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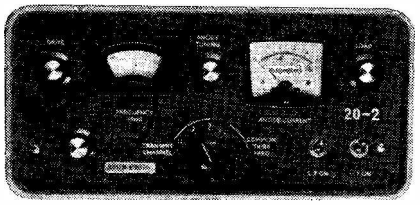
The SHORT WAVE Magazine

VOL. XXII JANUARY, 1965 NUMBER 11



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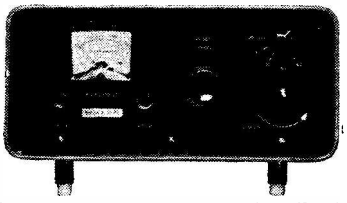

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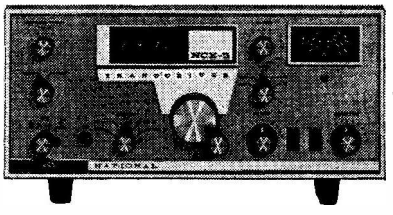

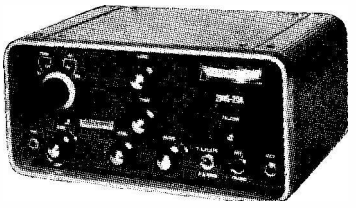

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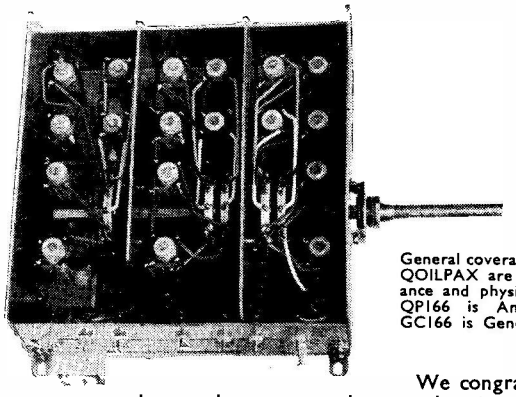

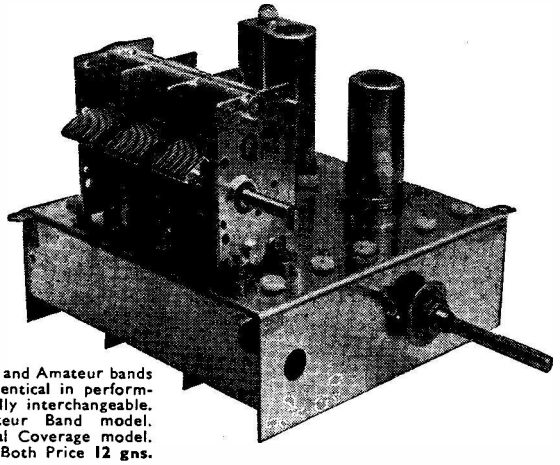

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SHORT WAVE MAGAZINE

(GB3SWM)

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CONTENTS

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AUTHORS' MSS

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E. & O.E.

FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT-WAVE Magazine

EDITORIAL

Wreckers *It seems hardly to have got about yet that the very important LF/MF Broadcasting Conference, convened by the I.T.U. at Geneva to produce an African version of the Copenhagen BC Plan (by which LF/MF broadcasting in Europe is governed) broke down after only four days. Called for October 12 and scheduled to last a month, with some 40 nations represented, the collapse of the Conference was due entirely to the political intransigence of the African group. Largely ignorant of the delicate balance of the system of international frequency allocation the representatives of the Emergent States, so called, of Black Africa chose to cut up rough on a purely political point which had nothing whatever to do with the terms of reference of the Conference.*

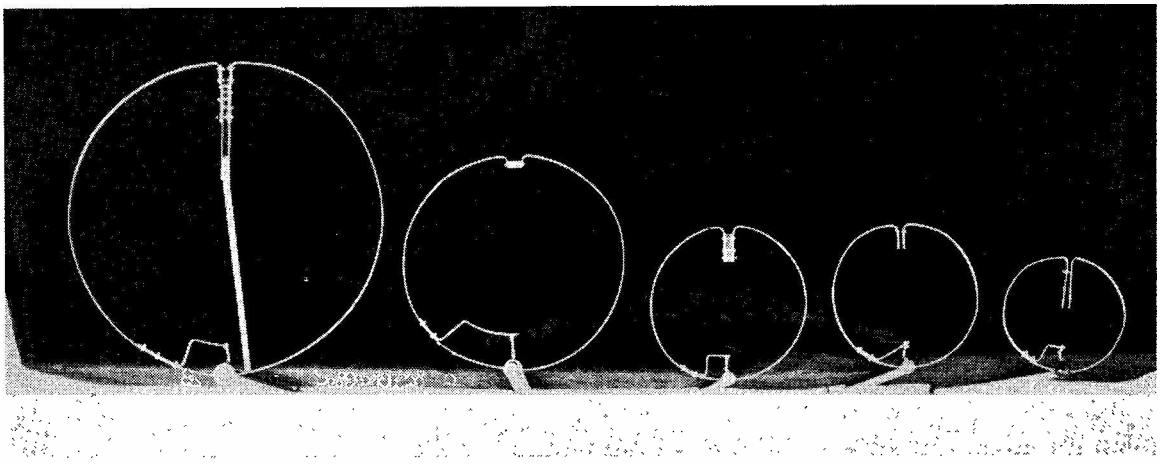
Most of these Emergents have little technical knowledge and only the poorest of resources—but what they have got is a determination to create every imaginable difficulty where European interests are concerned (though in this case the underlying idea was to help them solve an urgent practical problem).

They also have a vote, and there are 25 of them with votes. Though most have minute populations and the minimum of any skills, solemnly they are admitted to the United Nations—and through it to such bodies as the I.T.U.—and presented with their vote, which they proceed to use with total irresponsibility. Even the U.S.S.R., in her worst and most difficult period, always co-operated in I.T.U. matters.

The unfortunate fact is that this LF/MF Conference—now perforce abandoned—was only the first of several very important such meetings which it is intended shall take place during the next few years to settle the larger problems of the international allocation of frequencies and the governance of the radio spectrum and its users. No wonder the other countries involved view the whole situation with some apprehension.

Austin Forsyth, G6FO.

WORLD-WIDE COMMUNICATION



Mini-Halo aerials for mobile, as evolved by G4AC, ranging from 6 inches to 12 inches in diameter for two metres, and 18 inches for four metres. These aerials were designed and constructed for the tests discussed in his article.

MINI-HALO AERIALS FOR MOBILE

ON TWO AND FOUR METRES — DESIGN, CONSTRUCTION AND ADJUSTMENT

E. POSTANS (G4AC)

WHAT the writer considers to be a highly effective, inexpensive, easy-to-build (though perhaps a trifle tricky to adjust) lightweight aerial, producing an almost completely circular horizontally polarised pattern for 2-metre mobile operation (similarly four metres when appropriately scaled to that band) is described in this article. Because the majority of fixed stations (possibly /M, too) operate horizontal polarisation on VHF, that plane was chosen. After making up and testing a number of /M aerials, final choice for two metres fell to an 8-inch halo, for the reasons now discussed.

Types constructed and tried included 12-inch standard halo, handlebar, semi-swastika and turnstile types. All radiated reasonably well, but each produced a horizontal pattern containing *nulls* of varying severity, to which was largely attributed the well-known irritating, troublesome " whoof whoof whoof " type flutter (as distinct from local change screening effects) on signals received in and from a moving vehicle.

