor transmitter! Henry has nice things to say about WØGTA/8F4, for his consistent activity during the contests, when he seemed to be always on, no matter which band was tuned.

As far as GM3SVK was concerned, Fifteen yielded little of real interest, and Fred describes it as "better at first, pretty ropey later" and offers CT2YA, CT3AS, JA's, HM1DE, ZC4PC, all on the key, to support his view. As for Ten, we detect a discordant note from a usually happy soul—"Nothing wrong with the ATU as I haven't got one!" It would appear that the aerial used for Ten has been, up to now, the long-wire, and success has been a little elusive; however, a resonant wire is about to be erected. Incidentally, regular followers of this piece will realise that the number of aerials being erected by GM3SVK will soon result in a permanent eclipse of the Sun in those parts.

G8DI puts his comments and Table entries on QSL cards each month, so does not have space to say much; however, he picks out an interesting one in W3YYZ/MM, operating from the American submarine *Blenny*.

Piracy

It would appear that piracy is becoming quite common in the area of the world covered by such calls as 9V1, 9M2, 9M6, 9M8, etc., and we have a letter from 9V1ND (R.A.F. Changi, Singapore) which points out a couple of the pitfalls. 9M8KZ closed down on Christmas Eve 1965, and 9M8NZ on August 31 this year, and any contacts with stations using these calls after the specified dates were with pirates—so don't expect them to QSL! Incidentally, 9M8KZ is on the air with the call G3KZM, and 9M8NZ is active under 9V1ND.



WØGTA/8F4, Pekanbaru, Sumatra (Zone 28) was operated by Bob Snyder 9VILP (Singapore) during August-October, an activity of extreme interest to amateur stations throughout the world — and not least to G's on Top Band. The U.K. stations worked on 160m. by WØGTA/8F4 were G3FGT, G3FPQ, G3LIQ, G3RFS, G3RPB and G3SED, all over October 18-20, with the 20th as the best day. Out in the Far East, all 160m. signals have to contend with a very high local static level. It is also of interest to add that, running all bands 10 to 160m., WØGTA/8F4 has worked G3FPQ (Farnham, Surrey) on these six bands — a remarkable feat indeed; and a great credit to them both. Bob expected to be on again from WØGTA/8F4 for the last week or so of November. He is a very fine operator with first-class gear.

Somebody Boobed

Another letter from the same area, this time from a genuine station who had the mortification of being regarded as a pirate! In this case Ian was first issued with the call 9W6MG, which was about as popular with the 'chasers as a nine-bob note, and had it rectified after a few days to the present 9M6MG. The rest of Ian's letter refers to his operating times and frequencies and is discussed in more detail elsewhere in this piece.

Things That Are Said

G3IDG has a tail-piece to the description and discussion about Boris, Vlad and Ivan over the last few months. He suggests very simply, like TVI, only worse, is BVI!

The preamble remarks on the subject of QSL'ing, touched off an

answering chord in various places; G3NOF remarks that in his early days as an SWL, he was always taught that "The final courtesy of a QSO is a QSL." With which we cannot but agree. G3GIQ, in the same context, has praise for the services of those who act as QSL managers, who, Henry feels, do a great job; on the other hand, he touches a sympathetic nerve when he bewails the cost of air-mail letters at 1s. 6d. and IRC's at a shilling, which make the getting of the "difficult" cards a costly business.

Still on the subject of those elusive cards, G3IDG touches on the remarks of 6Y5FH last time and his low return of 18 per cent cards from the G's; Allan points out that his own return is far better than 18 per cent from the straight G-to-G sort of contact, and thinks

maybe Frank was being a little impatient. As a final broadside in this particular debate, we have the words of GW3PMR, who points out first his own Scots background and then goes on to say, in connection with Top Band activities, that the GM stations are by far the worst offenders in the matter of the non-return of cards!

A letter from G3VIZ (Pinner) indicates that he is a New Zealander, who is returning home for a few months after a 13-year sojourn in U.K. The programme is roughly this—sail December 20 by way of 9M2, 8F, VK, to arrive ZL about January 20. The return trip will commence around April 10 and will take about ten days, this time by way of W-land. Whilst in New Zealand, G3VIZ would appreciate personal contacts, as also, one would assume,

at the stopping-places mentioned *en route*. The U.K. address is QTHR, and in New Zealand will be G3VIZ, c/o 168 Moana Avenue, Nelson, New Zealand.

Due to heavy pressure on space—well, look at it!—the Tables are being held over for this month.

The Magazine Daylight Test

In connection with this Test, 20 reports have come in. Geographically, the reporting stations seem to have been spread out as well as one could desire for this event—with GM3SVK to the far North, G3NPB in St. Ives, Cornwall, for the other end of the country, and the odd OK station appearing in the logs to complete the picture in the south-easterly direction.

As to the conditions, it seems to be that during the morning the band was not too good, with a certain amount of fading on the DX. Later in the day, things got better, with lower noise-level and less QSB. In the last half-hour or so, as the late afternoon faded into dusk, one could hear the band conditions making the transition from day to night conditions.

From where GM3SVK is, about 600 miles from the middle of England, any amateur signal heard

on 160m. would come into the category of DX. Nevertheless, he was covering the whole country throughout the period of the Test, as his log shows, working GW3UUZ at 1320, and hearing G3RPC at 1000, which, if it had come off, would have represented just about the longest possible G-GM contact, from Unst in the Shetlands to the Isles of Scilly. The contact between GM3SVK and G3NPB immediately after lunch was one of the longest, at 850 miles, Unst to St. Ives, Cornwall.

Another who seems to have been blanketing the country from Llantwit Major in South Wales was GW3UUZ, who has a fine aerial pole in the shape of Nash Point Lighthouse. Andy had quite a successful morning until the aerial fell down, and, by the time he had rectified things, it was lunch-time, so the break was as near as no odds to a couple of hours. The first QSO after lunch was with GM3SVK! GW3UUZ added three new ones to his score in Counties as a result of this event.

G3SED (Portsmouth) was only able to be on for an hour or so because of mutual QRM caused by the presence of locals G3TZM

and G3SFR within a hundred yards or so, and as a result only has a very brief log to show; however, towards the end, Mike was able to raise three OK's, the farthest at a claimed distance of 1012 miles. It would seem that OL4AFI, at least, was well heard over the U.K. throughout the Test, as he was logged in the morning by GM3SVK, mentioned as heard elsewhere during the day, and ended up in G3SED's log. G3PWY of Hounslow worked five stations at well over the 100 miles, and heard four more GM's, three GW's and GI3ZZ.

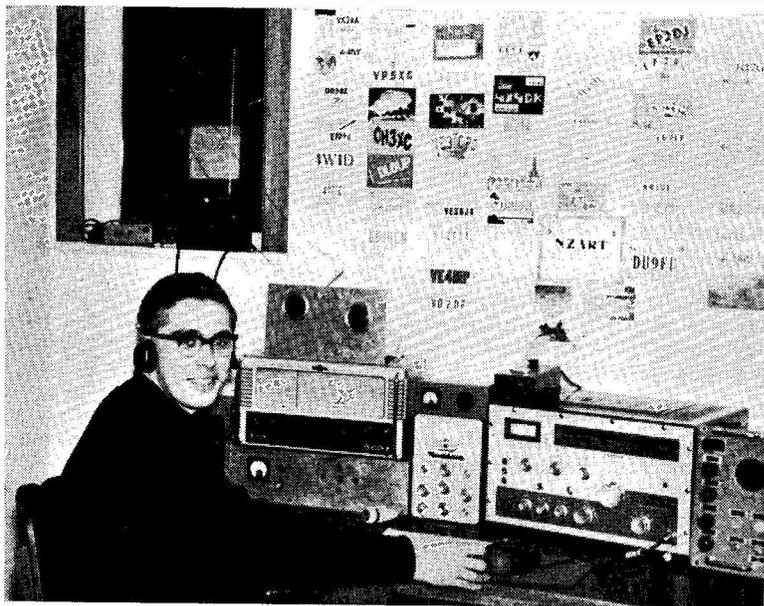
Some of the MDT Comments

"Weather was very wet and windy—QRN in the morning, and plenty of QRM from the ship-shore stations." (GM3SVK) . . . "My QTH is unpleasantly close to Lands End Radio!" (G3NPB) . . .

"I believe that by about 1530, it should have been possible to have QSO's with stations in ZB2 and possibly 9H1 (at a push!). Perhaps next time we can arrange to have these stations active, and find out." (G3SED) . . .

"Using the mobile rig and 6ft. whip stuck out of the window, first contact was G3TIR (Crawley) at 120 miles—not bad for a small

Peter Day, well remembered as a keen and efficient SWL, started as G3PHO in 1961 and is now ZL2BDA, of 11A Albert Street, Gisborne, New Zealand, going out there last December as a teacher. The first thing he found was that he had to take a 15 w.p.m. Morse test (easy for Peter) and had he not had a U.K. licence he would have had to spend a QRP year on 80m. only and make at least 50 CW contacts before being let loose on the HF bands—that's the rule in ZL! Gear shown here includes an Eddystone 888A Rx, with a Heathkit SB-10U Adaptor and Apache Tx.



whip!" (Call not given) . . . "Locals persisted in discussing Fred's rheumatics on 1830 kc all morning" (G3TKF) . . . "If there is a prize for calling the most stations I should get it, hi!" (GM3OXX) . . . "Very enjoyable—was surprised to hear and work so many stations in daylight." (GM3NXA) . . . "Was all the activity up here in the North?" (G3TKN) . . . "All in all, a very interesting day; it would be worth running similar tests over a longer period" (G3PWY).

Summing Up

It seems the majority enjoyed themselves calling "CQ MDT" and much of the operating was of a high standard, as were the logs sent in. The experts at this sort of thing would probably have preferred to see the Test end

earlier, and to have had the limit lifted to 500 miles, which would have eliminated all the ground-wave contacts—but, after all, the Test was to see what old Joe, with his bit of wire in the back garden, could do in the way of GDX on 160m., and in that it succeeded admirably.

Finally, this is where we have to acknowledge the MDT logs from the point of view both of their quality and the gen. they contained. Without them, we could not have written any sort of a report at all.

And that, good people, about wraps it up. Thanks for all the correspondence, and we hope you have, in return, been entertained. Your letters and cards, without which we cannot make our effort, should be timed to reach us by Friday, December 9, and please make allowances for the Christmas postal delays. Address, as always, CDXN, SHORT WAVE MAGAZINE, BUCKINGHAM.

With you again on December 30—till then, 73 and all the Season's Greetings.

E.P.E.



The new Redifon GR.410T is a transceiver for operation on the HF bands, 2.0 to 16.0 mc, and gives 100 watts p.e.p. on the transmitter side. Designed specifically for Service and commercial applications, there is a choice of four switched crystals in the tuning range, with rapid change of crystals to other frequencies as needed, and it will also accept drive from an external VFO or frequency synthesiser. Operating modes are telephony—AM or SSB, USB/LSB—CW and MCW, with automatic send-receive switching and Vox working if required. All necessary panel controls and metering are provided for on-the-nose operation. As it stands, the Tx will feed into 75 ohms, but an ATU can be provided for matching either into a vehicle whip or an open-wire aerial. The GR.410T can be run as a mobile, fixed or transportable station, for which the appropriate PSU's are available separately.

EXPEDITION SAGA — DON MILLER, W9WNV

STORY OF ENTERPRISE AND
ADVENTURE GETTING TO
THE SEYCHELLES, OCTOBER
1966

S. H. W. TANNER (5Z4AA)

WE often read about what happened on a DX expedition and how many countries were worked, and so on—but we rarely hear about the planning and effort that has to be put in before such an expedition can take place. This article tells of the problems of Dr. Don Miller, M.D., W9WNV, the holder of 65 different countries' call signs including his latest—VQ9. Don is aged about 30, weighs 222 lbs., the fortunate owner of blood in "O" group, possesses boundless energy and is certainly a credit to his DX followers and American sponsors.

The story begins in the third week of last September when G8KS reported that Don would pass through 5Z4 in October, *en route* to the Indian Ocean Islands and that he would be grateful for any local assistance. He left New York by air on September 26, travelling light. He was met in London the next morning by G8KS where Don was issued with a U.K. licence to facilitate his obtaining a VQ9 permit. Next day he set off for Madrid and later to Seville to meet EA2CA, EA7IQ and EA7ID, prospecting and ironing out problems for licences to operate from the Spanish territories and islands in and around Africa. By October 2 he was in Rome and then a quick trip to Naples, meeting I1KDB and I1CL to investigate possibilities in that part of Europe. Off by air again he arrived in Nairobi on October 4. The writer and his XYL met him at Mombasa airport that afternoon. He told us that his immediate needs were two sea passages to the Seychelles by the first available ship, as it was hoped that CR7GF would join him in Mombasa. But there were no passages available to the Seychelles on the regular monthly passenger ship until April '67 and the American amphibian aircraft that makes a weekly return flight to the Island from Mombasa was not permitted to carry passengers.

Equipment and Transport Problems

Don then revealed that his heavy gear, consisting of 24 packages and weighing 642 lbs., had missed the weekly aircraft freight flight from New York direct to Nairobi and the earliest it could arrive was late evening on October 8. The gear included a Collins KWM-2 transceiver, 75S-3 receiver, 32S-3 transmitter, two 30L-1 linear amplifiers, five power supplies, two heavy 1,250 kV petrol power plants, two beams and masts with rotators, accessories and tool box—in fact, two complete high powered

stations! Here was Don in Mombasa only a thousand miles from the Seychelles with no means of getting there and no gear. Then the news came through that CR7GF, being unable to obtain a visa for Kenya, would not be able to join up after all. Listening around on Twenty we heard VQ9HB and on making contact, we were surprised to hear that VQ9TC, VQ9BC and VQ9HB were themselves planning to leave that coming weekend for the Des Roches Islands by the only small ocean-going boat then available in the Seychelles, and that they would be away for seven days.

All day on October 5 Don walked the streets of Mombasa calling at shipping offices, boat-builder yards and the local yacht club in an effort to find an ocean-going vessel of any sort. He was out of luck but was informed that at Malindi, a small town 70 miles up the coast, a 50-foot privately owned ocean-going boat had just returned from a pleasure trip to the Seychelles.

Next day, Don hired a car and set off for Malindi over a winding dirt road, two toll bridges



Don Miller, W9WNV, on arrival at Mombasa Airport on October 4, where he was met by 5Z4AA — see story.

The 24 packages of radio equipment for the W9WNV expedition to the Seychelles had to be taken under Customs guard from Mombasa Airport to the B.I. mail-boat "Kampala" in the harbour—by thus keeping the gear in bond, a heavy duty charge was avoided.



and a hand operated car-ferry, arriving at the home of the boat owner some two hours later to find him lying seriously injured after a mishap on the reef. He was in a coma with a very low pulse having lost a considerable amount of blood. The gravely injured man was rushed to the small ill-equipped native hospital some twelve miles away where the resident doctor did his best to repair the damage whilst Don drew off from himself two pints of his Group "O" blood, which was transferred to the casualty, whose pulse immediately responded and who certainly owes his life to Don. But once again he had drawn a blank as regards transport and returned to Mombasa slightly dehydrated!

On the Friday, 7th, Lady Luck decided to change her attitude and began to smile on Don. On calling at the shipping office he was informed that the B.I. ship s.s. *Kampala*, which had been due to sail for the islands on Saturday, would be delayed in Mombasa for a further twenty-four hours and that there might be a passage cancellation which he could take up. A quick check at the airways office revealed that the freight aircraft carrying the 24 packages of gear from New York was scheduled to arrive in Nairobi at 23.00 on the Saturday, 8th, and the connecting flight for Mombasa left Nairobi at 08.00 on Sunday, with the *Kampala* sailing at 14.00. A very tight time-table for a Sunday with most offices closed and staff off duty.

Shipping the Gear

On Saturday, Don arranged with the aircraft office to reserve space for the gear on the local Sunday flight from Nairobi, made a call at the Customs office to arrange staff so that the gear could be accompanied in customs bond from the Mombasa airport to the ship's berth in the harbour some six miles away, to avoid having to pay the 25 per cent customs charges raised on radio equipment

in Kenya. With his sea-passage ticket safely in his pocket he made a late-night telephone call to the Nairobi airport to be told that the flight from New York had arrived and the equipment would be despatched to Mombasa on the morning flight.