On the assumption that these highly undesirable shortcomings were mainly due to uneven distribution of current over the radiating section of the aerial, concentration was centred upon the halo, which readily lent itself to miniaturisation. Several were made up, including models having diameters of 12, 8½, 8 and 6 inches for 2 metres, and one of 18in. for 4 metres.

In each case resonance was achieved by means of a solid dielectric capacity loading section, with built-in trimmer, accommodated within the circular radiator (*see* photographs), its otherwise open ends being continued diametrically within its circumference, as shown. In this way current distribution over the shortened radiating length was made less uneven, reducing with decreasing diameter. But where would the optimum fall?

In the belief that no aerial can radiate better than *almost* equally in all directions without forfeit of some other quality, it seemed that a maximum average radiation intensity through 360 degrees, consistent with minimum null levels, might well become an acceptable guide to final choice for the diameter.

Subsequent testing of these aerials, fixed and mobile, over the 20 odd miles between G4AC, Woodbridge, and G3FIJ, Colchester, tended to support this view; the optimum diameter proving to be around 8 inches. The 6- and 12-inch types produced about equal carrier levels at the receiver, but, whereas the 12-inch displayed two relatively deep nulls, the 6-inch and 8-inch produced but one insignificant null. In every case the SWR was approximately 1·1 to 1.

Since the autumn of 1963, when these anti-flutter-*cum*-non-directional experiments commenced, very many /M-to-fixed station and *vice versa* tests have been conducted between G3FIJ and G4AC, to establish the facts.

No measurements have been made of signal strengths received /M *via* the Mini-Halo. In practice, however, its performance appeared at least comparable with its efficiency as a radiator. For example: Turning the aerial through 360 degrees produced no noticeable change in received signal level, and, under mobile conditions, flutter was almost invariably

non-existent. This was also the case on the receiving side.

Weather Effect

Therefore, what the writer had set out to accomplish seemed, in the main, to have been achieved. But there was one failing. In wet weather moisture across the capacity loading section caused an off-resonance condition and greatly impaired performance—reminiscent of 300-ohm ribbon feeder days!

However, this was eventually eradicated completely by modification of the loading section.

First, each of the two arms were re-made to symmetrically opposite shape contained within the circumference of the halo. The substantially increased length was not easily accommodated and, in spite of nigh perfect resonance and almost 1-to-1 SWR, the result was an adverse effect upon the aerial's hitherto non-directional horizontal pattern.

Further, whilst water mist sprayed on the loading section produced less deterioration than in the case of the solid dielectric type, the SWR was degraded to an unacceptable level. And so, with some progress in one direction, failing was suffered in another.

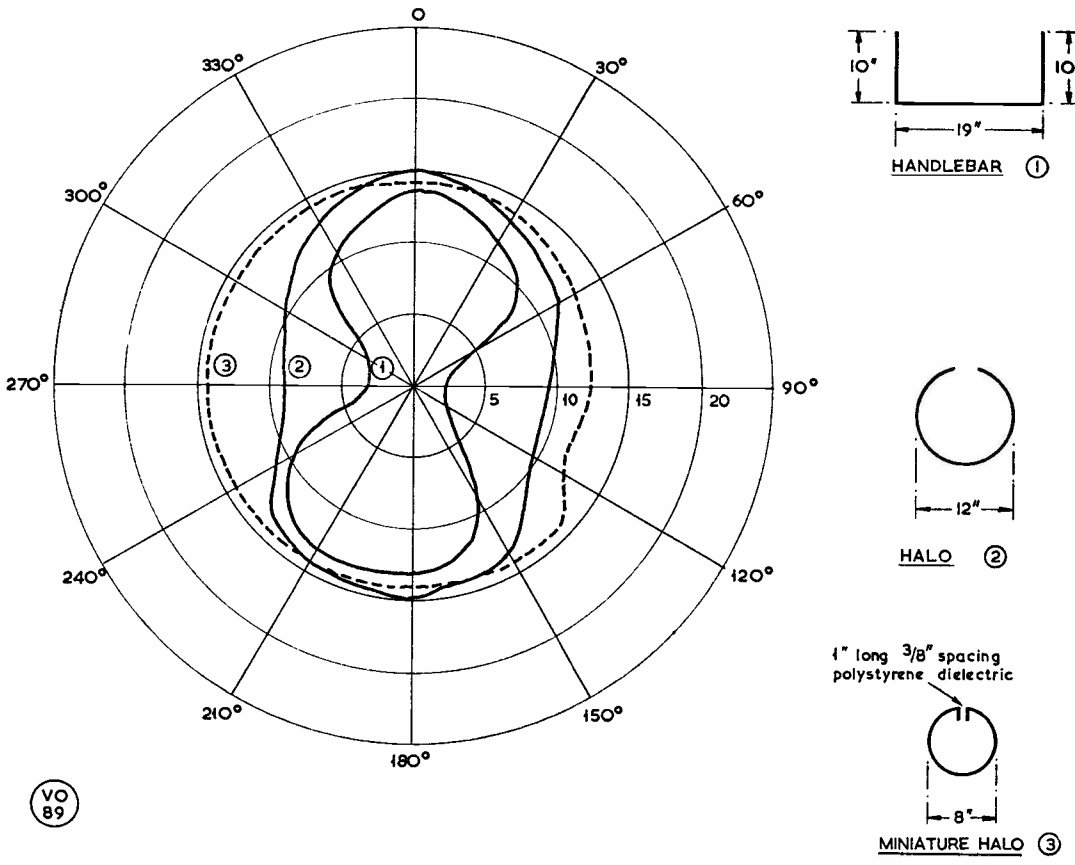
To meet this problem, a new 8-inch diameter radiator was made up with spacing between its loading section arms increased to $1\frac{1}{8}$ inches. To each arm was attached a 3-inch diameter capacity disc, capable of being moved along each arm to provide an easy method of resonating.

This time the moisture test showed no adverse effect on SWR, which remained at around 1·1 to 1. The next question was the all-round performance.

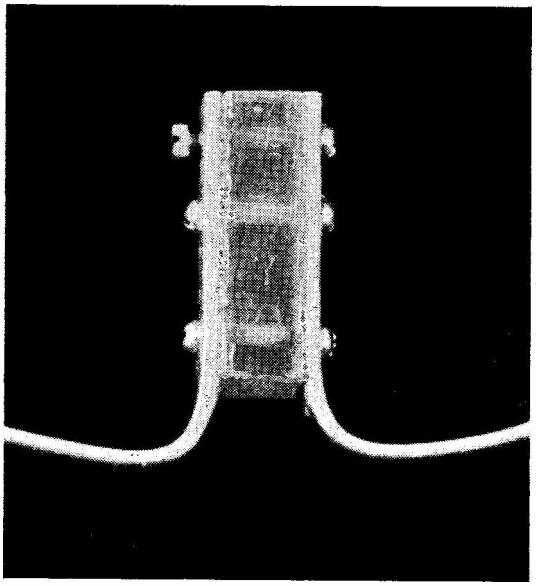
It was air-tested under mobile conditions between Woodbridge and Colchester, and at the same time and place the other halo types were re-tested. At the receiver of G3FIJ this disc-capacity type produced maximum carrier level and an omni-directional effect precisely similar to the results obtained with the best of all types so far tested.

Next, the 18-inch solid dielectric halo for 4 metres was made up and similarly tested, with the same highly satisfactory results.

Regularly for many months the 8-inch solid dielectric type has been operated by G3FIJ and G4AC, both using 6J6 PA Tx's and 6AK5 RF Rx's,



Radiation patterns for the three aerials discussed in his article by G4AC, showing the halo configuration appropriate to each pattern. These are for the two-metre halo's, at a frequency of 144.2 mc, with an SWR of 1.1 : 1 exhibited. The gamma matching feeds are 4in. long with a 4.7 $\mu\mu$F series condenser. G4AC claims much improved performance when using these shapes under mobile conditions.



Close-up of the solid-dielectric capacity loading section, actual size, on an 8-inch diameter Mini-Halo for two metres, as designed by G4AC.

with extremely satisfactory—and indeed, occasionally —extraordinarily good results.

G3LQR has also contributed with helpful reports from time to time. One QSO worthy of note was an absolutely solid cross-band duplex Phone contact, with G4AC/M on two metres and G3LQR on 4 metres over a range 26-28 miles, reducing to 18 miles or so at the QTH of G4AC, including passage through forest, riverside roads and narrow streets in built-up areas. The RF output at G4AC/M was approximately 1½ watts to aerial, the arrangement shown in the photographs.

Construction

The photographs should be self-explanatory. However, designs of this nature involve so many inherent variables, which are almost certain to differ aerial-to-aerial, that, in the writer's view, it is not possible to provide completely reliable measurements. For example: The radiator can be (and probably will be) 8 inches diameter *more or less*. Consequently, the loading section, which is generously accommodating, will be varied accordingly. G4AC's version is 1½ inches in length and G3FIJ's is one inch. Similarly, if the junk-box contains a couple of discs a bit less than 3 inches in diameter, by all means use them and adjust spacing accordingly.

Nevertheless, a few notes may be helpful. For easy reference the three main aerials are numbered: 1—Solid dielectric type for two metres; 2—Disc type for two metres; and 3—Solid dielectric type for four metres. These are given in the Appendix.

APPENDIX

Dimensions for 2-m. and 4-m. Mini-Halo

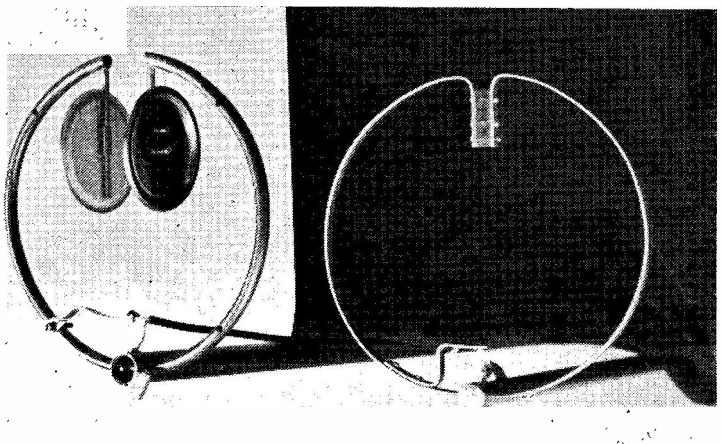
	(1)	(2)	(3)
Radiator diameter	8	8	18
Radiator material	⅜*	⅜	⅜*
Capacity-disc diameter	—	3	—
Total length, capacity-section arms	2	4	3¼
Capacity-section, dielectric length	1½	—	2**
Capacity-section, arm diam.	*	3/16	*
Gamma match, centre mast to radiator connection	1¼	3	2½
Feed point connection	1¼	1½	1¾

Notes: All dimensions in inches. Aerial (1) is for 2m., solid dielectric; (2) is for 2m. with disc resonator; (3) is for 4m. with solid dielectric. Where marked * use 3/8th inch flat dural curtain valance rail. ** this is continued out 5ins. to provide anchorage for stabilising bracket. Feed impedance in each case is 75 ohms.

Adjustment

Having made the solid-dielectric type loading section arms, say, a half inch longer than expected to be necessary, and a gamma match to radiator that can be easily varied, then with the feeder attached and an SWR indicator in circuit, gradually reduce the length of the loading section. As resonance is approached adjustment will become more critical and sensitive as SWR falls. Final adjustment and trimming of the loading section and gamma match will be found to be inter-dependent, and eventually a very low SWR can be secured. Once gained, resonance should be positive and easily maintained—except in wet weather, as already described.

Bringing the disc type to resonance is on the same lines.



Mini-Halo's of 8-inch diameter to the G4AC design showing solid and air dielectric capacity loading (left). These aerials are for two-metre mobile.

If provision can be made for one of the discs to be rotatable on a slightly off-centre single-bolt fixing, a useful trimmer results.

For anyone wishing for the quickest, simplest possible approach to this design—but not by any means the best—merely create the capacity section arms (flat dural) as already described, then drill and tap one arm as close as possible to the rim gap. Accurately opposite this hole drill another in the other arm of a size to accommodate an end plug from a BIC ball-point pen casing (!). Centrally through this drill a clearance hole (6BA). Insert a 6BA bolt, screw it into the opposite arm and thus one has a widely variable capacity loading section—which, once having been brought resonance, is very easily kept on the nose. But this arrangement will not tolerate more than a watt or two of RF input.

SEMICONDUCTOR CODING SYSTEMS

SORTING OUT THE NOMENCLATURE

J. B. DANCE, M.Sc.

THE various coding systems by which semiconductor devices have been identified are so numerous that even experienced designers sometimes meet difficulties. The American system uses the 1N coding (*e.g.* 1N34A) for diodes and the 2N (*e.g.* 2N709) for transistors, but a few American manufacturers adopt other coding systems for some of their transistors (*e.g.* the 2S701 of Texas Instruments). European (including British) manufacturers have been ringing changes on a number of different codings, but it appears that many manufacturers will be standardising on the coding system given here for their future products; this system is being adopted by Mullard and S.T.C. in this country and by such Continental manufacturers as Siemens & Halske of Germany, Telefunken of Germany and Philips of Holland. This will ensure that, for example, the Siemens & Halske type AF114 transistor will have this same coding in the Mullard range if an equivalent exists—as it does in this particular case.

Semiconductor types which are used mainly for domestic radio, television and tape recorder applications are identified by two letters followed by three digits in the new European coding. Industrial semiconductors are identified by three letters followed by two digits. In either case the first letter shows the type of semiconductor material employed, whilst the second letter indicates the basic function for which the device is intended. The remaining three digits, or one letter and two digits, are serial numbers which distinguish each device from others in the same group.

It should be remembered that those manufacturers who have adopted the new European Code will continue to make devices under the old coding systems whilst there is a demand for them. All their new devices will, however, be coded under the following system:

The Code

First Letter:—	**A**	Germanium Device
	B	Silicon Device
Second Letter:—	**A**	Diodes, including voltage sensitive capacitor diodes
	C	Audio frequency transistor
	D	Power transistor for audio frequencies
	E	Tunnel Diode
	F	High frequency transistor
	L	High frequency power transistor
	P	Photo-sensitive semi-conductor device
	R	PNPN Diode
	S	Transistor intended for switching applications
	T	Controlled rectifier
	U	Power transistor for switching applications
	Y	Rectifier
	Z	Zener diode

Primarily for Domestic use

Examples:—	**AC116**	Audio frequency germanium transistor
	AF101	High frequency germanium transistor
	AD130	Audio frequency germanium power transistor
	BA103	Silicon diode

Primarily for Industrial use

ACY24	Audio frequency germanium transistor
AUZ11	Audio frequency germanium power transistor for switching applications
BFY27	High frequency silicon transistor
BZY83	Silicon zener diode
BPY11	Silicon photodiode
BAY41	Silicon diode
BYZ10	Silicon rectifier diode

Editorial Note: An invaluable guide for the user of transistors and the designer of transistor equipment is the new AVO *International Transistor Data Manual*, a strongly-bound book of more than 200 pages which gives type, manufacturer, base connections, ratings and characteristics covering some 10,000 of the named varieties produced by nearly 100 different manufacturers in all parts of the world. *International Transistor Data Manual* is obtainable through the Publications Dept., from stock, and the book costs 36s. 3d. post free.