On Sunday morning, October 9, we were at the airport when the local flight touched down at 09.30 and the twenty-four packages were off-loaded in perfect condition. After a careful check by Customs they were transferred to a large taxi and escorted to the harbour where the master of the *Kampala* allowed Don to store them in the mail locker until their arrival in the Seychelles on the following Wednesday morning, October 12.

By the time you read this you will be aware if Lady Luck still smiled after Don's arrival in the Seychelles—and if she also smiled enough to enable you to work W9WNV on the three or four rare Indian Ocean islands that he hopes to operate from using the Seychelles as his base.

Editorial Note: In the covering letter with his article, 5Z4AA mentioned that W9WNV was expected to remain around the Islands of the Indian Ocean till about the third week of November.

SMALL ADVERTISEMENT SECTION

There is an astonishing spread of interesting advertising on pp.632-640 of this issue. This section has long since become established as the recognised market-place for all those who wish to buy, sell or exchange used amateur-band equipment. Though we cannot, of course, guarantee results, most readers who comment say they are surprised at the response—not only the volume of offers, but the celerity with which they appear. Our own check is by the Box No. advertisements—some of these produce more than 20 replies over the weekend following publication.

THE MONTH WITH THE CLUBS

By "*Club Secretary*"

(Deadline for February Issue: January 6)

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

IT was extremely pleasant, during the course of the Exhibition, to meet so many of the correspondents to this piece in person and to gain, at first hand, a feel for the activities, and problems, faced by various groups in different parts of the country. It resulted in your scribe taking home pages of notes on the back of various envelopes with details of this and that, and it is hoped that they have all been covered in this month's discussion.

At the top of the clip is a report from **Cheshunt** and District, who get together on the first Friday in each month, at 7.30 for 8 p.m., the venue being Waltham Cross Methodist Hall on the Hertford Road at Waltham Cross. The December affair is to be a lecture on VHF by Harold Brock, G3FD, which should be well worth listening to. Incidentally, the Club are grateful indeed to Irwin Riemer for his donation of useful equipment to them.

Greenford are making an effort to attract new members from the local schools and G3OZY, the chairman, is providing instruction for them, while the December meetings are aimed specially at the youngsters; these are on Friday, December 16, a Mullard Film Show, and on the 30th a Beginners' Construction Contest.

Up North at **Lothians**, the recent "Visitors Night" seems to have been quite a success, and future sessions will no doubt be organised to hold the new members so gained. The YMCA, South St. Andrew's Street, is the venue, and the second and fourth Thursdays the evenings to keep in mind.

Fylingdales (Early Warning Station) suffered a double blow in the loss of both chairman and secretary, but volunteers were forthcoming at the resulting special general meeting and the new address for enquiries can be found from the panel. A winter programme is settling into its stride, and Morse classes organised.

The usual full programme is running at **St. Helens** Electronics Society, with a tape lecture on "Electronic Music" slated for December 13; the 27th is, reasonably enough, marked "closed," but to make up for it there is a lecture on January 10 (subject to be announced) and on the 24th, when the topic will be "Moon-bounce" with no less than G2HCG doing the talking. All this leads to the essential AGM, which is due on February 7.

A new event with the intriguing title of "Minifest" was held by **Peterborough** on November

28, and it is said the younger members have been cajoled into decorating the top of the Windmill, which serves as a clubroom, with a Seventycem beam array, ready for the A/TV work which is planned for the programme.

Scarborough mention in their report that a full programme is in hand up to the time of the AGM, which is to take place during January. We gather that some poor unsuspecting wight is then to be pushed into doing all the work of "Publicity"—and it must be admitted that someone able to do such work is an asset to any group.

As for **Verulam**, the matter immediately in hand is the AGM, which takes place on December 21, at the Cavalier Hall, Watford Road, St. Albans, 7.30 for 8 p.m. It is understood that a full programme for the New Year is at the moment virtually in existence, and no doubt we shall have the details in time for the February piece.

Echelford are going on a visit to the ABC Television Studio at Teddington Lock, on Sunday, December 4, congregating at 2.45 p.m. outside the main gate; however, it is noted that the party is limited to 15 only, and it would seem best to contact the hon. secretary to secure a place. The meeting on December 14 has been moved to the Links Hotel, Ashford, and due to its proximity to Christmas will be an "informal natter."

The modernising of the "Scout Image" has resulted in changes for the **Swindon** crowd, as the additional activity at the Scout Hut has driven them into the wilderness; this little snag has already been dealt with, and the new Hq. is at the Science Laboratory, Headlands School, Cricklade Road, where there is to be a station with a KW-77 receiver and K.W. Viceroy transmitter, to be at the group's disposal, plus a large lecture theatre and facilities for the essential brewing-up. This all seems rather to be a blessing in disguise! December 15 is the date of the next get-together after publication day.

The Cottage Inn, **Stoke-on-Trent**, every Thursday evening, is the venue for the locals, and there are various subjects laid on for the December meetings; however, it is not possible at the time of writing to give details as these are still to be allocated dates by the committee. From the details in your conductor's hands, it would seem to be worthwhile to look in and sample the local club atmosphere.

Novelty is the theme for the Christmas meeting

of the Acton, Brentford & Chiswick gang, who are all bringing along their holiday slides to revive memories of sun and warmth—a sound scheme for a season that is usually better described as “wet and windy.” Visitors, as ever, will be welcomed, on December 20, at 66 High Road, Chiswick, starting at 7.30 p.m.

Somebody has been at work at Cray Valley, with the result that the November meeting was headlined in their news-sheet as “Talking-Type Wireless” and members were exhorted to leave shooting-irons in the care of the caretaker, who was presumably security-cleared! As at the time of writing, we cannot say what is in store for December.

The chairman of the Plymouth crowd is on the warpath—this much is evident from the news-letter—and as so often happens, the cause of the trouble is the health of the organisation. However, we must admit to a feeling that his words will be heeded and we fully expect peace to be restored ere long. A Club very seldom goes under when there is someone ready and able to “jump up and down” and get things moving again. As for the programme, on November 29, the Hilliard Trophy is to be judged, and on December 3 the Annual Dinner takes place, for which a mouth-watering menu is given.

On to the Royal Navy ARS, who send in their *News Sheet* with a very pleasant new cover; inside it contains a good article on Quad aerials, and, as a new departure, a good recipe for the making of—beer!

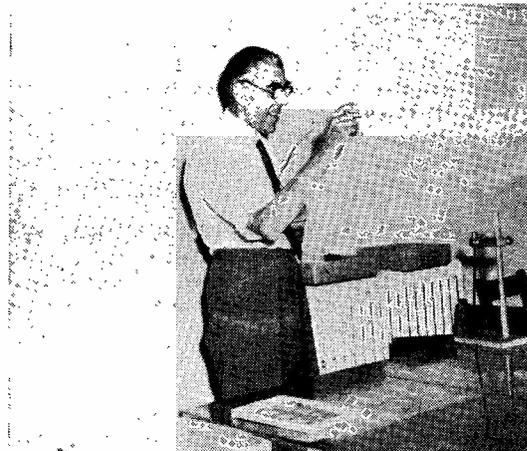
Cornish Radio Amateur Club send along the *Cornish Link* as usual, from which we gather there has been a change in the secretary's address, noted for the Panel. (No details are to hand of the sessions laid on for December.)

Notable Anniversaries

The letter from Grafton this time is a little longer than usual, and justifiably so since they have just celebrated their 21st birthday as a Club. Your conductor is pleased to note that the new slate of officials puts G2CJN into the president's chair; a worthy honour after many years of good service to the Club in various ways, not all of which appears on the surface. As for the programme, December 2 is set aside for “SWL Corner,” conducted by G3KRH; on the 9th there is a talk on “Oscillator Stability” by G3ONS; and on the 16th it is their famous Christmas Junk Sale. The venue for all these is Room 35, Montem School, Hornsey Road, London N.7, the kick-off being at seven, tea from eight, and

MCC REPORT—JANUARY ISSUE

As usual, the next issue (January, published on December 30) will carry the Magazine Club Contest report, using the space normally allotted to “The Month with The Clubs.” Accordingly, Club-activity reports should be held till the first week in January, for the February issue (due out on January 27), when the “Clubs” feature will re-appear as usual.



Magician at work! This little picture barely does justice to Dud Charman, G6CJ, giving his aerial lecture and demonstration before the Verulam (St. Albans) Radio Club. As all who have been present on one of these occasions will know, G6CJ is able—by using scaled-down antennae and a miniature klystron oscillator on 3,000 mc—to prove the performance and behaviour of aerials of all types, and even to show how the ionosphere affects propagation.

the evening's main business commencing about 8.30 p.m.

“Brief” is the word for the note from Mid-Warwickshire Amateur Radio Society, who have only one get-together in December, on the 12th, when they will hear the tape lecture by G6CJ on “Aerials.”

A school is often a good place in which to have a group Hq., and this is the case with Magnus R.S., who have a shack set aside for the AM rig and have been allocated another for the SSB station which is in the process of being got together. The programme during the autumn period was very varied, with lectures, a couple of visits, a Club net, and a station for the Jamboree-on-the-Air in conjunction with the local Scouts. It is a reasonable assumption that the rest of the winter programme will also be good.

Purley have a “Natter Nite” and Construction Contest rolled into the one evening of December 2, and follow this up with a slide show on the 16th, by G3RKK, covering his recent trip to the States. On the 17th, all three SARA Clubs combine to have a Grand Christmas Party; Purley, Wimbledon and South London Mobile. As for the latter, a deafening silence as to their programme, but Wimbledon, like Purley, run a *Newsletter* and from this we glean that the Mobile crowd have a Construction Contest slated for the 3rd, while the Wimbledon AGM is down for the 9th.

Reigate send in their *Feedback* each month, and very interesting it is; the current issue tells us that on December 10 they are running an event connected with their Construction Trophy (it seems to be the fashion at this time of the year!), and January 19 is down for the Annual General Meeting.

On now to Harrow, who make no mistake about their future programme—December 2, practical, R.A.E., and Morse; on the 9th a Junk Sale; the 16th is given over to the Christmas Party; and on

December 30 and January 6 the practical, Morse and R.A.E. sessions start again. As a relaxation from all this, the AGM will be taken care of on January 13.

The meeting routine at **Port Talbot** is rather unusual in that they get together every fourth Tuesday, so that the dates are December 13, January 10 and February 7, the Hq. being 8-10 Jersey Street, Port Talbot (which is one of the South Wales sea-ports).

An Open Evening is on the card for **Torbay**, who entertain Plymouth (and as an aside mention that YL's and XYL's will be welcome) at the December meeting, which will be at the Hq. in Bath Lane (rear of 94 Belgrave Road) in Torquay.

Success as a Club brings its own problems, as **Wolverhampton** are finding out. They have changed yet again the venue for the special lecture meetings, this time to the Golden Lion, on the main Cannock Road, about a mile past Park Village. The meeting here on December 5 is to be addressed by G3BA, and his subject will be "VHF and Variverterers." The session on the 19th at the Hq. in Neachells Cottage, Stockwell Road, Tettenhall, will be devoted to a discussion on "Junk versus Surplus," with demonstrations—which should provide a lot of food for thought as far as the younger element are concerned.

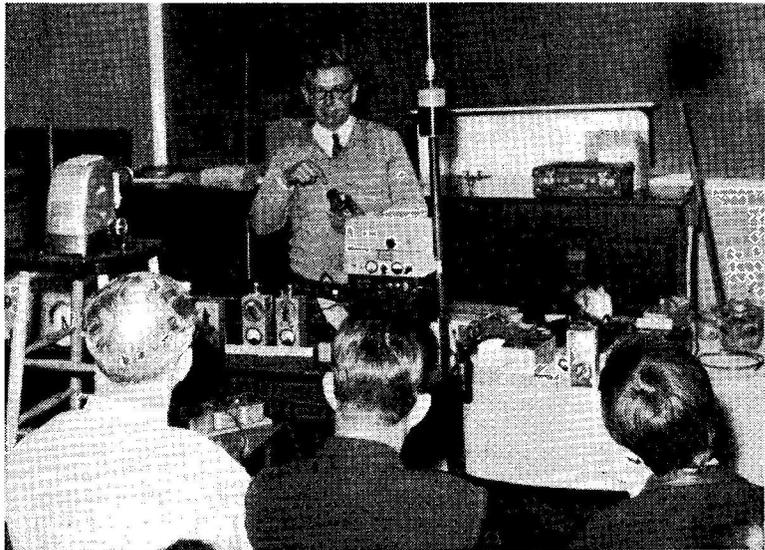
Now into Leicestershire to **Melton Mowbray**, who are to hear a talk on the very important topic of

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
 A.E.R.E. (HARWELL): V. J. Galpin, Building 347.3, A.E.R.E., Harwell, Didcot, Berks.
 A.R.M.S.: N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10. (Leystonstone 6700).
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 BARRY (College of Further Education): D. H. Adams, GW3VBP, The College, Colcot Road, Barry, Glam.
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 CHILTERN: J. W. Burnham, G3UJK, 304 Desborough Avenue, High Wycombe, Bucks.
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 CORNISH: M. J. Harvey, Chycarne Farm, Truro.
 COVENTRY: R. E. Rogers, 205 Brownhill Green Road, 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).
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 EAST WORCS: J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire.
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 Ex-G: F. W. Fletcher, G2FUX, 53 St. Ives Park, Ringwood, Hants.
 FYLINGDALES (E. W. Station): G. A. Couzens, G3NTA, 16 Westbourne Road, Whitby, Yks.
 GRAFTON: E. A. Rudolph, G3SIL, 29 Pangbourne Drive, Stanmore, Middx.
 GREENFORD: E. Gray, G3CPS, 111 Ravenor Park Road, Greenford.
 HARROW: R. C. Ray, G2TA, Wintons End, Springfield, Bushey Heath (1762), Herts.
 HULL: G. G. Wray, G3MVO, 93 Wolfreton Lane, Willerby, Hull.
 LOTHIAN: A. J. Masson, GM3PSP, 20 Merchiston Park, Edinburgh, 10.
 MAGNUS: R. Wallwork, G3JNK, Magnus Grammar School, Newark, Notts.
 MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead, Berks.
 MELTON MOWBRAY: D. W. Lilley, G3FDF, 89 Sandy Lane, Melton Mowbray (3519), Leics.
 MID-HERTS: H. R. Thornton, G3PKV, 43 Fordwich, Welwyn Garden City, Herts.
 MIDLAND: C. J. Haycock, G3JDJ, 29A Wellington Road, Handsworth, Birmingham, 20.
 MID-WARWICKSHIRE: K. J. Young, 180 Northumberland Court, Leamington Spa (26426), Warks.
 NORFOLK: A. Marcantonio, G3TLC, 10 Hellesdon Mill Lane, Norwich (45244), Norfolk NOR.21.L.
 NORTHERN HEIGHTS: A. Robinson, G3MDW, The Candy Cabin, Ogden, Halifax (64329).
 NORTH KENT: P. T. Baber, 64 Latham Road, Bexleyheath (8655), Kent.