MOBILE RALLY DATES — 1965

Following are the dates, as at present notified, for the coming Mobile Rally season: Royal Naval A.R.S., at Petersfield, Hants., *May 30;* Hunstanton Rally, *June 20;* Cornish Radio Amateur Club, at Newquay, *July 25;* and Derby & District A.R.S., at Derby, *August 30.*

We can only publish fixtures notified direct to us, and this should be as soon as possible to avoid the unfortunate clashes of last season.

AN ALL-BAND SSB EXCITER

UNIT CONSTRUCTION— RELIABLE CIRCUITRY— STANDARD COMPONENTS— PROGRESSIVE DEVELOPMENT

Part I

C. BOWDEN (G3OCB)

This article by a well-known contributor will be of considerable interest, not only to all who build their own gear, but also to those who want to understand SSB circuitry. A high-power linear amplifier to go with this Exciter was described in the July '64 issue of "Short Wave Magazine," and a VHF-Transverter/PA for two metres in October, 1963. These two items could, of course, be used with almost any existing Sideband exciter. The article following now describes the author's own SSB generator and driver/PA, built in five separate units, and operated with the equipments already mentioned.
—Editor.

THE construction of this Sideband Exciter is based on the use of individual sub-chassis for the various sections of the unit, a practice which is much less common than the use of single chassis, and which is often ignored by constructors.

Although more expensive, there are many advantages to be obtained from unit type construction. A far more rigid assembly is possible and screening between various sections is much more effective, especially if feedthrough capacitors are used. Another useful feature is that various sub-units may be re-used in later designs. When the design of a particular unit proves unsatisfactory it can be very easily replaced without necessitating a complete rebuild or, what is probably worse, leaving what was originally a neat piece of equipment looking like wire netting.

Five main assemblies are used in the exciter:

(1) AF Amplifier and Carrier Oscillator/ Balanced Modulator.
(2) Filter and First Amplifier; First Conversion Mixer.
(3) Sideband Selection Oscillator, VFO, VFO Amp, Second Mixer and Amplifier.
(4) Final Conversion Oscillator, Mixer, Driver Amplifier and Power Amplifier.
(5) Vox and Control Circuits.

Although the Exciter described is fairly complex in order to produce good sideband with the minimum of spurious output, the less experienced constructor can obtain perfectly adequate results from a much simpler basic transmitter. The use of sub-assemblies permits the newcomer to gain much experience by building the "heart" of the SSB rig, *viz*, sub-assemblies 1 and 2 and obtaining efficient operation of these two fairly straight forward units before proceeding to sub-assemblies 3, 4 and 5.

Suggestions for the beginner: Build the filter with one half-lattice only to begin with, leaving room for the addition of a second one later. Instead of feeding a conversion input frequency of 1·6 or 2·525 mc into mixer V5, Fig. 2, a VFO covering about 50-100 kc at 4·2 mc (or a crystal oscillator in this range) may be substituted. IFT5 can be replaced by a single 3·7 mc tuned circuit and the output from V5 fed *via* a link winding to a simple 2-stage amplifier using say, an EF91 and 6CH6, which will permit a few watts of SSB to be produced. The remaining circuitry could then be substituted when the constructor feels he has gained enough experience.

Although testgear such as BC-221, Wobbulator and an Oscilloscope would make the task of alignment much simpler, these instruments are not absolutely essential. Provided a reasonable general-coverage receiver incorporating some form of S-meter is available the only other equipment needed will be a multi-range testmeter and a diode probe. The S-meter need not even be accurately calibrated as only a *relative* indication of output is required. Also some form of simple oscillator covering the filter frequency will be necessary.

The block diagram Fig. 1 shows the general operation of the circuit and the various frequencies used. There is, of course, considerable latitude in the choice of valves, crystals and other components. Where the latter have not been given a tolerance rating in the table of values there is considerable scope for variation, in some cases 100 per cent or more without materially affecting performance. Certain voltages and currents are more critical, however, and where these are important their values are given in a table.

Crystals for filter and carrier can be selected from any suitable frequency in the region of the normal IF range. Crystal XC8, Fig. 3, can be any frequency between about 1·5 and 1·8 mc and XC9 will then be higher by an amount equal to twice the carrier frequency.

The VFO range (Fig. 3) can be altered to suit the requirements of the constructor. As the coverage is reduced, tracking the various variable tuned circuits becomes simpler and it is also much easier to maintain drive over the whole range. Bandspread is also improved. By using a coverage of 500 to 750 kc, however, there are several advantages which will be described later.

A calibrated dial is not fitted, as at G3OCB this exciter is used in conjunction with a well-calibrated amateur-bands-only receiver and the Eddystone vernier dial used is quite satisfactory. The whole assembly is accommodated on a chassis 15¼in. wide by 12in. front-to-back, on which are assembled five sub-chassis units. (Layout diagrams will appear with Part II.)

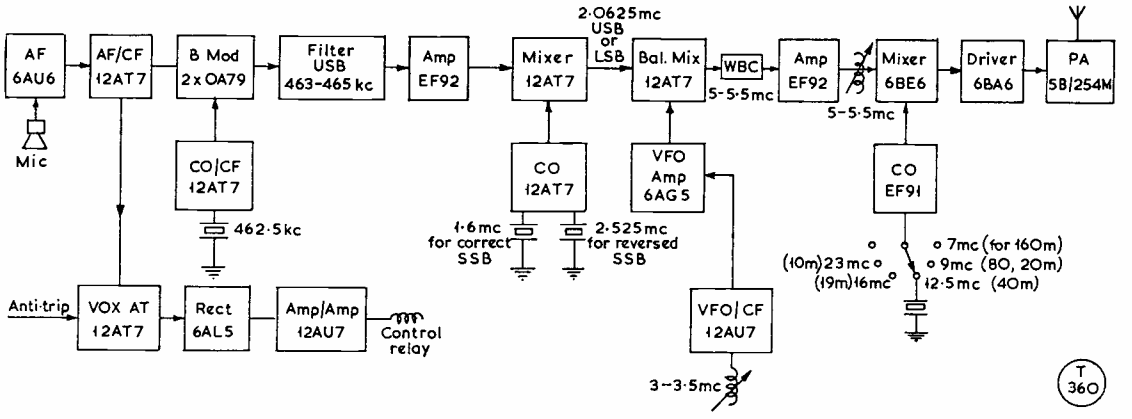


Fig. 1. Block diagram of the all-band Sideband Exciter described in the article by G3OCB. While it could be operated initially as a low-power SSB transmitter — the PA valve being a 5B/254M — it is intended as a driver for a 600-watt linear amplifier. On the constructional side, the arrangement breaks down into five separate units, made up as sub-assemblies for mounting on a single chassis. Details of the circuitry are shown in Figs. 2-4 herewith.

Individually, the circuits used are quite straightforward. All of the amplifying and mixing stages employ normal circuitry of the type found extensively in modern equipment.

Perhaps the only unusual feature in this circuit (Fig. 3) is the use of the amplifier V7 after the wideband coupler. There are two reasons for this: In the first place the whole performance of any exciter rests on its capability to produce adequate input to the last mixer over the whole range of the VFO coverage; many exciters do not provide adequate drive at this point. Since the gain after the latter is usually limited, in order to preserve stability, it is important to ensure that there is ample drive to the grid of the last mixer so that later stages will be able to drive the PA fully. The use of the amplifier V7 after the wideband coupler ensures that there is about 1v. peak SSB available from 4·75 to 5·5 mc (the coverage in the author's exciter), across the link winding on L1, Fig. 3.

The other reason for the use of the extra stage, and for tuning it, is that the wideband coupler is at best a compromise and may exhibit an appreciable response outside the passband, as well as passing anything spurious that may fall within the passband. Provision of the single fairly high-Q tuned stage after the coupler results in good rejection of unwanted signals.

Since mixer V6 is balanced (for reasons explained later) the use of a wideband coupler in its anode circuit is more or less unavoidable since a single tuned circuit cannot easily be used here without resorting to the use of an unbalanced mixer.

The balanced modulator, Fig. 2, is quite simple to construct, but the leads should all be kept short, and the layout should be as symmetrical as possible in order to balance the stray capacities. Even so it may be necessary to include C100 from one side or other of R33 to earth—*see* Fig. 2—the value being anything from zero to 50 $\mu\mu$F or even more.

The carrier oscillator V8 in Fig. 2 may not be easy to get going with some crystals. If this is so the capacitors C97 and C98 may be altered in value until the circuit oscillates readily.

The construction of IFT7 is shown in Fig. 6. The coil was removed from an old 465 kc IFT and the threads were reamed out until the coil slid easily on to a Neosid former. The original condenser which resonated the coil is used in the position C34 (Fig. 3). The secondary consists of 50 turns, 25 being wound either side of the coil and tightly coupled to it.

The construction of the wideband coupler is shown in Fig. 7. The formers used are again taken from old IFT formers and reamed to slide on the Neosid former, which allows the coupling between the coils to be varied.

The Filter

Articles describing the construction and alignment of filters are often made to appear very complicated. Filters are not difficult to make and align although the beginner may be well advised to start with a single half-lattice version to avoid the complications which may arise with double-filters. Room can be left for the addition of another section after some experience has been gained.

In the opinion of the author it is unnecessary and indeed inadvisable to try to alter the frequency of the very delicate FT241 surplus crystals by plating, etching or edge grinding. When a single-section filter is to be built there is no need to shift crystals around. In the case of a two-section filter it can be avoided by buying a number of each of the required frequencies and selecting suitable pairs by experiment or, if available, by using a BC-221. Most amateurs number among their acquaintances one who is the proud possessor of a BC-221 or similar instrument and who would be pleased to assist in matching the crystals.

Even if it is not possible to match accurately the constructor should not despair. Experiments with a Wobbulator and 'Scope on some double half-lattice filters revealed that it was possible to obtain quite a

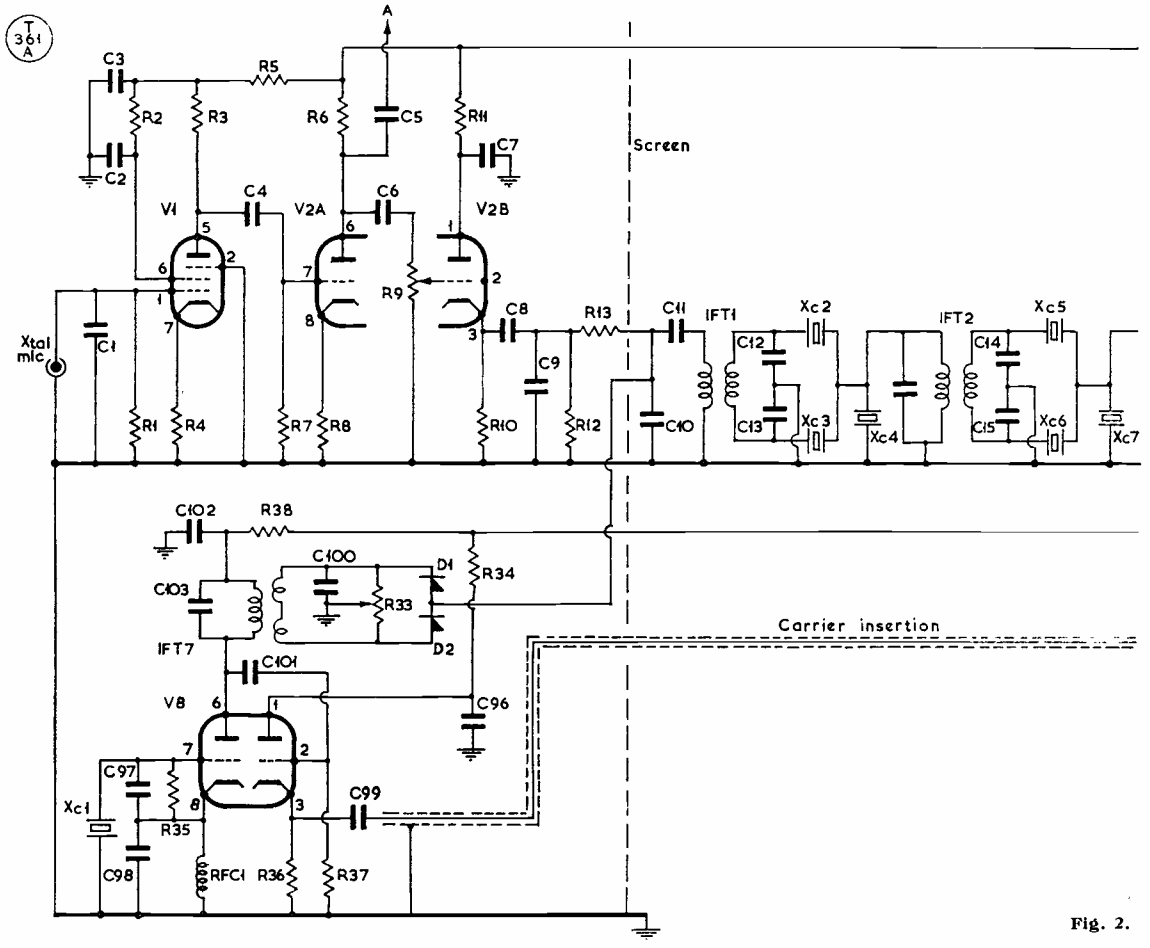


Fig. 2.

reasonable selectivity curve even if some of the crystals were as much as 150 cycles separated in frequency. The side-responses were slightly inferior and occasionally very narrow slots appeared in the passband, but on a listening test results were usually quite satisfactory. If it is found impossible to construct a satisfactory double half-lattice filter the constructor can still resort to a single half-lattice with acceptable results.

A double half-lattice filter should result in a sideband suppression of about 55 dB without difficulty, while with a single half-lattice the figure will be about 35 dB. The carrier rejection crystals XC1, XC4, XC7, can be omitted but their inclusion will greatly improve the performance as the remaining carrier will be much attenuated and the passband will be a great deal steeper on the carrier side, resulting in improved transmission of the middle frequencies of the audio register (250 to 300 c/s approx.).

Commercial crystals can be obtained which should enable the filters to be built with more predictable results, or a mechanical filter can be considered as an alternative. Either of these will, however, result in much greater expenditure as something like 18 to 20 surplus crystals can be obtained at half the price of commercial crystals or a mechanical filter.