NOTTINGHAM (University): K. L. Taylor, Radio Society, The Union, Nottingham University.
 NOTTINGHAM (Club): N. E. Down, G3SRX, 23 Lady Bay Road, West Bridgford, Nottingham (83106).
 PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.
 PLYMOUTH: B. J. Curnow, G3UKI, 113 Mountgould Road, Lipson, Plymouth.
 PORT TALBOT: H. G. Hughes, GW4GC, 20 Austin Avenue, Porthcawl, Glamorgan.
 PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey.
 RADIO CLUB OF SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace Glasgow. (Western 4080).
 READING: N. W. Austin, G2FQR, 20 Worcester Close, Reading (40685), Berks.
 REIGATE: D. Thom, G3NKS, 12 Willow Road, Redhill, Surrey. (Reigate 45033).
 ROYAL NAVY: G. J. Perry, G3SJC, H.M.S. Mercury, Leydene, Petersfield, Hants.
 ST. HELENS: B. Hardy, 198 Knowsley Road, St. Helens, Lancs.
 SALOP: W. Lindsay-Smith, 22 Kingswood Crescent, Cophorne, Shrewsbury.
 SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.
 SCARBOROUGH: P. Briscoe, Roseacre, Irton, Scarborough.
 SOUTH BIRMINGHAM: A. Bishop, 40 Cecil Road, Birmingham, 29.
 SOUTHGATE: R. Wilkinson, 23 Ashridge Gardens, Palmers Green (4592), London, N.13.
 SOUTH LONDON MOBILE: B. Negri, G3LXN, 17 Voltaire Road, Clapham, London, S.W.4.
 SOUTHPORT: N. K. Waring, 33 Chestnut Street, Southport, Lancs.
 STOCKPORT: G. R. Phillips, G3FYE, 6 Ross Avenue, Davenport, Stockport, Cheshire.
 STOKE-ON-TRENT: K. H. Parkes, G3EHM, 41, Golborn Avenue, Meir Heath, Stoke-on-Trent.
 STRATFORD-UPON-AVON: I. A. Cobbold, G3RPJ, 5 Avenue Road, Stratford-upon-Avon.
 SURREY: R. Morrison, G3KGA, 33 Sefton Road, Croydon, Surrey. (ADDiscombe 5982).
 SUTTON COLDFIELD: W. V. Sutton, G3GLQ, 57 Ashfurlong Crescent Sutton Coldfield, Warks.
 SWINDON: D. Goacher, G3LLZ, 51 Norman Road, Swindon (21740).
 THAMES VALLEY: K. A. H. Rogers, G3AIU, 21 Links Road, Epsom, Surrey.
 TORBAY: B. E. Symons, G3LJK, 52 Reddenhill Road, Babba- combe, Torquay, Devon.
 VERULAM: G. Slaughter, G3PAO, 6 Leggats Avenue, Watford, Herts.
 WAMRAC: Rev. A. W. 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.
 WIRRAL: J. M. Phillips, G3PXX, 52 Allans Meadow, Neston, Wirral.
 WOLVERHAMPTON: J. Rickwood, G3JJR, 852 Stafford Road, Fordhouses (3338), Wolverhampton.
 WORCESTER: G. W. Tibbetts, G3NUE, 25 Greenford Gardens, Worcester (21083).
 WORTHING: P. J. Robinson, G6KFH/T, 46 Hillview Road, Findon Valley, Worthing, Sussex.
 YORK: J. A. Rainbow, 14 Temple Road, Bishopthorpe, York.

Bob Palmer, G5PP, of Coventry, giving his lecture on mobile/portable equipment and methods before the Radio Society of Harrow. For many years now, G5PP has specialised in /P, /M working on 160m., with which he has been very successful. Bob can give a good lecture on the subject, with demonstrations and explanations of his apparatus.



“Safe Electrical Wiring” by G3FDF—but date and place not mentioned!

Wirral report a change of secretary as a result of the recent AGM—for details see the Panel. For December 7, a film show is offered, but details are not to hand.

What for many years always used to be known as the Welwyn Garden City Group has now reconstituted itself and changed its name to the **Mid-Herts Amateur Radio Society**. The next meeting will be held on December 8, at Backhouse Room, Handside Lane, Welwyn Garden City, starting at 8 p.m.; the talk for the evening will be on SSB Transmitters, by G3AAZ.

Coventry are a live crowd, if the reports we have are anything to go by; the latest one has it that on December 2 they hope to be visiting Rugby Signal Box—an essential link in the new main-line electrification system out of Euston to the North—a trip which your conductor would dearly love to join.

In the same area is the **Midland A.R.S.** crowd, who are in session on December 1, at the Savoy Hotel (Birmingham) for an informal buffet evening. The normal meetings of the Midland group are, of course, held at the Birmingham and Midland Institute on the third Tuesday in the month, starting at 7.45 p.m.

Group Publications

A couple of groups which cater for rather more than local interests are **Amateur Radio Mobile Society**, by way of their *Mobile News*, and the **Ex-G Radio Club** with its *Bulletin*. It is much to be regretted that in October's *Mobile News* someone (G3KVF) had to write the letter about “barring humour in their technical articles”—as a result, he claims, they have lost contributors, and he is probably right. The result of a lost sense of humour is usually pomposity, which is the impression one

gets from the editorial. But however off-putting the editorial may be, the rest of the offering is good, and well worth membership support. As for the *Ex-G Club Bulletin*, it has no pretensions and no pomposity, and so is one of the most eagerly awaited publications to reach this desk.

The editorial of the *GM Magazine*, which is the journal—also in the photostat category—of the **Radio Club of Scotland**, is devoted to grinding axes! The “axe,” in this case, is a variation on the old theme of amateurs being up-to-date and hence always being equipped with transistor gear in preference to valves. This one should be good for a couple of months of irate correspondence from the readers—which, after all, is what makes a Club publication worth reading. However, just to add a little fuel to the fire, let your scribe comment that one snag with transistors is that they are so boring to play with! Failure with transistors is always catastrophic and never spectacular, whereas with valves the result of mis-operation is usually spectacular but rarely disastrous to the valves. As for the R.C.S. meetings, these are held each Friday, at 336 North Woodside Road, Glasgow.

A Club of which we have not heard for years has suddenly decided to publicise itself again—this is the **Conway Valley Amateur Radio Club**, which, as its name implies, operates in the Llandudno area. Meetings are on the third Thursday in each month, at the Cross Keys, Madoc Street, Llandudno. A special event is the Annual Dinner, this year slated for December 10 at the Colwyn Bay Hotel. The normal meeting is on the 15th, and will be a Quiz evening at which Conway will be opposed by Flintshire—this session will be at Hq.

The **Stratford-upon-Avon** and District Radio Club has a proper appreciation of history, and at the same time a desire to move to a better Hq. What better, then, than to make it Hall's Croft, Old Town, Stratford, which in earlier years was the home of

the John Hall who married Shakespeare's daughter Susanna. On December 1, the talk is on a subject that might well make the Bard turn in his grave—"Winding Transformers" by G3RPI. The 15th is given over to a pre-Christmas get-together.

In their own opinion, **Nottingham University** have recently been "somewhat on the slide"; however, the trend has now been reversed, new members recruited, and amongst other activities work on the 9 cm. band (yes!) is in view as a co-operative project.

One of those your scribe had the pleasure of meeting at the Show was G3FVC, secretary of the **Maidenhead** outfit, and much mutually useful discussion took place. We gather the session at the Victory Hall, Cox Green, Maidenhead, on December 5 is to be an Annual Party, at which the judging of the G3CAZ Cup for a home-construction contest will be undertaken by G5HZ of Henley.

Ten days later, on December 15, **Chiltern** are to have their Party, replacing the meeting which normally would occur later in the month. They are also running a Top Band Phone contest between 1000 and 1200 on December 4, with two "pots"—one for the transmitters and one for the SWL members.

North Kent Radio Society are to have an Extraordinary Meeting, at the Kings Head, Bexley. It would be appreciated if those intending to be present would advise the hon. secretary, who can give details of the matter in hand; notification will also be of help in the important matter of finalising the catering arrangements.

Now to **Norfolk** Amateur Radio Club, who inform us that the December sessions are programmed as follows: On the 5th a Junk Sale; a business meeting on the 12th; and a Christmas Party on December 19. The Hq. of this group is at Old Lakenham Hall, Mansfield Lane, Norwich. (The information is gleaned from a copy of *Challenge*, which is a very fine specimen of the best sort of local Club magazine.)

Edgware have a meeting laid on for December 12, at which they will enjoy each other's films and slides. This should provide quite an enjoyable lead into the Christmas Season. On the other hand, the gang at **Crawley** have, as it were, kept the eye on the ball in the matter of the December 14 affair—nothing less than the Annual General Meeting, at 8 p.m., the Trinity Congregational Church Hall, Ifield, Crawley, being the place at which all members are wanted that evening.

Your scribe was sad indeed to see the **Southgate Newsletter** and to find a letter which shows how this once fine group has fallen from its standard of some years ago, when average attendances of fifty-odd was the normal thing. However, they will no doubt be able to sort themselves out in due course. On November 10 they were to have the G6CJ lecture on aerials, for which they should have drawn a bumper attendance, and the December "do" will be the Annual General Meeting. (Odd that the contest calendar in the current **Southgate Newsletter** does not include MCC—perhaps because the OK CW Contest was on the same weekend!)

"Symposium on Microwave Bands" is the title

for the December session of the **Thames Valley A.R.T.S.** The man in the hot seat for this one is understood to be G3UFW, and the meeting-place is the usual Hq. at the Prince of Wales, Bridge Road, East Molesey. In addition to this there is the Annual Dinner, for information on which (and tickets) consult G5LC, who is handling the arrangements. All other matters are of course dealt with by the hard-working hon. secretary—QTH as in the Panel.

Wit and Humour

Another of our Clubs with world-wide interests is, of course, **WAMRAC**, whose secretary, G3NGF, the writer was pleased to meet at the Show. Incidentally, Arthur experienced The Duke of Edinburgh's well-known sense of humour on the opening day of the Show, when H.R.H. asked the Rev. A. Shepherd (in clerical collar and wearing his G3NGF call-sign lapel) "Who he was hoping to communicate with"! One suspects that if the way this yarn was going around the Show even as late as the Saturday evening is any criterion, then **WAMRAC** gained more publicity in a couple of seconds than they have sweated to obtain in years!

And now from the sublime to the other thing—we are told by **Pathfinder Radio Group** and its organiser—there appears to be *no* committee or system of representation—that they now have formed a Hemel Hempstead radio club to complement their other activities.

Mid-Warwickshire sent in their November programme a fraction too late for the deadline, but as luck would have it your conductor remembered that he had the December information on file anyhow—on December 12 the group will hear the G6CJ Tape Lecture on Aerials, while the session which would have fallen on December 26 is, pretty obviously, marked "No meeting." As for the New Year, a full programme is in prospect which kicks-off with the Annual General Meeting, on January 10.

The Art Centre, Monson Road, Tunbridge Wells, is the home of the **West Kent A.R.S.**, who foregather there on December 2, to hear G3NTT (G6NTT/T) talking about "Recent Transistor Applications." December 16 is set aside as an informal evening, "to plan Christmas celebrations," and on January 13 G3UEQ will open a discussion on Simple SSB and DSB.

Information Lacking!

East Worcestershire's secretary is cross with your conductor because no mention was made of certain of their activities—the reason being that we were not told! The matter in question was, in fact, one that is rather too important to be dropped, and that is the transporting of the disabled. In the case of East Worcestershire it was disabled Scouts carried to the J.O.T.A. station so that they could take an active part in things, but in the general case it applies as much to the disabled SWL or licensed amateur, and the local Club meeting. The East Worcestershire boys do a fine job here and are to be congratulated. As for the more mundane matter of the December lecture, they are to hear the postponed Daystrom



At the 6th international congress of the Federation Internationale des Radio Amateurs Chemionots (FIRAC) held in Gavle, Sweden last August and attended by about 120 members, the U.K. delegates were SWL Ron New (back row, left) and G3SGW (back row, centre). A dozen or so European countries are affiliated to FIRAC and the U.K. section, recently formed, is the British Rail Amateur Radio Society (hon. secretary, H. Gray, Eleven, Swanton Road, East Dereham, Norfolk). They hope that the Board of British Rail will accept BRARS as a worthy branch of the Staff Association. The U.K. group welcomes as new members all who, with an interest in Amateur Radio, are connected with British Rail or its ancillary activities and services. Nine countries are represented in this picture. Left to right, front row: OE1KD, HB9KY, DJ3UN, SM3WB, F8ZR. Back row LX1VW, between SWL New and G3SGW, OZ9FM and IIAYX—railwaymen all.

talk and demonstration. This will be at the Redditch Hq. on December 8. In addition, a move is in hand to provide a further session each month, although we have no details as yet.

Crystal Palace have just had Hi-Fi for their October meeting, and G3COX with slides again for November, but at the moment details of the next meetings are not with us.

One of the well organised groups—from our point of view!—is the **Salop A.R.S.**, which, as its name implies, has its being in Shrewsbury. On December 8, they get together to hear Mr. F. J. Balston, of BBC Woofferton, talking on the subject of HF Aerials. The venue, as usual, is the Old Post Office Hotel, Milk Street, Shrewsbury.

Another novel way of filling the programme is to be found in the **Worcester** list. This is a Photographic Exhibition, at which slides and prints with a radio theme were show. As for the December event, this is on the 9th and is the Annual Dinner.

Durham are in session three times during December, on the 1st for a talk on Construction, with examples by G3SFL; on the 15th to discuss aerials and ATU's; and on the 29th when they are at the Bay Horse for a Social.

As for **York**, they are at their Hq. at 61 Mickle-gate, York, on December 1 for an evening of films on the theme of Transistory, while on the 15th they are to hear a tape lecture entitled "The Human Machine as a Radio Operator"—sounds a bit esoteric!

Another novelty appears in the programme of the **South Birmingham** lads—"Annual Christmas Party and Surplus Sale to pay for it!"—this being the agenda for December 21. It is assumed the venue is to be the usual one, The Scout Hut on the Pershore Road, Selly Park.

G2HIF usually has something thoughtful to offer in the **AERE (Harwell)** publication *QAV*; this time he is commenting on a recent foray on to the HF bands. The punch-line is his suggestion that undoubtedly the advent of SSB has caused Phone operators to assimilate a proportion of the skills that the CW man has been, of necessity, using for years, to the general benefit of Amateur Radio techniques. That should stir up a hornet's nest—even though what he says is to a great extent true!

Northern Heights report (through G3MDW, whom your scribe was pleased to meet at the Show) that an Annual Dinner is in prospect for December 7, and on the 21st the evening is to be given over to

MCC REPORT—JANUARY ISSUE

As usual, the next issue (January, published on December 30) will carry the Magazine Club Contest report, using the space normally allotted to "The Month with The Clubs." Accordingly, Club-activity reports should be held till the first week in January, for the February issue (due out on January 27), when the "Clubs" feature will re-appear as usual.

a Ragchew.

Stockport can be found in session on December 14 at the Blossoms Hotel, Buxton Road, Stockport, when they will be, like so many others at this time of the year, dealing with the Annual General Meeting, "and matters arising."

Painting-and-decorating is a chore to be passed on to the XYL if it is at all possible, but the Hull and D.A.R.C. have been doing just this to the Club shack and lecture room. As the programme says the painting will be complete by the time this reaches the bookstalls, it should be fairly safe to take along a pair of overalls in the boot of the car, and look in; Friday is the night, starting at 8.0 p.m., and the address is 592 Hessele Road, Hull. You may not need the overalls, but be prepared!

Saltash have had the AGM which resulted, we understand, in quite a heavy shift in the committee, but it seems not to have had any effect on the programme, which goes on as ever. On December 2, a Mullard Film Show; on the 16th a "Lecture evening"; and on the 30th a constructional session during which work is done towards the building of a Club station.

The Amateur Radio Club of **Nottingham** missed the very tight deadline last month; we have no details of the December programme, but no doubt a quick call to the address or 'phone number in the Panel will disclose details.

New Club Formations

It is proposed to form a club for younger enthusiasts (up to about 20) in the Croydon district. If a good response is forthcoming, accommodation in suitable premises is already assured. This project is in the hands of A. Hansen, G3VLJ, 99 Stretton Road, East Croydon, Surrey—who is a keen 16-year-old, and can be reached either at this QTH or on *ADDIS-combe 6866*.

The **Barry** College of Further Education has formed a radio amateur group, the inaugural meeting having been held on October 18, with an attendance of 20. A newsletter has been started, from which we get it that there are meetings on November 30 (Communication Receivers, by GW3RIH, with demonstrations); on December 7, which is Club Night; and on the 14th for a film show, for which the G.P.O. picture "Ship-to-Shore" has been booked—it is well worth seeing.

From **Reading**, increased attendances are reported at recent meetings, with "something of interest for everyone." On December 6, the talk will be by G3VMY, and the subject—On Being Newly-Licensed. This should be interesting! December 20 is scheduled for the AGM.

Dorking have their Christmas dinner at the local Star & Garter on December 13, and on the 20th there is an informal meeting at the Wheatsheaf, another local hostelry. Recently, they took G3CZU/P over to Somerset, near Minehead, and from a very good site and in fine Wx, had a success on the 70 cm. band. More such excursions are in mind for the New Year.

Recently, **Surrey** Radio Contact changed to a new meeting-place—the Blue Anchor, South End, Croydon, where they have better facilities. They were to kick off, at their first meeting there on November 15, with the W1BB Top Band slide-and-lecture, with G3BFP, G3FPQ and G6LX available for introduction and questions. All fully paid-up members can now have a supply of the QSL cards donated by the Croydon Borough Council. Next event for Surrey R.C. will be their Christmas Social on December 20, the first meeting in the New Year being on January 17.

The **Ashton-under-Lyne** & District A.R.S. now have their meetings every Friday evening, 7.0 p.m., at Ashton College (Rooms F52, F53), Beaufort Road, the programme including Morse instruction and tuition for the R.A.E.

Note from **Worthing**: "After more than 20 years, the greatest thing has happened to our Club—we have been able to get our own work-shop." Meetings are weekly, at the Rose Wilmot centre, and plans include stations for the 70 mc and HF bands, for which they have good aerial facilities. The Club building-project is a transistorised GDO, in hand with about 12 members. On the SWL side, a listener contest is to start in the New Year, covering all bands. And as if this were not enough, monthly lectures have been fixed into February.

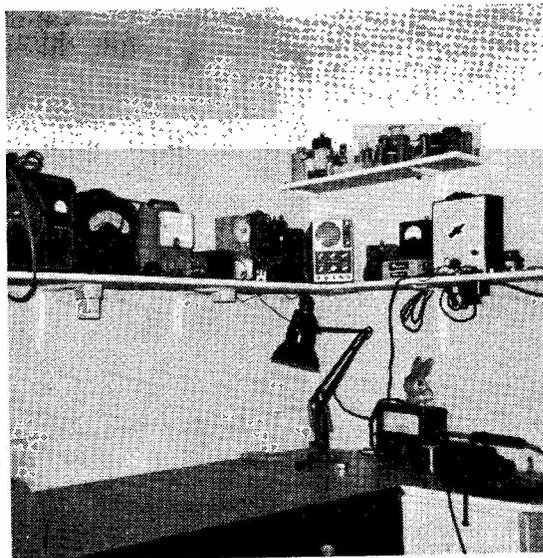
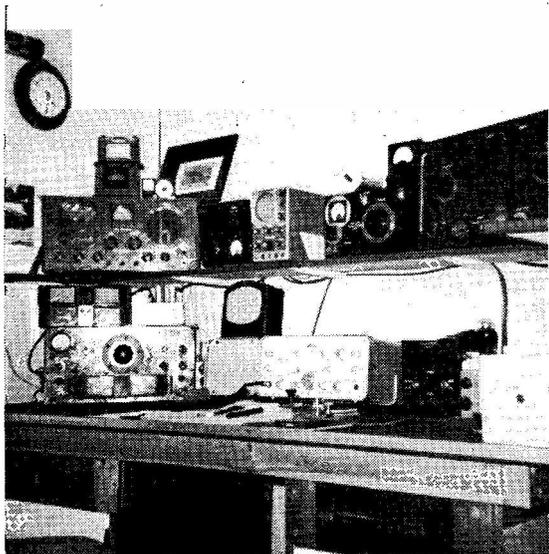
Sutton Coldfield Radio Society sign G3RSC and meet at the Fox Inn, Walmley, on the second Monday and fourth Wednesday of each month, with net-nights (1910-1920 kc) on Mondays and Fridays at 2130. (If reasonable support can be assured—say, five or so stations—a regular Top Band net is a very good way of inspiring local interest, both in the Club and in Amateur Radio.)

Though the programme at **Southport** is well under way, we gather that support is not quite what it should be—which is always disappointing for the organisers, who have to work just as hard whether ten or 50 members turn up. On November 30, four members of the Wirral group are coming over to talk about and demonstrate D/F equipment—one of those lesser-known activities in the radio amateur context, but nevertheless of considerable practical interest. As the Wirral chaps are experts in the D/F field, this is one of those occasions not to be missed.

The "Clubs" Section will revert to normal with February's *SHORT WAVE MAGAZINE*, and for that the closing date will be **Friday, January 6, 1967**. 73 de "Club Secretary," Short Wave Magazine, Buckingham—and a Very Happy Christmas to all who read this feature.

"MCC"—QUICK REPORT

Just as this was going down, the first leg of MCC was in full spate—great activity, reasonable conditions, much QRM, the usual pretty high standard of operating, many beefy signals from GDY in the last hour or so, and very little out-of-time working logged. No less than 25 Clubs, not included in the October listing, asked for identification groups. So it should be an interesting report.



THE OTHER MAN'S STATION G2HKU

IN the March 1948 issue of *SHORT WAVE MAGAZINE* we had a description of the station of G2HKU as it then was—here it is as you could see it now, with all the changes that have taken place over more than 18 years, not the least being the progression from battery power to a DC supply and then AC mains! (And only those who may have had to suffer without AC on tap will realise what that means).

First licensed as 2HKU ("Artificial Aerial") in 1939, at the ripe old age of 15, the period of Hitler's War saw him trained and qualified as a signaller in a Home Guard unit attached to the Queen's Regiment. (In those days, everyone was needed, and all contributed what they could). On the post-war resumption of amateur activity and the granting of G2HKU as a full radiating permit, a start was made on 10 metres (the first-band opened to U.K. amateurs) using a battery-powered CC Tx, involving an RK-34 and a Bliley "fundamental crystal" on 28007 kc. In due course, as the other bands were restored and the DC mains arrived (!), power was boosted to 20 watts and DXCC achieved.

It should be mentioned that G2HKU—owned and operated by E. H. Trowell, now of Hamlyn, Saxon Avenue, Minster, Kent—is on the Isle of Sheppey, where in 1953 they had disastrous floods, when G2HKU at the old QTH was washed out and much of the gear lost. A move to a higher and less vulnerable part of Sheppey involved a complete rebuild, since when the station has evolved to what we see here.

The right-hand view shows the work bench, with a very practical selection of equipment for construction and testing. At left is the operating position, the apparatus in view including a Hallicrafters S.20R, a home-built 10w. two-metre Tx, a 'scope, and ATU's for 160m. and the HF bands—the latter being at once a Z-match, with incorporated forward-and-reflected power bridge, artificial load and LP filter, covering 10-80m.

On the operating deck is a re-built HRO, having all bands spread, a built-in xtal calibrator, Q-multiplier and nuvistor front-end converter. The main transmitter is a KW-2000, with an electronic keyer and monitor unit. The bench equipment also includes an inter-com. panel to give two-way talking (with the kitchen!), since now the shack as shown here is in the roof-space, reached by a retractable ladder. (Those floods are not forgotten!).

Not shown is a large book-rack containing, among other references, all issues of *SHORT WAVE MAGAZINE* back to 1939. A monitor TV/Rx is also set up within sight of the operating position—on the sound precept that "If I don't interfere with me, I can't be causing QRM to anyone else."

The main interest at G2HKU is CW operating—a code proficiency certificate for 25's is held—but AM/SSB can also be worked on all bands. Aerials in use include a four-band vertical array, a full-size 5RV and a 4/4 slot-fed J-Beam for two metres. In the DX tally, the score is 149 countries in 37 Zones, and 18C in four Continents on Top Band. A very

careful earthing system has been put in, which undoubtedly makes a considerable contribution to radiating efficiency on all bands.

In addition to all this, G2HKU also operates /M, with a small CC rig built under the dash of a Morris 1000, using as Rx a modified

"Command" unit, the aerial being a centre-loaded whip mounted on the rear bumper. And just to fill up his spare time after Amateur Radio, G2HKU collects old maps and is also interested in archaeology, with the little-known Minster Abbey (A.D.664) as his current study.

Some Letters To The Editor

Sir,—My first reaction on reading the article by G3KSU was a feeling of sadness. How right he is, I thought. Gone are the days of ebonite and bright emitters—and gone are the chaps who used to fashion basket-coils and carve out their own galena crystals. (At least, like me, they must be pushing along a bit in years.) I felt very sad, but only for a moment.

G3KSU and I are wrong, of course. There are still amateurs aplenty, and true amateurs at that. The spirit still lives on. All that has happened is that G3KSU (and some others) now suffer from a touch of nostalgia. It isn't *all* long hair and sun-glasses in the fog, or mini-skirts and mini-brains. (I remember my Oxford bags!) How do I know all this? Just by observing youth. Life is not easy for them in the world of today. They have so much more to take in than we had at their age. Life was slower in our youth. Time was easier, and there *was* time.

Two world wars changed all that. Technology raced ahead, and there was no place for basket-coils and galena xtals. The coils became highly-complex inductances, and the galena into even more complex solid-state material. We had then to buy much of the hardware of radio because we had neither the time nor the machinery required to manufacture it. And the dearest of these items was time.

In the old days, too, there was often more space in which to build. Since then we have become a nation of cliff-dwellers, flat on flat. Many of today's youth have never known the luxury of space. They either let off steam by running amok, or take up some worth-while thing to do.

Never were our night-schools so full of youth hard at work. Never were so many clubs and societies devoted to studies and hobbies of all kinds. Never were youth organisations so strong, or doing so much to help the less well endowed, the needy and the old. Never did they devote so much time to art, literature and science. It's only the lunatic fringe we hear about, of course.

All *is* well with Amateur Radio and the youth who after us will carry it forward. It's just different, that's all. One day, in their turn, the youthful amateurs of today will be sighing nostalgically for their own "good old days."

K. M. BAILEY, G3EPU,
London, S.W.19.

In the October issue of the Magazine we published an article by G3KSU entitled "Amateur Radio, 1966," and invited readers' comments. Here is a selection from the many replies received

Sir,—Commenting on the article "Amateur Radio, 1966," most radio amateurs nowadays have many commitments which early amateurs did not have, and so are only able to devote a limited time to radio. To get the most out of their hobby they buy the best commercial equipment they can afford, and build what they can. Another reason for the use of commercial equipment is that the constructor of similar gear at home would require a lot of time and a good deal of test gear—neither of which are always available.

For some time after the last War amateurs were pressing radio manufacturers to produce gear suiting their special requirements. Now, the majority of amateurs delight in the fact that such commercial equipment is available, and its use should never be criticised.

With regard to those "meaningless awards" and "unwanted QSL cards," surely it is the desire for some standard or yardstick of achievement which has given rise to them. The effort to gain an award is no more "meaningless" than playing cards, collecting stamps or knocking a ball round the golf-course.

The 1966 radio amateur has technical knowledge and skill far in advance of his predecessors. The amateur of the future will, in his turn, have to be a highly skilled technician and he will, no doubt, get as much enjoyment out of his hobby as the early amateurs.

By the way, I was building and using radio gear in 1920!

H. TURNER, G8VN,
Leicester.

Sir,—Having in the last 30 years introduced some hundreds to Amateur Radio—mostly at Cranwell during the last War—I have naturally something to say in reply to G3KSU.

I would look for the present licensing conditions to allow for no more than 10 watts on CW as the

standard, with incentive licensing for anything more than this. I would accept justification for buying commercial gear provided that within a period of, say, three months, the operator had to satisfy the Post Office that he really understood how it worked. And that privileges over and above the initial licence conditions should depend upon technical ability, and a somewhat higher Morse speed than that now required.

The present system permits a person to mug up enough "tech." to scrape through a very simple exam. and hold enough 11.9 w.p.m. Morse in his head to creep past.

Ours are not *amateur* bands any more—they are citizens' bands, with the genuine amateur suffering in them. The state of the art is expanding rapidly. If the professionals leave us hopelessly behind they will have every right to our frequencies. We cannot drive a pony and trap along a motor-way. And those who will not keep up can surely not expect to survive. I am quite willing to climb into the chair for my new-style amateur licence.

Finally, may I add that I am not and never have been professionally engaged in radio or any kindred subject.

H. S. CHADWICK, G8ON,
Worksop, Notts.

Sir,—We should be making it easier for people to obtain an amateur licence, and not more difficult. The art is becoming more intricate as the years pass; more has to be learnt, and easier methods and chances of obtaining a licence should be the aim.

G3KSU's other point about home-construction is all a matter of economics. In the early days it was cheaper to buy or make components for a station. Today it is more economic (in terms of value for money) to buy a complete station—except perhaps on the VHF's, where many amateurs still do their own construction. It was a wise step to open up a band for which Morse is not required—and this is the way things should go, forward not backward.

A. G. THORBURN, (SWL),
Workington, Cumbs.

Sir,—Having read the article by G3KSU, some of my opinions and experiences may have a bearing on the matter. I am a G8/3 and have now had about a year on 70 cm. In that time I have worked 83 stations and heard perhaps as many more.

The statistics break down to: 38 A-licence stations worked; 36 B-licence; and 9 A/TV stations, for about 850 contacts in all. My log details show that about 64% of these stations had commercial antennae, and 52% commercial main receivers—but their Tx's were 75% home-built, and 52% of their 70 cm. converters were of their own construction.

As I see it, on 70 cm. and bands above practically everyone is a home-constructor, whether he likes it or not, and yet the standard seems to be as high as on the HF bands, on which so much commercial gear

is used. The constructional situation on the UHF's will stay healthy while the commercial product remains inadequate or too expensive.

In some other directions things are not so good. The operating standard on 70 cm. is abysmally low. This is normally of little account, because one has all the time in the world to conduct a QSO, with relatively few stations within range. But with a good opening, all the weaknesses of poor operating procedure show up.

Perhaps I may now comment on some of G3KSU's suggestions. Obviously, as long as the B-licence is available, the "CW for the first 12 months" requirement is pointless. On the VHF's few people ever progress beyond 25w. in the PA. If a confirmed B-licenssee sticks to UHF, he will never take the Morse Test and so would not come in for the suggested Procedure Test. But I do think that there ought to be some limitations during the apprentice period—though not based on "the first 12 months" because all one would have to do would be to lie doggo for that period, and then emerge without limitations.

I suggest that for the first 12 months from commencing operations, as proved by the log, new operators should be restricted to the bands from 28 mc upwards, with power limits as at present defined. I would also suggest that written procedure questions be included in the R.A.E. (which is in any case much too easy), preferably in Part I of the paper as a third question.

I would also like to see some method devised for preventing people giving forth about "the good old days" and "our declining standards." Unfortunately this won't happen—and in due time no doubt I shall be doing the same!

B. A. CARTER, G8ADD,
Birmingham, 23.

Sir,—I feel I must comment on what G3KSU says in the October issue, especially where he remarks "On the other hand has Amateur Radio become just too easy?" Amateur Radio never has been "easy"!

I am studying for the R.A.E. and the Morse Test and I (and many of my fellow SWL's doing the same) find it quite the opposite. Indeed, should I pass both these exams. at the first attempt, I would consider myself a professional and not an amateur.

E. DURKE, (SWL),
Thornton Heath, Surrey.

Sir,—Progress is only progress if it makes things better and not just different. Amateur Radio has changed but hardly for the better.

Abolition of the compulsory "First Year on CW" did nothing to improve our bands. There were always those who were apathetic towards CW operating. Today we have many who are positively anti-CW without even having given it a try. And there are those who, not content with not collecting QSL's themselves, refuse them to those who do.

It seems that, with our "progress," we have lost

many of the finer aspects of the hobby. Let us all take a long, fresh look and resolve to restore some of the traditional niceties of Amateur Radio. We must not fall into the trap of confusing progress with things simply being made easier.

F. A. HERRIDGE, G3IDG,
Basingstoke, Hants.

Any further letters on this subject offered for publication must be short, to the point and written legibly (preferably typed) on one side of the paper only.—*Editor.*

* * *

“IRON CURTAIN EPISODE”

It is fair to record that the article by G3OLS, “Iron Curtain Episode,” in the November issue has

drawn a certain number of letters in refutation of the experiences he described.