High Q transformers should *not* be used in the filter. The types recommended are excellent for this application. Whatever type is used the fixed tuning capacity should not exceed about 100 $\mu\mu$F or difficulty may be experienced in obtaining a good passband shape due to the mismatch of impedances. The IF transformers IFT1 and IFT2 (*see* Fig. 2) feeding into the filters are modified slightly, the internal 65 $\mu\mu$F capacitors being removed from the secondary side and being replaced by two 120 $\mu\mu$F capacitors in series which are mounted externally. In addition the primary capacitance of IFT1 is removed and replaced by 65 $\mu\mu$F and ·001μF condensers connected in series, again both being mounted externally. This allows the low impedance balanced modulator to be effectively matched into the filter.

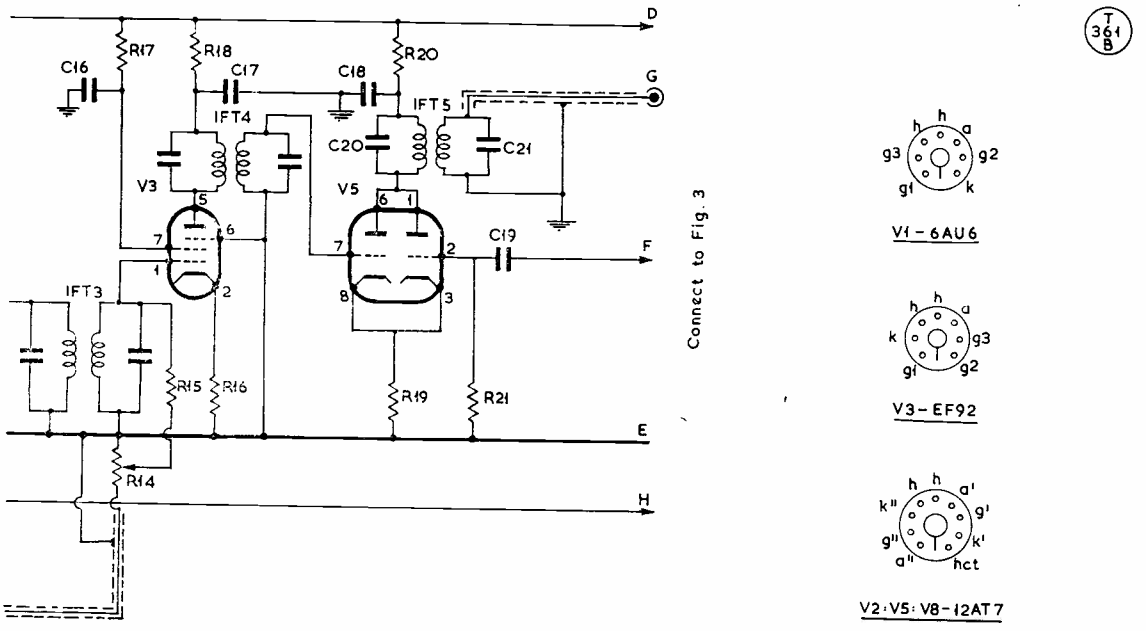


Fig. 2. The audio, carrier and filter section in the Sideband Exciter by G3OCB. This is fully discussed in the text, and the crystal frequencies to use are given in the table on p. 660. With full filtering, a very high degree of carrier suppression can be obtained.

Carrier Re-Insertion

In order to tune up the exciter it is necessary to be able to introduce a constant signal at will. This can be easily done by by-passing the filter and balanced modulator with a certain amount of carrier. RF from the carrier oscillator is fed to the second half of V8, a cathode follower; from there it is passed to R14, the carrier insertion control (Fig. 2). When this is advanced, carrier energy is fed directly to the grid of V3. Inserted carrier is also necessary for CW transmission and for amplitude modulation (carrier and one sideband only).

After amplification by V3 the upper sideband signal is passed to mixer V5 where it is converted to a new frequency at about 2 mc, the output of the latter being either upper or lower sideband depending on the frequency of the input from V9.

The various RF circuits of the individual sub-chassis are coupled together by short lengths of coaxial cable and the standard TV type plugs and sockets, the latter being indicated by Sk 1 to Sk 4.

The two transformers IFT5 (Fig. 2) and IFT6 (Fig. 3) are modified so that they resonate at around 2·06 mc, by removing the original 100 $\mu\mu$F capacitors and replacing these by condensers having values of about 50 $\mu\mu$F (two 100 $\mu\mu$F in series in the case of IFT6 secondary).

VFO and Amplifier

The VFO circuit used has been found to be very stable in operation, even without negative temperature coefficient capacitors, although use of the appropriate degree of compensation would remove most of the remaining drift. The output from the VFO is low, however, as stability has been given priority, so it is necessary to amplify the VFO output in order to assure adequate conversion gain in V6.

Crystal Oscillators V9, V15

Both oscillators are straight-forward and easy to get going. Only one coil is used in the case of V15, Fig. 4, this being tuned to the appropriate crystal harmonic by C59 to C64. This results in a reduction of coil Q on lower frequency bands, but since lower order harmonics are used on these bands, there should be ample output. The tuning condenser is set to a point at, or just off resonance, at which the required mixer injection is obtained. If injection is insufficient on any particular band, then a coil and capacitor having a better L-C ratio can be switched in on that band, but this will require an additional switch wafer.

Mixing Circuits and Distortion

It will be noticed that the two mixers V5 (Fig. 2) and V16 (Fig. 4) use different valves and circuit. There is very little practical difference in either circuit and the choice of each was governed by the valves available at the time the exciter was built. Both are very low distortion types but the gain is rather low and in the case of V5, there may be some damping of IFT5 by the low Ra of the triode mixer.

Mixer V6 (Fig. 3) employs a completely different type of circuit. Since the heterodyne input to the