Those writing in to say that they have found personal contact easy with amateurs (and hospitality generous) behind the Curtain include: G3LYV, Coventry, visiting Hungary in August—G3IAG, Ely, Cambs., who was in Poland some years ago—G3IOR, Norwich, in Yugoslavia this summer—G3BEZ /GW5BI, also in Yugoslavia, and Opatija—and G3RPB, London, N.3, who, with G3NQG, was in Yugoslavia last year.

It certainly seems to be a matter of “the luck of the draw” as to how one gets on in these countries. While the experiences related to us by the readers mentioned do not put G3OLS in the wrong, we are glad to be able to say that there are those who have found the contrary.



This interesting group includes some well-known old timers—left to right: G3UAS, G2TA, G3SM (with scroll), G4RZ and G3MJF. The picture was taken on the occasion of the retirement and presentation party given recently for G3SM, completing nearly 50 years service with Kodak (England), Ltd., Harrow. Thirty of his colleagues were present, of whom these five hold call signs, and G3SM is the father of G3UAS. Both G2TA and G3SM have at different times in the past contributed articles to “Short Wave Magazine.” According to G2TA, the American counterpart of Kodak, Ltd. employs no less than 200 licensed amateurs, justifying a call book of their own to locate them all.

“Short Wave Magazine” covers the whole field of Amateur Radio, has been established for nearly 30 years, is independent and unsubsidised, and circulates in 80 countries outside the U.K.

NEW QTH'S

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

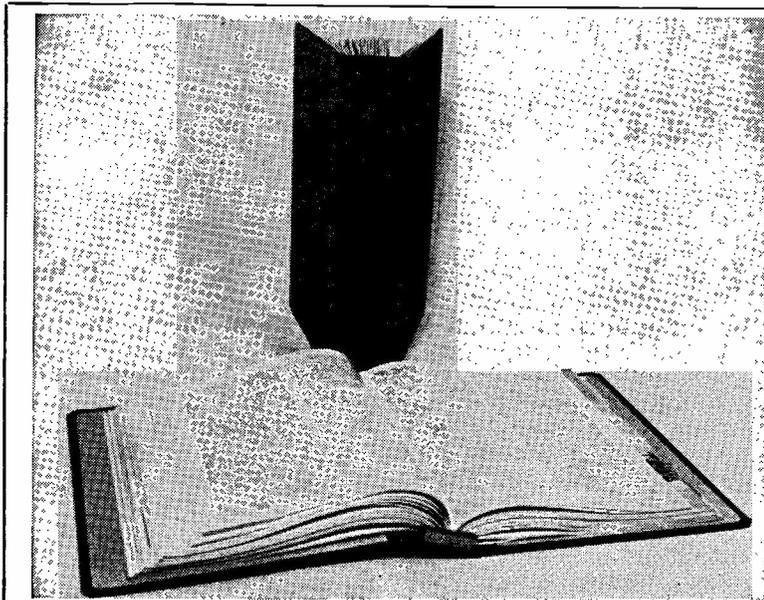
EISBA, F. W. Norman, 5 Newcourt Avenue, Bray, Co. Wicklow.
G3VDF, H. Gregory, 24 Lucknow Drive, Sutton-in-Ashfield, Notts.
G3VKE, R. H. Turton (*ex-G8AMM*), 2 Greystones Crescent, Sheffield 11, Yorkshire.
G3VKT, R. A. J. Smith, 178 Harrow Road, Wollaton Park, Nottingham. (*Tel. Nottingham 284829.*)
G3VLG, Amateur Radio Society, Dynamics Radio, Hawker Siddeley Dynamics, Whitley, Coventry, Warks.
G3VLH, J. E. Longhurst, 31 St. Mary's Road, Reigate, Surrey.
G3VLR, B. Rispin, 37 Ferry Road, South Cave, Brough, Yorkshire, E.R.
G3VNM, W. J. Bond, 9 Clinton Road, Barnstaple, Devon. (*Tel. Barnstaple 2061.*)
G3VNX, A. R. Uwins, Ravenscourt, Grange-over-Sands, Lancs. (*Tel. Grange 2083.*)
G3VPO, G. R. Willey, 5 Rough Way, Horsham, Sussex.
G3VPP, M. J. Hartill, 1 Perton Road, Tettenhall Wood, Wolverhampton, Staffs.
G3VPQ, I. R. Westwood, 76B South Ealing Road, Ealing, London, W.5. (*Tel. 01-579-1259.*)
G3VPS, P. J. Lennard, 2 Court Lodge Cottages, Wartling, Hailsham, Sussex.
G3VPW, J. S. Wright, Reservoir Cottage, Redhill, Arnold, Notts. (*Tel. Nottingham 267668.*)
GM3VQJ, T. L. Darke, 52 Rowan Drive, Bearsden, Dunbartonshire.
G3VQM, D. M. Harrington, 30 Heathwood Gardens, Birchwood Corner, Swanley, Kent.
G3VQN, S. M. Newbold, Caverley, Silverdale Road, Burgess Hill, Sussex. (*Tel. Burgess Hill 6471.*)
G3VQO, L. M. Allwood, 69 Farhalls Crescent, Horsham, Sussex. (*Tel. Horsham 61509.*)
G3VQS, S. Barraclough, 4 Balliol Grove, Blundellsands, Liverpool, 23.
G3VRE, Chippenham and District Amateur Radio Club, Chippenham High School (Boys), Hardenhuish Lane, Chippenham, Wilts.

G3VRF, J. Charlton, 17 Beechwood Avenue, Waterlooville, Portsmouth, Hants.
G3VRS, C. Whyles, 67 Wygate Road, Spalding, Lincs.
G3VRV, M. A. Huish, 36 Glenwood Road, Mill Hill, London, N.W.7. (*Tel. Mill Hill 6144.*)
G3VSE, K. C. Thompson, 2 Rookery Drive, Penwortham, Preston, Lancs. (*Tel. Preston 44509.*)
G3VSJ, D. Chaloner, 717A Green Lanes, Winchmore Hill, London, N.21.
G3VSK, T. W. McCurry, 61 Bly Road, Darfield, Barnsley, Yorkshire.
GM3VSP, M. Valerio, 1648 Great Western Road, Glasgow.
G3VSZ, G. T. Barnard, Lulworth, Rushmoor Avenue, Hazlemere, High Wycombe, Bucks.
G3VTM, E. Ridgway, 8 Highfield Crescent, Widnes, Lancs.
GW8ASA, G. J. Wyatt, 177 Barry Road, Barry, Glam. (*Tel. Barry 4207.*)
G8ATP, K. E. Mintern, 3 Rollo Court, Charlotte Despard Avenue, Battersea, London, S.W.11. (*Tel. MAC 7820.*)
G8ATZ, R. E. Tinson, 6 Radway Drive, Wilford, Nottingham.

CHANGE OF ADDRESS

G3ADM, G. H. Killick, 10 Brocket Road, Stanborough, Welwyn Garden City, Herts.
G3AMW, Hull and District Amateur Radio Society, c/o Hull and East Riding Co-operative Society Limited, Hessle Road Branch, Hull, Yorkshire, E.R.
G3BAC, R. A. Bastow, 57 London Road, Ramsgate, Kent.
G3BOT, A. B. Reeder, Northfield Farm Boarding Kennels, Malton Lane, Meldreth, Royston, Herts. (*Tel. Melbourn 741.*)
G3EFA, T. F. Wareing, 32 Delta Park Drive, Hesketh Bank, Preston, Lancs.

G3HBW, A. L. Mynett, 10 Prior Grove, Chesham, Bucks. (*Tel. Chesham 5937.*)
G3KOC, J. D. Pearson, 10 Woodgarth Villas, New Holland, Barrow-on-Humber, Lincs.
GW3KWB, R. H. Neville, 3 Brynderwen Road, Newport, Mon.
G3LDI, R. J. Cooke, 163 Norwich Road, Wymondham, Norfolk.
G3LHN, R. D. Muir, 7 Orchard Road, Hampton, Middlesex.
GM3NLB, F. Inglis, 39 North Castle Street, St. Andrews, Fife.
G3NOP, D. J. Peacock, 336 Cottingham Road, Hull, Yorkshire, E.R.
G3OAZ, J. Akehurst (*ex-DL2VM/5AATZ/DL2BC/GW3OAZ*), 19 Meadowland Avenue, Eastbourne, Sussex. (*Tel. Eastbourne 53695.*)
G3PDL, P. F. Linsley, Hillgarth, Beelsby, Grimsby, Lincs.
G13PLL, R. P. Moore (*ex-ZB2AO*), c/o Sgts' Mess, R.A.F. Station, Ballykelly, Limavady, Co. Derry.
G3PYB, P. Blakeborough, 131 Lichfield Road, Mere Green, Sutton Coldfield, Birmingham. (*Tel. Four Oaks 0123.*)
G3RBR, F. B. S. Rogerson, 11 Moulder Road, Pyke Farm Estate, Newtown, Tewkesbury, Glos. (*Tel. Tewkesbury 2151.*)
GM3TCM, D. J. Munro, 4 Harrow Terrace, Wick, Caithness.
G3TEY, Miss Patricia Stansfield, 14 Beech Lane, Macclesfield, Cheshire.
G3TEY/A, Miss Patricia Stansfield, 42 Jordangate, Macclesfield, Cheshire.
G3TJA, R. G. Street, B.A., 73A Albany Street, London, N.W.1. (*Tel. 01-387 2254.*)
G3UMH, A. Dailey, 1018 York Road, Leeds 14, Yorkshire.
G3UPZ, H. W. James (*ex-GM3UPZ*), 10 Templeway, Lydney, Glos.
G3VMB, P. A. W. Cooper, 16 Mornington Road, Sale, Cheshire.
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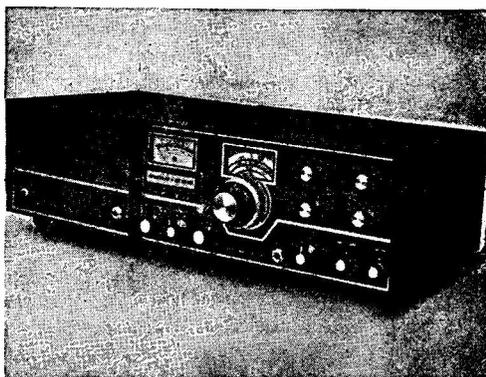
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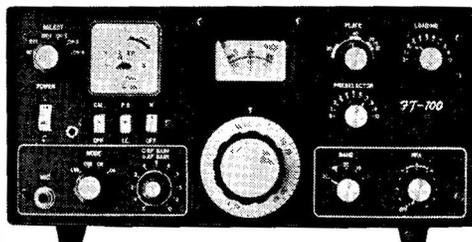
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Note that everything I sell is fully checked and re-aligned where necessary. I am not in the habit of concealing anything or glossing over faults. Furthermore, if you are not happy with your rig, you've only to return it to get your money back. I would like to stay in business a long, long time and there's only one way to do this!

By the time this ad. appears, the chances are that my stock will have changed quite a bit. However, if you want a Rx or Tx, a s.a.e. will bring you my latest stock which includes all kinds of bits and pieces.

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"GUIDE to Surplus Communication Receivers," 8s. 6d. not paid.—Adkins, 72 Courtenay Avenue, Harrow, Middlesex.

JUST A Reminder: For your immediate copy of the January issue (publishing on Dec. 30), send 4s. postal order by Wednesday 28th.—Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

RECEIVERS GALORE! Our latest list of over 50 (yes, 50) Communication Receivers is yours for an s.a.e.—R.T. & I. Electronics, Ltd., Ashville Old Hall, Ashville Road, London, E.11. (Tel. Leytonstone 4986.)

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FOR SALE: Complete Station of the late G2CIP, consisting of new HX-50 Hammarlund Tx, AM/CW/SSB, USB/LSB; Hammarlund HQ-180A Rx; Heathkit Valve Voltmeter; Triplet Sig. Generator; LP Filters; Weston Analyser; K.W. Reflectometer; CDR Rotator; Vibroplex key; many small items. Offers and lists.—Horrocks, G2CUZ, 34 Sandbrook Road, Ainsdale, Southport (77604), Lancs.

WANTED: RSGB "Bulletin" Nos. 1, 2, 3 of 1965; also "Short Wave Magazine" Nos. 1 and 2 of Vol. XXIII. **SELLING:** HA-350 Rx, in mint condition, with 100 kc calibrator and matching speaker, year old only, price £65.—Pawley, 52 Sumatra Road, West Hampstead, London, N.W.6.

SELLING: National HRO, with seven GC and two BS coil packs, mains and battery PSU's, and handbook, £18. G4ZU-type 10-15m. beam, with mast, rotation gear and indicator, £18. Dynamotor, suit mobile, £3. Buyers collect. **WANTED:** Labgear LG.300 Tx, with matching Mod/PSU.—Parsons, G3MIX, 96 Blackamoore Lane, Maidenhead (26723), Berks.

SALE: R.1155 receiver, with output stage, PSU and speaker, coverage 160m. to 18 mc, in good condition; first £8 secures.—Ring Minett, Berkhamsted (Herts.) 3351.

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SALE: K.W. Vanguard Tx, coverage 10 to 160m., SAM/CW, price £35. Hallicrafters SX-28 receiver, £23. Leica 3C with F 3.5 coated Elmar, F 2.8 coated W.A. and F 2.0 Summar lenses, £50, or near offer? —218 Winchester Way, Bolton, Lancs.

WANTED: Packing case for Marconi CR-100 Rx. Please state price. (London area.)—Box No. 4383, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TRANSISTORS: AU-10's, 25s.; OC26's, 5s.; BY-100's, 4s. Zener diodes, 1½ watt, all voltages up to 47v. 4s. Valve bases for 807, 1s. 3d. All items plus postage; send s.a.e. for list.—Hatley, 2 Fitzgerald Avenue, Seaford, Sussex.

WANTED: To buy or borrow, instruction manual for the National HRO-5T.—Bowker, 8 Lytham Drive, Heywood, Lancs.

SALE: HE-30 receiver, virtually unused, coverage 550 kc to 30 mc. asking £30, or near offer.—Ring Price, Solihull 6368 (Warwickshire).

SELLING: A.M. Compass Type P4A, 40s. Crystal Calibrator No. 10. £5. D/F set, with table and compass, for 1.9 mc. £3. B2 Tx/Rx. £8. Gelooso VFO, £5. Record player, 4-speed, new, £3. CRT, 3in., 40s. CRT, 6in. medium persistence, 50s. All postage extra.—Bolton, 8 Dickens Avenue, Canterbury, Kent.

WANTED: Transistor Rx, such as Heathkit Mohican or Eddystone, or similar. Would consider faulty specimen if the price is right. Full details, please.—Box No 4396. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Receivers: HRO-Jr. with nine coils and PSU, £12 10s.; Eddystone 840A, £27 10s.; Minimitter 38, complete but needs repair, £15; Hammarlund 120X, £28. Transmitters: Olympic 300w., complete, £75; Labgear LG.50. PSU fault, £25; B2 Tx complete, £7 10s.; B.44, perfect, £7 10s.; home-built 10-80m. Tx, basis mobile, no PSU, £6. Cossor Oscilloscope, Type 339, HT fault, but working, £7. Cossor Type 343 Ganging Oscillator, £6. Carriage all items at cost; write or call after 7.0 p.m.—Wheatcroft, G3HMY, 27 Lower Wear Road, Exeter, Devon.

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SELLING: Swan 350 Transceiver, new April 1966, in perfect condition and complete with microphone, price £200, no offers. (Lancs area.)—Box No. 4397. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS. READERS—continued

FOR SALE: Eddystone 840C receiver, price £35. Also Codar PR-30X preselector, £5.—Chamberlain, 6 Longfield Road, Winchester, Hants.

FOR SALE: Heathkit RA-1 amateur band receiver, professionally built, 10 hours' use only, £36. Hammarlund HX-50 Tx, with auto-xformer, in mint condition, £95. Both open to offers?—Allbright, G3RCE, c/o Y.M.C.A., 55 High Street, Portsmouth, Hants.

OFFERING: A KW-77 receiver, electrically and mechanically excellent, £65 (Notts. area).—Box No. 4393, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Marconi CR-100, coverage 60 kc to 30 mc, in good condition, with S-meter and crystal filter giving excellent results, price £20 or near offer. If possible, buyer views and collects.—McAlister, 10 Woodfield Road Shrewsbury, Shropshire.

SELLING: Eddystone 888A receiver, with S-meter and mounting blocks, £65. Philips EL-3541 4-track tape recorder, £20. Green & Davis Mk. III two-metre converter, IF 28-30 mc. £5. All carriage paid.—Eeles, 76 Wilton Road, Shanklin, Isle of Wight.

WANTED: For personal use, a second-hand transistorised communications receiver, such as Eddystone or Heathkit; home-built Rx considered. State details and price, etc.—Keenan, 3 Forest Grove, Eccleston Park, Prescott, Lancs.

WANTED: Panadaptor, 455 kc. BC-1031A or similar. Top price given for unit in first-class condition. (Derbyshire area).—Box No. 4395, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FIRST 10 guineas secures an excellent R.107 receiver, with S-meter and circuit.—Howson, 30 Charles Avenue, Thorpe, Norwich, Norfolk, NOR 66.T.

MUST Sell a K.W. Vanguard AM/CW Tx, £25. Home-built Top Band Tx. £6. Mullard 'scope, £10. Lafayette CDO, £5. Joystick aerial, 20s.—Nurse, G3RBI, 10 Wenwell Close, Aston Clinton, Aylesbury, Bucks.

WANTED: Closed-circuit television camera for operation with domestic TV set; preferably suitable for 16mm. cine lenses.—Mason, 8 Highbury Road, Streetly, Sutton Coldfield, Warwickshire.

WANTED: A KW-500 Linear Amplifier, must be in FB condition and have square meters. Also required a 12-volt battery charger giving 10-15 amps.—Box No. 4394, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Hallicrafters SX-28A, with spare set valves and manual, £18 (carr. 30s.). Rocal SA-18 Spectrum Analyser, £10 plus post. Siemens marine Rx, coverage 200 kc to 4 mc in three bands, with eight CC channels, including miniature speaker, 11 min. valves, for rack mounting and complete with all crystals, £7 (20s. carr.). Similar Rx, coverage 10 kc to 2.8 mc in five bands, with BFO, NL, AGC, RF-IF-AF gain and Ae. trim controls, long vernier-type d'al, IF reject unit, for rack mounting, with matching PSU output stage and built-in speaker, price £7 (post 20s.). R.1475 Rx, coverage 2.0 to 22 mc. £7 (carr. £1). All in good condition. Meter 0.1 mA. 3½ in., 7s. 6d. (2s. 6d. post). CRT. 3 in., 7s. 6d. (2s. 6d. post). Woden transformers. 5v. 10 amp., 10v. 5 amp., 15s. plus 5s. carriage.—Spence, School of Physics, The University, Newcastle-upon-Tyne, 1, Northumberland.

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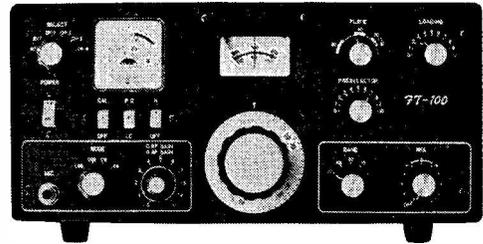
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Carriage extra on all the above

665 allowed on your Eddystone 888A against a new EA 12 Radio Control gear by Grundig, REP, MacGregor, O.S., etc. Models by Keil, Veron, Frog, Graupner, Ripmax, etc.

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SMALL ADVERTISEMENTS, READERS—continued

SALE: Mosley full-size 20-metre three-element beam, \pounds 10. Short Webster Bandspanner, \pounds 4. Mosley MA3, 60s. 813 valves, 15s. each; 813 base, 5s. Also transformers, chokes, condensers, etc., etc.—Griffiths, G3NPZ, 1 Burswin Road, Carterton, Oxfordshire.

SELLING: K.W. Viceroy Mk. III, \pounds 120. KW-600 Linear, hardly used, \pounds 90. Three-section 30ft. tower, \pounds 20. Offers considered. Prefer buyers collect but can deliver first two items to 50 miles.—Sykes, G3NFV, 8 Uplands, Ashted (2546, after 7 p.m.), Surrey.

WANTED: Urgently, the correct Jones plug/sockets and connecting cables for the ex-R.A.F. T.1154/R.1155 Tx/Rx assembly, as used in Bomber aircraft during Hitler's War.—The C.O., CCF, Derby School Moorway Lane, Littleover, Derby (21391).

OFFERING: An immaculate KW-2000, faultless performance, at \pounds 150, with delivery to 100 miles.—Emms, G3TUS, 30 Longleaze, Wootton Bassett (501), Wiltshire.

WANTED: A reasonably priced and unmodified communications receiver, coverage 10 to 160m., preferably with its manual. Full details, please.—Box No. 4398, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR THE January Issue, due out on December 30, we should have single-copy orders (4s. post free) by Wednesday 28th. This will ensure your receiving a copy of the January issue, flat in an envelope, in good time to browse through the Small Ads. Please remit by postal order, with a note saying "January issue, please."—Circulation Dept., Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

ON OFFER: A B.44 Mk. III, in very good condition, converted ready for operation, complete with diagram and ex-W.D. dipole, price \pounds 99 or offer (carriage extra). Eddystone 840C Rx. very little used, quite equal to new except for small scratch, asking \pounds 42 (carriage extra).—Neaverson, G5NX, Lakeside Hotel, Newby Bridge (207), Nr. Ulverston, Lancs.

SALE: Collins S-Line Units, consisting of Transmitter, Receiver and Power Supply, with many extras. Cost \pounds 850. Best offer over \pounds 200 secures. (London area).—Box No. 4399, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: R.308 Rx, coverage 20 to 145 mc in five bands, in excellent condition throughout, complete with handbook and circuitry, \pounds 25. Also complete aerial rotation gear, with two motors, drive mechanism, control and direction indicator, \pounds 10. (Cambridge area).—Box No. 4400, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

GONE SSB, so offering a K.W. Vanguard 10 to 160m AM/CW Tx, in as-new condition, used two hours only, at \pounds 55 or near, with delivery arranged.—Denman, G3MEW, 17 Testcombe Road, Gosport, Hants.

UNUSUAL OFFER: A 1948 Armstrong-Siddeley car, with its M.o.T. certificate, in fine running order (any trial) in Exchange for an AR8 or any similar high-grade Rx. Also for EXCHANGE: A self-contained 80-160m. Tx, modulator pair 6BW6, with mains PSU and provision for 12-volt input. For the "Electronics" transistorised front-end unit.—Morrison, 86 Wavedon Avenue, London, W.4. (Tel. CHIswick 1460.)

WANTED: Introduction to willing and competent constructor able to build valve-type switched TV sound-only Tuner Unit for Ch. 9 and 12, giving about 1-volt of audio from a cathode-follower output. Price secondary consideration to well-engineered job in attractive presentation.—Sedwell, 23 Knowsley Street, Bury, Lancs.

WANTED: National HRO-MX receiver, with BS coil pack for 10, 20 and 80 metres. Also copies of "Short Wave Magazine," "CW" "QST" and RSGB "Bulletin" for years 1960-66.—Greene, 29 Oxford Road, Calne, Wilts.

SMALL ADVERTISEMENTS, READERS—continued

GIFT at £15. Eddystone 358 receiver, in good condition, with PSU, coils and manual. Buyer to collect.—Elzocks, G3RJX, 223 Perry Wood Road, Great Barr, Birmingham, 22A. (Tel. GRE 3756.)

"RTTY—The Easy Way." The new British Amateur Radio Teleprinter Group booklet is an introduction to radio T/P operation on the amateur bands. It is packed with basic facts about amateur RTTY, and costs only 3s. post paid. Limited print. Remittances payable to B.A.R.T.G.—Owen, G2FUD, 184 Hæle Road, Hale, Cheshire.

SELLING: Converter for 70 cm., with built-in PSU, price £6 15s. A small 18w. RF section for a two-metre Tx, £8. Converter for two metres, IF tunable over 28-30 mc., with built-in PSU, £6 15s. Four-metre converter, tuning 28.1 to 28.7 mc on the IF, with incorporated PSU, £6 15s. High-voltage silicon rectifier stacks. 1 kV to 10 kV, 0.5 amp. to 10 amp. output. Send s.a.e. for full details any item.—Sandall, G3LGG, 21 Dale View, Ilkestone, Derbyshire.

MUST SELL—Leaving for U.S.A! R.1155A Rx. in good order, £5 or near offer? Hallcrafters S.39, 500 kc to 32 mc, small fault. 30s. SCR-522 Tx complete, with spare valves. £3 10s. Soldering irons, 25w. and 65w., 10s. each. Transformer 600-0-600v. 500 mA. 20s. 4X150A. 17s. 6d. KT88. 7s. 6d. U19 2s. 6d. Siemens relays. 65-ohm and 1700 ohm, 2s. 6d. each. Lots of miscellaneous parts, including crystals for 7.15, 7.175 and 7.20 mc (and others), power transistors, capacitors, relays and resistors, all cheap; s.a.e. for list. Postage and packing extra.—Carling, 27 Ellis Close, Cottenham (284), Cambs.

FOR SALE: Eddystone 840C receiver, as new, little used (by SWL), £40 or nearest offer. Prefer buyer checks and collects.—Anderson, 1 Highlandykes Crescent, Bonnybridge, Stirlingshire, Scotland.

CAN BE HEARD ON 80m. by appointment: A Heathkit SB-400, in as-new condition and professionally built. For further particulars apply.—G2AMG, QTHR, or ring Great Chatwell 276 (Shropshire).

EXCHANGE or SELL: R.1132A receiver with PSU, £6. A 19 Set with mains PSU, £6. Offered at £10 together or in EXCHANGE for a general-coverage communications receiver.—Lemon, 12E Lewis Trust, Warner Road, Camberwell, London, S.E.5.

WANTED URGENTLY: The Type 360 PSU for an R.1475 receiver, with manual or circuitry notes.—Bach, 27 Greville Hall, London, N.W.6.

SELLING: A Marconi "Electra" marine receiver, 13 valves, coverage 250 to 520 kc and 1.5 to 25.0 mc, with universal AC/DC power pack, £45. Radio Corporation of America AR88D receiver, with £20-worth new spares, price £60 all in. Hallicrafters S.36A VHF receiver, including Panadaptor, £40. All these receivers with their manuals.—Sutcliffe, 103 City Road, Bradford, Yorkshire.

FOR SALE: Labgear Topbander, converted for plate-screen modulation on 80m., in nice cabinet, first offer nearest £10 secures. Also almost complete "MVZ Exciter," with H6CU crystals and mechanical filter, in professional cabinet, price £18 (no offers).—Clarke G3OWQ, 12 Robin Hill, Bedford (56676).

FOR DISPOSAL: One Eddystone 888A, in very good condition, with S-meter, price £75 or near offer.—G3MDW, QTHR (or ring Halifax 64329, afternoon-evening).

SELLING: HE-30 communications receiver, factory built, price £23. Can deliver to 20 miles for purchaser.—Pryse, 36 Hart Road, Byfleet, Surrey.

FOR SALE: R.107 receiver, coverage 1.2 to 17.5 mc in three bands, with fine tuning, BFO, etc. Price £10, carriage extra.—Sleeman, 9 Albert Road, Stoke, Plymouth Devon.

OFFERING: Geloso 4/102V VFO, valved, £4 10s. Eddystone Crt. 699 S-meter, grey finish, unused, £4 15s. Or EXCHANGE either for Codar PR-30X. ISWL "Monitors" 1959-'65 inclusive, offers?—Knowles, 104 Tetley Road, Birmingham, 11.

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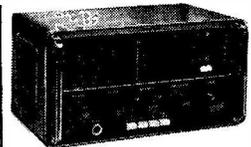
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- 2 metre Preamplifier.** 2 dB NF. 25 dB gain. 2 TIXMO5 grounded base stages. 3 144 mc. tuned ccts. Copper chassis and screening ... **£7**
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SMALL ADVERTISEMENTS, READERS—continued

WANTED: Woden UM1 mod. transformer, also 500-0-500v. 250 mA mains xformer with 240v. primary.—Burnham, G3UJK, 304 Desborough Avenue, High Wycombe, Bucks.

SALE: Complete station, comprising Heathkit DX-40U and VR-1U v.f.o. factory built; Green T.M.R-5 receiver, with DC PSU/speaker; Cannonball 160m. SSB Tx, with PSU; ATU for 80/160m.; Class-D Wavemeter, mains operated; complete with relay box for single-switch change over. All immaculate and in perfect condition. Price £85 the lot. Delivery free to 100 miles.—G3TQY, QTHR.

WANTED: Pye "Dolphin" or similar marine radiotelephone, in any condition. Also required Bendix loop aerial with azimuth control, and cabling.—Box No. 4401, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: A 52 Set, with PSU and headphones, in very good condition, £10 or offers?—Huggett, 2 Orchard Cottages, Brewer Street, Lamberhurst (482), Kent. (Ring after 5.0 p.m.)

SELLING: A KW-2000A, with AC/PSU, in brand-new condition, only 11 months old (reason—QSY to VE7). Price £190 or near offer?—Wood, 250 Worples Road, Staines, Middlesex.

FOR SALE: Transformer, primary 115v., secondary 1250-0-1250v., 32v. 1A., 6-3v. 0-25A., 5v. 5A., price £5; smoothing choke to suit, 20s. HRO dial, new, 20s. Lots of other components, valves, resistors, condensers, etc.; enquiries.—McCallum, GM3UCI, 1 Burnbrae Street, Faifley, Clydebank, Dunbartonshire.

SALE: Heathkit DX-100U transmitter, in mint condition and little used, accept £50.—Alloway, G3FKM, 10 Knightlow Road, Harborne, Birmingham, 17.

OFFERING: K.W. Valiant, for 10-160m. 10/60 watts, with PSU. AR88D, with S-meter, speaker and manual. SWR bridge, ATU, BM-3 microphone; all leads, relay or manual control. The lot for £70, or near offer? Will split. Buyer collects.—Reid, G3OUX, QTHR (or ring Crawley 23890, evenings, weekends).

WANTED: Correspondence course for the R.A.E., in good condition and not too old.—Tuckett, 72 Tindal Street, Balsall Heath, Birmingham, 12. (Tel. 021-440-4432.)

FOR SALE: Hallicrafters HT-37 Tx. coverage 10 to 80m. CW/DSB/SSB. 100 watts output, £95. Heathkit self-supporting tower, £20. Labgear Quad array, complete, £10. All carriage extra, or buyer collects.—Ring Braintree (Essex) 2051.

OFF to ZL! Selling National HRO-5T, perfect mechanically and electrically, £25 or offer? R.1155 Rx, £5 or offer? Amateur quality modified W.S.19, with mains PSU, £8 10s. or offer?—McKellar, G3VIZ, 18 Cheney Street, Pinner, Middlesex.

SALE: Heathkit RG-1 receiver, with factory calibration certificate and special internal aerial tuner, including 8"n. cabinet speaker, £30. Ex-Govt. 30ft. plus 14ft. portable aerial, in bag, 40s. Buyer collects or pays carriage. (Deceased SWL).—Mrs. A. E. Jenner, Netherns, Cricketfield Road, Horsham (5698), Sussex.

CLEARING SHACK: Receivers Eddystone (new, boxed). £27 10s. Collins ARR-15A, HA-350, HA-55, S-37, SX-62. R 278B Panadapter. BC-221AK, £12 10s. Oscilloscope TS-375A. Megger, AVO-8X. Valve Tester, Electronic frequency counter. Akai M8 recorder, FM tuner. VHF converter, Signal generator. Manuals.—Wright, 249 Sandy Lane, Hindley, Wigan (55948), Lancs.

WANTED: FT-241A crystals, Ch. 44 and 325. Will pay 10s. per crystal.—Carlin, G3AFP, 3 Bank Street, Somerton, Derby.