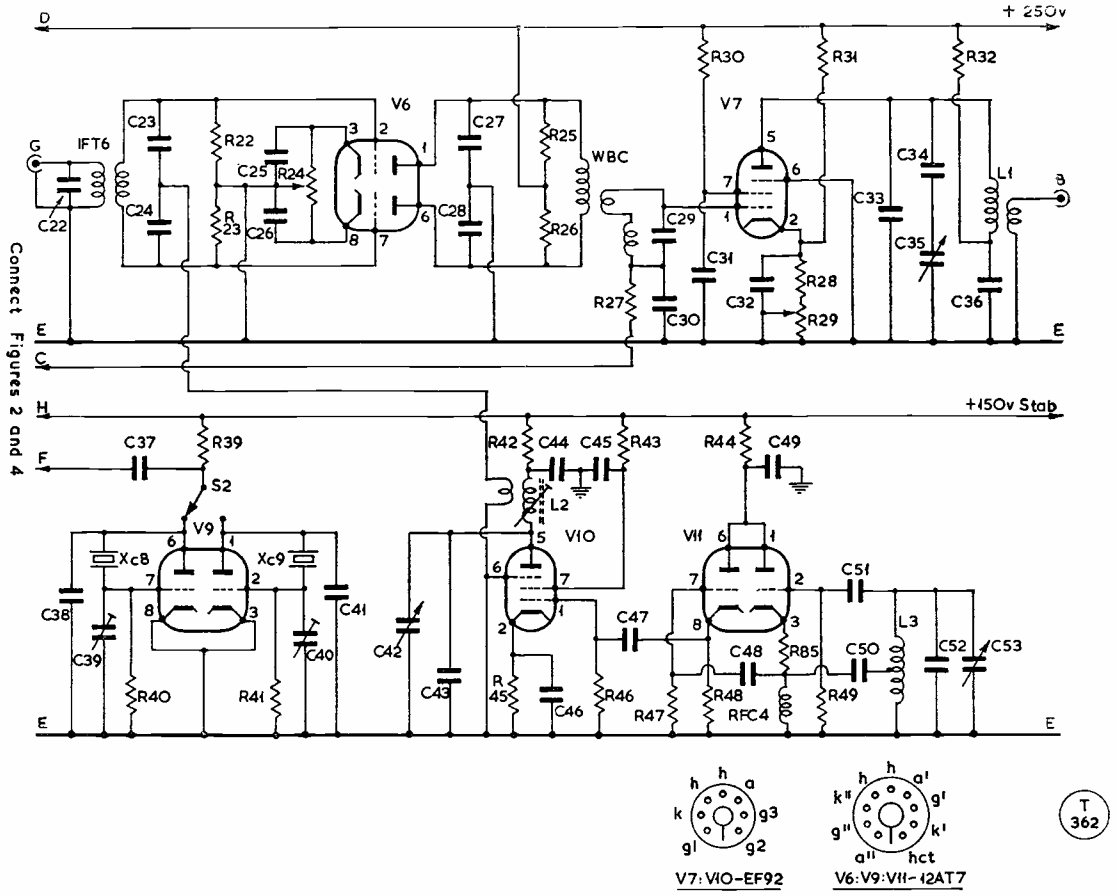


Fig. 3. Circuitry for the VFO and Sideband selection in the G3OCB SSB Exciter. The latter operation is performed by S2, in the plate of V9, and values for the appropriate crystals are given in the table. V11 is the VFO, and V10 its amplifier stage, since the output from V11 is kept very low in the interests of stability. Further details are given in the text, and it will be noted from the lettering how Fig. 2 connects to the next section and how Fig. 3 feeds into Fig. 4.

valve is a variable frequency, there is greater chance of any signal that leaks through to the following stages causing spurious responses and by employing a balanced mixer, the VFO signal is reduced by some 20 dB or more in the anode circuit. The balanced mixer also provides more gain than either of the other two circuit configurations.

The use of the two transformers IFT5, IFT6 connected back-to-back provides enough selectivity for adequate rejection of the crystal controlled input from V9 without having to make V5 a balanced mixer, which would have introduced problems with regard to the transference of the signal from V5 to V6 *via* a pair of long balanced leads.

Mixer V16 (Fig. 4) is unbalanced but in practice it has been found that there is again more than enough rejection of unwanted frequencies due to the overall selectivity of the various cascaded tuned circuits (V17 grid, V17 anode, V18 anode). The input to V16 from V7 is quite free from spurious signals and the heterodyne input from V15 is about 5 mc away from the output frequency. If the crystal frequencies indicated are chosen, no crystal harmonic should fall closer than 2 mc (weak fourth harmonic when on 10 metres) and little trouble should be experienced due to radiation of one of these harmonics.

The level of all spurious signals can be kept down by ensuring that the heterodyning input to each mixer is at the correct level. Too much input can cause a drop in conversion gain and a considerable increase in the generation of harmonics. In a similar way excessive SSB input to an amplifier or mixer can result in severe distortion and generation of spurious signals both in adjacent channels and on harmonic frequencies. The ratio between the heterodyne and signal voltages fed to a mixer stage should always be at least four or five to one if distortion is not to be introduced. Similarly the audio input to the balanced modulator should not

exceed about 25 per cent of the carrier input. It is for this reason that the AF gain control is mounted inside the exciter. Once set it should not be touched.

A table is given later showing the approximate voltages which may be expected at various points in the circuit, as measured on the diode probe shown in Fig. 8 (Part II). In the same table a number of maximum permissible voltages are quoted and these figures should not be exceeded.

When a tone of about average speech level is sounded into the microphone with the drive control advanced, then about one volt should be indicated on the diode probe if the latter is connected across R76 (Fig. 4). If this figure is not obtained then it is useless to try to increase drive to the PA by increasing the gain of the exciter in any stage *before* V16 grid. To do so will not improve the drive level to any material extent. Any apparent increase in drive will be accompanied by an increase in harmonic and intermodulation distortion. The only solution here would be to increase the gain at a later stage in the circuit.

Examination of the circuit will show that some of the amplifier stages are operating without cathode decoupling since there is ample drive into the grid of V16 without this. Due to the differences in gain which may arise in individual cases, however (due to differing filter loss, etc.) it may be found that the drive at this point is insufficient in which case the gain can be increased by introducing cathode decoupling, or in extreme cases by employing a higher slope valve in the position of V3 or V7.

If the general design suggested here is followed there should be little difficulty in obtaining ample input to V16. It is usually the gain after the final mixer which is insufficient and it is often difficult to employ a high-slope driver valve due to the circuit becoming unstable. Should this be decided on it may be necessary to neutralise the driver. Suitable alternative valves which may be used as drivers include the EF91, 6CH6 or E180F.

The PA Stage

A 5B254M is used in the exciter, V18 in Fig. 4, and it provides ample drive for a linear running a pair of TT21's in passive grid. Some constructors may have other valves available or may wish to use the exciter as a self-contained transmitter capable of about 100 to 200 watts p.e.p. input. This may be done quite simply although it may be necessary to enlarge the final chassis and PA compartment. Suitable valves include the 6146, TT21, 4X150A (needs blowing) and the QQV06-40A. Although the 6BA6 employed in this exciter should be capable of driving these valves in Class-AB1, to avoid running the driver flat out it may be advisable to substitute a valve capable of slightly more output to drive any of the larger PA valves.

The QQV06-40 is especially suitable as it is capable of being run at 200 watts p.e.p. and yet it is not as large as a TT21. It would, of course, be