SALE: Phone transmitter for 80/160m., requires PSU. price £10. National HRO-MX. with PSU and seven coil packs, five BS. £15. **WANTED:** Pye Ranger, or similar.—Box No. 4404, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—continued

OFFERING: Labgear LG.50 Tx, 10-80m., AM/CW, table-topper, £25, or £20 to collect. What offers Hallcrafters S-86 receiver?—Payne, G3KCR, 2 Nevill Road, Crowborough, Sussex.

SALE: Teletype 14 teleprinter, commercially reconditioned, complete with 45 and 50 baud forks, price £15.—Vears, 15 Betley Court, Watton-on-Thames (29515), Surrey.

SALE: Marconi CR-150 double superhet Rx, coverage 2.0 to 60 mc, with PSU, £23. Demonstrations given. Call or phone after 6.0 p.m.—Fabricant, 5 Benschiffe Drive, Loughborough (5118), Leics.

WANTED: Morse tape auto-transmitter and keyboard perforator. Price and details.—Gold, 12 Hillside Avenue, Wembley, Middlesex.

FOR SALE: National HRO receiver, with coils and PSU, price £26 or near offer.—Baulch, 30 Lias Road, Street, Somerset.

SALE: All in excellent condition, Heathkit DX-100U, £50. KT-40 Tx, £20. Hartley 13 dB Oscillator, with probe, £16. Cossor Type 1059 Oscillator, with graticule and instruction book, £25. Class-D Wavemeter with calibration charts, £7. Wayne-Kerr Wavemeter with calibration charts to 300 mc, £12. Red'fon R.50 Rx, 16 kc to 32 mc, £20. AR88 receiver with S-meter and Q-multiplier, £35. (2) Mullard Crvstal Calibrator, 10-100 kc, 1 mc, £6. Geloso VFO with PSU, all built in, £9. Codar PR-30X preselector, £5. Codar AT-5 Tx, with PSU, £12. (2) Transistor walkie-talkies, new, cost £25, sell at £15. Various other items of equipment for disposal. Owner going abroad.—Hill, 19 Station Road, Tadcaster (2253), Yorkshire.

NICE QTH: Semi-detached house, three bedrooms, vitrolite tiled bathroom, some fitted carpets and (night storage) heating throughout. Garage and large garden with open aspect to rear. Also beam tower with drive motor, feeders and cabling, and a 30ft. mast. The VHF location of G3RND. Price £3,000.—Berden, 20 Mill Hill Avenue, Pontefract, Yorkshire.

FOR SALE: AR88D, £40. Type 53 Tx, £5. Solartron stabilised PSU, giving 0.500v. at 300 mA, 0.170v. neg., heaters 6.12 volts 10 amp, manual. £20. Command Rx, coverage 1.5 to 3.0 mc, £4. Vibrator-type DC/AC converter, 12v. DC to 230v. AC, £3. Rotary converter, 12v. DC to 250v./6v. DC, £3. All items open to offer.—Cragg, 115A Courtlands Drive, Watford Herts. (Call evenings.)

SALE: Codar AT-5 Tx, as new, with AC/PSU, £20. Jovstick aerial, with ATU, £5. Eagle RF-45 field-strength meter, £2. Data supplied. Please contribute to carriage/backing—or The Lot for £25, carriage paid.—Box No. 4407. Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

OFFERING: Shabby AR88D, no case, but in reasonable electrical and mechanical condition, £20. Labgear multi-wav coax aerial c/o unit, 30s. Labgear two-metre converter, functioning but suspect. 25s. Command Rx 3.0 to 6.0 mc. 60s.; junked ditto but with new 85 kc IF's, 15s. Carriage extra. Prefer buyer inspects and collects AR88.—Faulkner, 35 AbbeWav, Farnborough, Hants.

FOR SALE: Mains transformers, 1000-0-1000v. 200 mA, 40s.; 290-0-290v. 130 mA, 6.3v. 3A twice, 5v. 3A, 30s.; 200v. 20 mA, 6.3v. 1A, 5s.; 180v. 40 mA, 6.3v. 1.5A, 6s. Sideband filters, 50 kc, £4 each. HRO 6-volt PSU, 30s. Few 14in. TV chassis for spares—offers? New 813, 50s. New QV03-20A, with holder, 20s. Many other bargains, and all reasonable offers considered. Ring, write or call for details.—Holden, G3VEK, 239 Bingley Road, Shipley (58032), Yorkshire.

SELLING: Tiger TR-200 five-band Tx, 200 watts RF, 100 watts audio, excellent condition and performance, £50. Smaller Tx required, so would EXCHANGE for a good Panda Cub, with cash adjustment. Buyer collects.—G2BTY, QTHR. (Tel. Wokingham 2698.)

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PUBLICATIONS DEPARTMENT

SMALL ADVERTISEMENTS, READERS—continued

WANTED: A K.W. Vanguard 10 to 80m. Tx, in working order. **SALE:** R.107 Rx, coverage 1.2 to 17.5 mc, w/tn manual, £11. A wire-recorder by Utan Radio Products, requires attention, £7. A home-built 50-watt Tx for all bands 10 to 80m., not working, £5. PSU for this Tx, giving 650v., 250v., 150v. stab., 90v. neg. bias, 6.3v. for heaters, price £7 10s. Buyer collects.—Byrom, 54A Chapel Road, Tadworth (3252), Surrey (Ring evenings.)

WANTED: A KW-500 or KW-600 Linear Amplifier, also TW 2-120. **SELLING:** HRO-MX, with HRO/PSU, nine coils giving coverage 50 kc to 30 mc, including BS for 7, 14 and 28 mc, £21. BC-453 as Q5'er for 190-550 kc, £4. **Command medium-wave Rx, £3. R.1147B VHF Rx, 40s. TU5B, 30s.** All carriage extra.—Knight, G2FUU, Homefield, Nazeing (2274), Essex.

WANTED: Urgently, copy "Short Wave Magazine" for November 1964. **SALE:** Vidor 12in. TV Rx, new CRT and complete overhaul, suitable conversion for TV/DX, £5.—Hardstone, 43 Shrubbery Road, Streatham, London, S.W.16.

SELLING: Courier CTR-1 Transceiver, coverage 10 S to 160 metres, 200 watts p.e.p., mains PSU, with Shure ceramic microphone and spare valves; also Mosley two-element Tribander, price £180 or near offer (postage and insurance included).—Moore, ZB2AO, Sgt.'s Mess, R.A.F. Ballykelly, Limavady, Co. Derry, Northern Ireland.

FOR SALE: Galaxy three-band Transceiver, coverage 20-40-80m., 300 watts input to pair 6HF5's, three years since new, complete with 230v. AC/PSU and 24 hr. digital clock, price £85. Also a Swan 350 six-band transceiver, 11 months old, absolutely in mint condition, with 230v. AC/PSU and speaker, price £195. Powerful prop-pitch rotator, proof against a beam jam, with two 3 in. magslips, £10. Also Eddystone S.640, in reasonable condition, no S-meter or speaker, but complete with manual, £17. **OFFERS** invited for a Grundig TK-12 tape recorder, two-speed double-track, very little used and in mint condition. **WANTED:** The "Easibind" folders lettered for "Short Wave Magazine" and RSGB "Bulletin." Also Electronics components for G2DAF-type transmitter and receiver.—Lord, G3PHN, Newfield House, Moira, Burton-on-Trent, Staffs. (Tel. Swadlincote 7537.)

SALE: 19 Set, Rx 40-80-160m., modified with internal PSU and output stage to drive speaker, in good working order and complete with suitable ATU, price £5.—Goonan, Longridge, Storth, Milnthorpe, Westmorland.

OFFERING: Transistor Tester, Beulah Model D-909, 200-240v. AC, tests both p.n.p. and n.p.n. transistors in situ; checks AC and DC gains and leakage; also provides smoothed DC supply, continuously variable 0-25v. up to 25 mA, centre tapped. Size 5½ by 3 by 2¼ inches, complete with leads and in mint condition.—Watts, 62 Belmore Road, Norwich, Norfolk, NOR. 72.T.

SELLING: New Kokusai filter, £7. Also crystals, Dow coax relay, SWR bridge, balun, meters, relays and transformers.—Reynolds, G3IDW, Orchard Cottage, Hook, Swindon, Wilts.

HARD UP Student must sell, an HA-350, cost £80 nine months ago, price £55, in box with manual.—Senior, 26 Park Road, Barnet (4218), Herts.

SALE: KW-2000 with AC and 12v. PSU's, Shure press-to-talk microphone, with spares and manual, £165 or near offer.—Lordan, 9G1CC, 2 Poltisko Terrace, Penryn (3240), Cornwall.

SALE: Copies "Short Wave Magazine," also "73," "QST," RSGB "Bulletin," "CQ," "Practical Wireless," "Short Wave Listener" and "Short Wave News," all 9d. each, plus postage. "Wireless World," 4s. 6d. dozen, postage extra.—Andrews, 34 Rawcliffe Lane, Clifton, York (59035).

SMALL ADVERTISEMENTS, READERS—continued

GOING, in very good condition, a KW-77 receiver, for £80. ATR Inverter, input 110v. DC, output 115v. AC, 350 watts at 60 cycles, continuous rating, price £15. Brand new portable signal aerial, 30s. (Buyers to collect these items.) Also OFFERING a brand new Collins mechanical filter, F-455-H31, bargain at £11. In very good condition, HRO general coverage coils 3.5 to 7.3 mc and 14 to 30 mc, 27s. 6d. Transformer, primary 240v., secondaries 6.3v. 5 amp. centre tapped, twice, 6.3v. 5 amp., 10s.—Dolan, 15 Ringwood Road, Headington, Oxford. (Tel. 63000, evenings.)

WHEN Sending in your Small Advertisement, quote your callsign if you have one. It guarantees your identity and can make dealings easier and more certain. In Amateur Radio, your callsign is your passport.

WANTED: Hallicrafters SX-100, SX-140 or similar receiver, also R.A.E. and Morse courses. **SALE:** Hammarlund HQ-100A, in new condition, with matching speaker, price £50. Also Air-King receiver, all transistor, aircraft bands plus broadcast, new, £15. Veritone CR-150 Rx, new, £15.—Andrews, 34 Rawcliffe Lane, Clifton, York (59035).

WANTED: Any receiver requiring attention, condition absolutely immaterial, anything from an R.1155 upwards. Your price paid. Will arrange collection anywhere in the U.K. Price asked and full details.—Keith, 335 Eton Road, Ilford, Essex. (Tel. TREvelyan 8141).

WANTED: To buy or borrow, circuit or manual for the R.1475.—Wilkinson, 45 Emerson Avenue, Middlesbrough (86193), Yorkshire.

WANTED: Crystals, 5250 kc or near, for SSB exciter; also 16 µF 750v. condenser and 6146 valve.—Gray, G3VAJ, 300 Bowes Road, London, N.11.

FOR SALE: AR88D, in excellent condition, fitted with S-meter, price £45, buyer to collect.—Ridgley, 62 Elmfield, Gillingham, Kent.

OFFERING: A radio that tunes in the world—Zenith Royal 1000D all-transistor portable, nine wave-bands, fabulous appearance, performance and tone. Cost over £130, price £60 or near offer.—Box No. 4403, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Joystick de luxe, with tuner, never unpacked, price £6. Digital 24-hour clock, £10. R.C.A. TE-149 wavemeter, £5 10s. T.W. pi-choke, 15s. Factory-built SSB monitor scope, £8. Or W.H.Y.?—G3AAJ, QTHR. (Tel. 01-WAN-6741.)

WANTED: Receivers National NC-190, NC-183D, also Hallicrafters SX-100, SX-140, Hammarlund HQ-145, Eddystone 680X, S.750. Must be in new condition and reasonable. — Box No. 4402, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Eddystone 840C receiver, in mint condition, marvellous sensitivity, price £33 or offer. Will deliver at cost.—Bateman, 62 Coningsby Drive, Ferndale Estate, Kidderminster, Worcs.

GEAR For 70 Centimetres: ASB-8 receiver, 12-valve double conversion, for 70 cm., £6. Type G.44 Lecher-line modulated oscillator, coverage 60 to 120 centimetres, with calibration graph, £4. Postage extra.—Ollerhead, G8ALA, 36 Park Drive, Ellesmere Port (3854), Cheshire.

WANTED: Heathkit Model RA-1 receiver.—Ring Brown, G3PLJ, WORDSWORTH 4037.

SELLING: Top Band Command Rx, for 12v. mobile, with BFO, price £7 10s. Mobile whip for 1.8 mc, with fixing bracket, 20s. Type 247 PSU, giving 600v. 300 mA, 6.3v. 5A, 40s. Heater xformer, 10v. 5A, 5v. 10A. 20s. VHF radio, needs slight attention, 30s. All items carriage extra.—Smith, G3RB, 15 Malcolm Court, West Monkseaton, Whitley Bay, Northumberland.

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RECEIVERS PCR2. 6–22 mc/s., 200–550 and 900–2000 metres. Good working order, £7/10/–, carriage paid. Matching 12 volt vibrator supply, 20/–, carriage paid.

RECEIVERS R1475 (type 88). 2–20 mc/s. Large slow motion dial, etc. Power needed, 12 volts and 260 volts. Good working order, £8/10/–, carriage 12/6.

P.O. type 6ft. racks, £4, carriage paid. Meters 2" round ex-19 set 500 microamp scaled 0–15, 0–600 volts, 11/–, post paid. 2" Pyrex egg insulators, 6 for 10/–, post paid. New 19 set relays, 12 volts, 100 ohms, 4 make, 4 break contacts, 7/6, post paid. 70 feet 7 strand copper aerial on reel with bakelite insulators, 10/–, post 3/6. 19 or 22 set head and mike sets, 11/–, post paid.

ORIGINAL DRY BATTERIES for 38 and 18 Walkie-Talkie sets, recent manufacture, 7/6, post 4/6 any number.

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WHIP AERIALS. Eight 4ft. sections and heavy base. Will make up to 24ft. max., 35/–, carriage paid. Spring loaded wire centre type 17" closed, 10" 8" open, 13/6, post paid. 19 set Variometer aerial tuner, 16/–, post paid.

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AUDIO OSCILLATORS, BSR LOSOB, £8/10/–, carriage paid.

MARCONI VALVE VOLTMETERS No. 2, £4, carriage paid.

AVO ELECTRONIC TESTMETERS, fully overhauled, £25, carriage paid.

All equipment offered is complete but not tested unless otherwise stated. Carriage charges quoted are for England and Wales only. Telephone Worthing 9097.

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Contains 12 ft. of coil 18 s.w.g. Ersin Multicore Savbit Alloy. Quick and easy to use. 2/6 each



NEW SIZE 15
21 ft coil of 60/40 Alloy, 22 s.w.g. in a dispenser. Ideal for small components, transistors, diodes, etc. 3/- each



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Ideal for home constructors. Contains 102 ft. of 18 s.w.g. Ersin Multicore Savbit Alloy on a plastic reel. 15/- each (Also available in other sizes)



BIB MODEL 3 WIRE STRIPPER AND CUTTER
Strips insulation without nicking the wire cuts wire and splits plastic twin flex. 4/- each

From Electrical or Hardware shops. If unobtainable write to: **MULTICORE SOLDERS LTD., Hemel Hempstead, Herts.** M29 A

SMALL ADVERTISEMENTS, READERS—continued

EXCHANGE or Sell: Eddystone 840C, little used, new this year, £35, or would exchange for AR88D, AR88LF or similar.—Davenport, 735 High Street, Goldenhill, Stoke-on-Trent, Staffs.

BUILD That L. near! Two transformers, tapped primary 0-250v., secondaries, one giving 4560-3450-32.0v. CT at 400 mA, other 4500v. CT at 400 mA; also new 813. Offers?—Bateman, G3UUB, ring Windsor 61041.

CHRISTMAS PRESENTS? Clearance. AR88D's, re-aligned, working, £27 less case; with original case re-sprayed, £31 10s.; with brand new manufacture crackle case, £35. Elliott Syncroverter switches, model G1280, B7G base, 12s. 6d. VHF Rx 1132A, needs attention, £5. Two Marconi Video Osc. TF885, need attention, make one from two, £20 pair. Marconi xtal Calibrator, £7 10s. Cossor 339A 'Scope, working, £8. Cossor 1035 'Scope, working £20. Mulard 'Scope GM5152 65, needs attention, £5. Marconi Valve Voltmeter TF428B, £7 10s. Hewlett-Packard Signal Generator, TS535A/U 7-160 kc, £20. VHF Freq. Meter TS323/U/R 20-480 mc, less charts, £7 10s. GPO Dial Telephones, 15s. Pye VHF Reporter, master station with 13 slaves for cars, good condx., freq. range 100-185 mc, 6, 12, 24v., c/w car aerials, plugger, spares, test equipment, spare reel coax, £225 complete. Xta's 10X 500 kc, 7s. 6d.; 10XJ 4500 and 5000 kc, 10s. 6d. "Blue Steel" equipment, brand new, never unwrapped segments, c/w approx. 100 close-tolerance capacitors/resistors, valves, etc., selection 2s. 6d., 5s., 7s. 6d. All prices plus carriage.—G3LSD, Netherton Cottage, The Elms, Stoke Damerel, Plymouth.

SALE: "Radio Handbook" 16th Edn., new, 42s. "Amateur Radio Handbook" new, 17s. 6d. 100's monthly radio magazines, 1946-1966, 1s. each. AR88 manual, 15s. 12AU7's, 12AX7's, dozens, 3s. each. Transistors, BC211, new, 5s. each. 1mhf instrument cases, new, 40s. Levell transistorised oscillator, 150 c/s to 150 kc, £10. IFT's, 85 kc, ex-Q5'er, 7s. 6d. each.—Box No. 4405, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Four Johnson variable condensers, 500 μ F, with .08in. gap, in new condition. Write stating price.—Hodgson, 12 Spring Street, Brighouse, Yorkshire.

SALE: Eddystone 940 receiver, little used, as new, with speaker. Price £75, collected London area.—Box No. 4406, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Brand new unused National HRO-MX, S with nine GC coils, price £35. R.C.A. AR88D, as new, with trimming tools and manual, £45. Cathode ray monitor CRM-1, £9. G.P.O. Type 26B 80-0-80v. PSU, price £3 15s. Crystal Calibrator No. 10, with manual, £2 15s. BC-435A unmodified, as new, £5. RF-26B Unit, brand new, 35s. HRO coil for 180 to 430 kc, 10s.; AR88D manual, 25s.—Reynolds, 5 Headland Wav, Lingfield, Surrey.

SURPLUS Since Going Transceiver. Two-metre Tx, running 70w. AM or 90w. CW, £15. Converter for two metres, tuning 24-26 mc IF, £6 Lafayette HE-40 Rx, £22. Generating set, 12/24v. DC, 350-watt output, £18. Rotary converter, input 24v. DC, output 230v. AC, 50-cycle 250-watt (will run off the generating set), £10. Stuart-Turner P-E lighting set, output 230v AC 50-cycle, at 2,500 watts, mounted on trailer with waterproof covers, electric starting, in very good condition with suitable towing attachment, price £80. Some R.C.A. AR88LF's, used finish, but in very good electrical condition, re-calibrated and tested prior to despatch. £38, carriage extra.—Dodson, GW3PPD, 75 Queen Street, Pembroke Dock, Pembro. West Wales. (Tel. Pembroke 3232.)

WANTED: Codar AT-5 Tx, and an Oscilloscope. **SALE:** Eddystone EC-10 receiver, in as-new condition, price £35. Complete home-built Tx, 10 to 80m., 60 watts AM, £25. Command Rx, 1.5 to 3.0 mc, £3 10s.—Phillips, 56 Park Avenue, Skewen, Neath, Glam., South Wales.

FOR SALE: K.W. Vanguard Tx, 10 to 160m., £32 10s. K.W. Gelo 10 to 80m. converter, Ir 4.6 mc, self-contained RSU, £12 10s. Hallcrafters SX-28 receiver, £17 10s. or offer. Eagle RX-60 receiver, ideal for beginner, £12. Philips latest cassette-loading transistor tape recorder, Type BL-3301, £18.—Elliott, G3MFO, 17 Wedgton Road, Harrow Weald, Middlesex. (Ring UnDernill 3551 after 7.0 p.m.)

FOR SALE: Codar CR-70A receiver, in perfect condition.—Potter, 37 Wykeham Hill, Wembley, Middlesex.

EMIGRATING! Complete 10-160m. station and accessories for only £75, comprising K.W. Vanguard Tx, Lafayette HE-30 Rx (includes two-metre coverage), BC-221 with charts, BM-3 mic., stereo headphones, Morse key, and even the G5RV-type aerial. Also junk-box containing items such as BC-455, 850-0-850v. transformer, 10-watt mod. xformer; 807, 813 and many other valves; also meters and components. All included in price. Will only sell as one lot, complete.—Elliott, G3JXQ, 80 Northwood Avenue, Purley, Surrey. (Tel. UPLands 8749.)

SALE: AR88LF in good condition, bargain at £25. Can deliver to 50 miles.—Openshaw, 516 Walmerley Road, Bury (2385), Lancs.

WANTED: K.W. Vanguard Tx, in working condition. State price and details.—Forster, 12 Mitchell Road, Palmers Green, London, N.13. (Tel. EDWinton 1974.)

WANTED: Heathkit GDO; Hammarlund HQ-170A; Crystals for 6.25, 7.0, 8.0, 9.0, 11.5 and 11.75 mc, not surplus; also Heathkit OS-2 'Scope. **FOR SALE:** Eddystone S.640, with speaker and S-meter, in FB condition, price £18. Labgear Impedance Meter, 50s. AVO Type D meter, for spares, 30s. Labgear wide-band multiplier unit, £3. Labgear coil turret, 45s. Transistor car radio, latest type Newmatic, as new, £8 10s. G3FIF-type mobile whip for Top Band, £3 10s. Crvstal Calibrator No. 19, 50s. All carriage extra. Write onlv.—Eaton, 78A Stratford Road, Sparkbrook, Birmingham, 11.

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The Famous RHYTHM RECORDED COURSE cuts the practice time down to an absolute minimum.

One student, aged 20, took only 13 DAYS, and another, aged 69, took under a week to read 18 wpm. If you wish to read Morse easily and naturally please enclose 8d. in stamps or two international reply coupons for full explanatory leaflet to: G3HSC/IF.

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EXCLUSIVE OFFER

Radio Telephone, Type T.R.101 Mk. 2, Medium Power

These sets cover the range of 2-8 mcs. in two switched bands, using R/T and C.W. incorporating netting control, internal speaker and internal P.U. for 200/250v. A.C., A. 12 volt D.C. version available.

A meter is used for checking the set while in operation, using 13 valves (3 EL 32 in final transmitter output) transmitter automatically tunes to the same F.X. as receiver, which uses one R.F. and two I.F. stages, being extremely sensitive and selective.

Each set supplied fully tested, complete with mike, headset, spare valves, handbook, in carton, brand new. £17/10/-, carr. 30/-

(Manufacturing price alone cost around £100 each)

These sets have been made to stand up to the hardest of wear and working conditions.

T.R.101 Mk. 1, R/T M.C.W., C.W.

This set is practically identical to the above, but being an earlier version using: 11 valves (one large valve in final output instead of three). Main difference external power unit for 200/250v. A.C. or 12v. D.C., or 12 and 24v. D.C. also no internal speaker. Size of Mk. 1 and 2 approx. 18 x 8 x 12 inches, supplied complete with mike and headset, handbook, fully tested in carton, BRAND NEW. Set with mains P.U., £14/10/-, 12 and 24v. D.C., £12/10/-, 12v. D.C., £10/10/-, carriage all 30/-.

Please note this equipment has been exported fairly recently at extremely high cost and has only been offered at this very low price due to the introduction and full use of the transistor solid state system.

JOHN'S RADIO (Dept. F)

OLD CO-OP, WHITEHALL ROAD, DRIGLINGTON, BRADFORD



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VERTICALS**

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LC 80 8m. Loading Coil	£4. 0. 0

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Special offer of brand new KW2000A transceivers plus PSU's. Write now for full details of these superb sets being let go at a much less than normal price.

KW STOCK INCLUDES: *Adaptors, Airdux coils, Beams, Filters (Mechanical and Crystal), Microphones, Mobile Whips, Nuvistor Plugs, Pi-coils, Plugs, Relays, R.F. Chokes, Rotors, Signal Generators, Sockets, SWR indicators, Towers, V.F.O., etc., etc.*

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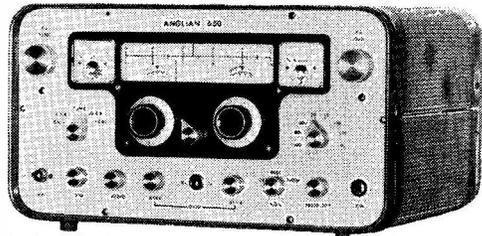
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THE ANGLIAN 650

This is not just another amateur transceiver but a complete station incorporating every conceivable "extra" and offering features that no other transceiver has, irrespective of price, supplied complete with microphone for £275.



Principal Feature

Offers complete split frequency operation on any 500 Kc/s. amateur band allowing full use of the following combinations:—

- (1) Normal transceive on the top scale position:
- (2) Normal transceive on the bottom scale position:
- (3) Normal transmit on the top scale and receive on bottom scale, with no limit on frequency differential.
- (4) Normal receive on the top scale and transmit on the bottom scale, with no limit on frequency differential.

This gives complete monitoring of transmit frequency in either of the split transmit/receive combinations.

Other Features

- (1) 650 watt P.E.P. input, 400 watt output on 160, 80, 40, 20, 350 watts on 15 and 280 watts on all the 10 metre sections, employing four TT21 in the output stage.
- (2) Covers:

1.5	—	2	Mcs.	21	—	21.5	Mc/s.
3.5	—	4	Mc/s.	28	—	28.5	Mc/s.
7	—	7.5	Mc/s.	29.5	—	29	Mc/s.
14	—	14.5	Mc/s.	29	—	29.5	Mc/s.
- (3) Full automatic gain control on transmit in the audio, IF, and peak level control of PA, all mixers balanced to ensure lowest intermodulation products.
- (4) No broad band couplers, all stages ganged tuned including the PA to provide maximum ease of operation and minimum spurious products.
- (5) Mechanical 2 Kc/s. filter for SSB.
- (6) Mechanical filter and a 1/2 lattice crystal filter for CW with a separate IF amplifier stage.
- (7) Upper and lower SSB selectable on all bands
- (8) Receiver employs 3 high Q Tunable coils in the RF stage on 160, 80 and 40 to provide an exceptionally high degree of freedom from cross modulation effects.
- (9) 1 1/2 watts of audio output into built-in loud speaker.
- (10) 100 Kc/s. crystal marker.
- (11) Transceiver in fully ventilated case 15" x 8" x 15" and PSU in a matching 8" x 8" x 15" case.

The Anglian 650 is not a new design but a logical development and combination of the Anglian 100 and 650L Linear amplifier which was first built in 1962.

OTHER PRODUCTS

- Anglian 20-2-2** : A two metre transverter at £83.
- Anglian 650L** : A linear amplifier for 80, 40, 20, 15 and 10 using four TT21 valves in AB₁ passive grid at 650 watts P.E.P. input, complete with PSU at £68.
- ANGLIAN 1000L** : A linear amplifier for 80, 40, 20, 15 and 10 using 4C x 250 in passive grid AB₁ at 1000 watts P.E.P. input, complete with PSU at £135.
- Anglian 200/80 and 20/M** : An inexpensive 20 and 80 metre mobile 200 watt P.E.P. SSB transceiver 4" x 15" x 12" due in May 1967 at £65.
- Anglian 500DL** : A 500 watt dummy load with watt meter at £6 12s.
- Anglian** : Case e.g. 15" x 8" x 15" wrap round type at £6 15s. 6d.
50 or 75 ohm SWR Indicator at £6 18s.
Monikey at £9 18s.
Speech Compressor at £6 10s.
Two-tone Oscillator at £5
Impedance Bridge at £6 plus postage 4s.

Components at very competitive prices : please ask for specific quote or lists.

Please send S.A.E. with enquiries and 4s. P. and P. for small items.



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AMERICAN HEATHKIT SSB EQUIPMENT

"The world's most advanced
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Prices quoted are Mail Order and include duty, carriage.



Transceiver HW-12



Receiver SB-300E



Transmitter, SB-401E

FILTER-TYPE SINGLE BAND SSB TRANSCEIVER, Models. For the 80, 40, or 20 metre bands. 200 W. P.E.P. input TX. 1 μ V sensitivity RX. Employs easy-to-build printed board techniques, with pre-aligned circuits. Power Req.: 800v. D.C. at 250 mA., 250v. D.C. at 100 mA., 125v. D.C. at 5 mA, 12v. A.C. or D.C. at 3-75A.

Models HW-12 (80m.) £62.10.0 Kit
HW-22 (40m.), HW-32 (20m.) £61.0.0 either Kit
GH12. Push Talk Microphone £3.10.0 Assembled

NEW! MONITOR 'SCOPE, Model SB-610. Displays wave-forms of transmitter output from 5 W. to 1 kW, up to 50 Mc/s. Can also be used to indicate P.E.P. Will monitor received signal (I.F. up to 6 Mc/s.). Built-in γ -tone generator. Power Req.: 110v. or 240v. A.C. £35.10.0 Kit

2 METRE TRANSCEIVER, HW-30. Input 5 watts c.c. Tunable regenerative Rx. Compact size. 12v. power supply available. £23.10.0 Kit

80-10m. TRANSCEIVER, Model SB-100. Send for full details. £181.0.0 Kit

Suitable A.C. Power Supply, Model H.P.23E. £22.0.0 Kit

AMATEUR BANDS 80-10m. RECEIVER, Model SB-300E. This de-luxe receiver offers unsurpassed value to the Radio Amateur. Of advanced concept, employing up-to-date design and construction techniques, its ultimate specification ensures un-paralleled performance. Full specification and details on request. Weight 22lb. Power Req.: 115/230v. A.C. 50/60 c/s. 50 watt. Size: 17 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ " x 13 $\frac{1}{2}$ ". £132.0.0 Kit (Less speaker)

AMATEUR TRANSMITTER, Model SB-401E. This transmitter is designed for "lock-in" facility with the SB-300E. A self-powered filter type Tx covering the "Amateur" bands, 80 to 10 m. with a P.E.P. of 180 watts. Weight 33lb. Power Req.: 115/230v. A.C. 50/60 c/s. Size: 14 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ " x 13 $\frac{1}{2}$ ". £170.0.0 Kit

LINEAR AMPLIFIER, Model SB-200. Covers 80-10m, 1200 W. P.E.P. input SSB—1000 W. C.W. Solid state power supply. 120 or 240v. A.C. £105.0.0 Kit

THE WORLD'S SMALLEST KILOWATT LINEAR. The Heathkit, Model HA-14. 80-10m. Provides 1000 W. P.E.P. input power. Size only 3 $\frac{1}{2}$ " x 12 $\frac{1}{2}$ " x 10" deep. Weight 9lb. Power supply available. £51.0.0 Kit

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AMATEUR BANDS RECEIVER, Model RA-1. Covers all amateur bands 10-160 metres. Half-lattice crystal filter at 1.6 Mc/s. I.F. Provision for fixed, portable or mobile uses. Switched USB and LSB for SSB. £39.6.6 Kit £52.10. Assembled

OPTIONAL EXTRAS. Crystal Calibrator CL-1 £4.12.0 Kit
Loudspeaker Cabinet SG-4 £1.9.6. Loudspeaker £1.4.5 incl. P.T

AMATEUR TRANSMITTER, Model DX-40U. From 80-10 m. Power input 75 W., CW., 60 W. peak, C.C. phone. Output 40 W. to aerial. £29.19.0 Kit £41.8.0 Assembled

AERIAL TOWER, Model HT-1. Strong steel construction. Height 32ft., self supporting. 3ft. x 3ft. at base.

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