Table of Values

Figs. 2, 3 and 4. Circuitry of the G3OCB SSB Exciter

C4, C5, C6, C16, C17, C18, C25, C26, C31, C32, C36, C44, C45, C46, C49, C54, C55, C65, C69, C71, C72, C80, C81, C85, C102, C105	=	.01 μF tub. ceramic
C1, C38, C41	=	30 μμF
C2	=	0.1 μF
C3, C106	=	8 μF, elect.
C7, C57	=	0.5 μF
C8	=	0.25 μF
C9, C10, C50, C84	=	.001 μF
C11, C27, C28, C34	=	65 μμF, 1%, silver mica
C12, C13, C14, C15	=	120 μμF, 1%, silver mica
C20, C21, C22	=	50 μμF, 1%, silver mica
C23, C24	=	100 μμF, 1%, silver mica
C29	=	33 μμF, 2%, silver mica
C33, C43, C52	=	500 μμF, 1%, silver mica
C19, C37, C48	=	10 μμF, silver mica
C30	=	.005 μF
C35, C42, C53	=	300 μμF 3-gang var.
C39, C40	=	3-30 μμF Philips trimmer
C47	=	200 μμF silver mica
C51	=	15 μμF silver mica
C56	=	16 μF, elect.
C58	=	.02 μF
C86	=	.005 μF, 2.5 kV
C66, C79	=	100 μμF, silver mica
C67	=	25 μμF, silver mica
C68	=	220 μμF, silver mica
C82	=	300 μμF, silver mica
C70	=	500 μμF, feed-through
C83	=	50 μμF, var.
C87A, C87B	=	30 + 30 μμF (*see text*)
C104A, C104B	=	300 + 300 μμF (*see text*)
Cn	=	Neut.capacity (*see text*)
R1, R15	=	1 megohm
R3, R6, R34, R35, R37, R40, R41, R46, R72, R88	=	100,000 ohms
R2, R7, R9, R55, R61, R64	=	470,000 ohms
R4, R19, R36	=	1,500 ohms
R5, R17, R56, R67, R69, R72	=	47,000 ohms
R8, R20, R66, R71, R73	=	2,200 ohms
R10, R12, R13, R32, R65, R76, R86	=	1,000 ohms
R11, R48, R54, R70, R81	=	10,000 ohms
R31	=	10,000 ohms, w/wound
R16, R45, R85	=	220 ohms
R18, R43, R44, R68	=	4,700 ohms
R21, R47, R52, R53, R59, R60	=	220,000 ohms
R22, R23	=	220,000 ohms 5%
R25, R26	=	22,000 ohms 5%
R30, R74, R78, R80	=	22,000 ohms
R27, R39	=	68,000 ohms
R28, R79	=	100 ohms
R38	=	27,000 ohms
R42	=	6,800 ohms
R87	=	12,000 ohms w/wound
R49	=	18,000 ohms
R57, R58	=	3,300 ohms
R75	=	56 ohms
R84	=	16,000 ohms, w/wound
R82	=	180,000 ohms
R62	=	10 megohms
R14	=	1 megohm pot.
R24	=	10K pot.
R29	=	5K pot.
R33	=	1K pot.
R50, R51	=	500K pot.
R63	=	25K pot.
R83	=	30K pot., w/wound,
S1	=	SP 4-w, 4-bank Control
S2	=	SPDT, Sideband select
S3	=	SP 6-w, 4-bank, Band select
S4	=	SP 4-w, Coarse load
D1, D2	=	Matched OA79, 1 mA
M1, M2	=	100 or 200 mA
IFT1-IFT4	=	*Denco* IFT 11/465
IFT5, IFT6	=	*Denco* IFT 11/1.6
IFT7	=	*See text*
WBC	=	*See text*
RFC1-RFC4	=	Small Rx type
RFC5	=	Pi-network type
RL1	=	10,000 ohm, DPCO
V1	=	6AU6
V2, V5, V6, V8, V9, V11, V12, V14	=	12AT7
V3, V7, V10	=	EF92
V4	=	Min. Neon
V13	=	6AL5
V15	=	EF91
V17	=	6BA6
V16	=	6BE6
V18	=	5B254M (*see text*)
V19, V20	=	OA2, VR150/30

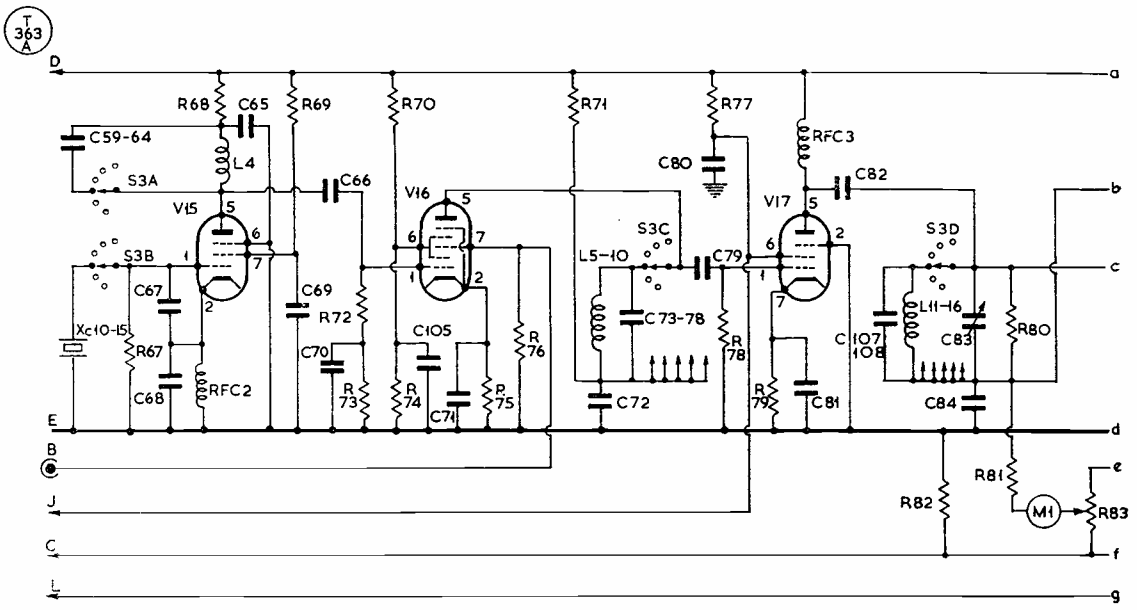


Fig. 4.

run with both sections in parallel to avoid the complications of bandswitched push-pull circuitry. Alternatively, a very low powered output stage could be incorporated employing a 6CH6 or similar type and providing enough output comfortably to drive any Class-AB1 linear stage employing a tuned input. (These remarks applying to PA stages in this equipment refer to Class-AB1 operation only and may not hold good for other modes of operation.)

Provided that suitably rated components are used the PA voltage can be as high as 1,000v. with any of the valves mentioned and in some cases it can be considerably more. The TT21 and 4X150 can be quite safely run at voltages up to 1,800v. or so. It would be advisable, however, to build a separate PA if it is intended to run more than about 1,000 volts or 100 watts p.e.p. otherwise the limited space will introduce problems in regard to tank efficiency, heating and component ratings.

It is also essential that the screen voltage be stabilised, or power output will be reduced and distortion may occur; 250 to 300 volts is quite a satisfactory figure for all of the PA valves suggested, except the 6146 which requires only about 200 volts.

Plug-in coils are used for a variety of reasons. One advantage is that less space is required as there is no separate 10/15 metre coil, as with a switched *pi*-network and stray capacities can be kept considerably lower. Leads can also usually be made much shorter as the switch is no longer needed in order to select the tappings—the coil base can be mounted so as to minimise lead lengths. It is also much easier to obtain the optimum L/C ratio and due to the fact that there are no shorted turns the tank efficiency is considerably improved.

CRYSTAL SELECTION TABLE

XC1, XC4, XC7, 462.5 kc (Channel 333)
XC2, XC5, 462.9 kc (Channel 50)
XC3, XC6, 465.3 kc (Channel 335)
} Or any similarly related selection of surplus or commercial crystals.

XC8, 1.6 mc approx.

XC9, XC8+(2 × freq. XC1).

XC10-XC14

Crystal frequency	7.666	8.0	9.0	6.25 or 12.5	7 mc.
V15 anode frequency	23.0	16.0	9.0	12.5	7 mc.
Tuning cap, C59–64, approx. values	15$\mu\mu$F	30$\mu\mu$F	100$\mu\mu$F	50$\mu\mu$F	160$\mu\mu$F

especially on the higher frequencies. Another advantage is that spare pins on the coil may be arranged to select extra fixed or variable capacitor sections automatically, depending on the band in use. (An application of this idea was shown in the circuit on p.269 of the July, 1964, issue of SHORT WAVE MAGAZINE.) This results in good bandspread on all bands and helps to reduce stray capacities on the higher frequency bands, again improving tank efficiency due to the better L/C ratio. The PA tuning condenser is a split stator 30 + 30 $\mu\mu$F of which only one half is used on 10, 15 and 20 metres. On 40m. both sections are used in parallel, while on 80 and 160 metres extra fixed capacitors (C88-C90 in Fig. 4) are selected. Similarly, the loading condenser is a two-gang 300 $\mu\mu$F variable, and extra capacity (C91-C94) can be selected in parallel by S4. There is no reason, however, why a normal switched *pi*-network should not be used if so desired provided that the foregoing points are borne in mind.

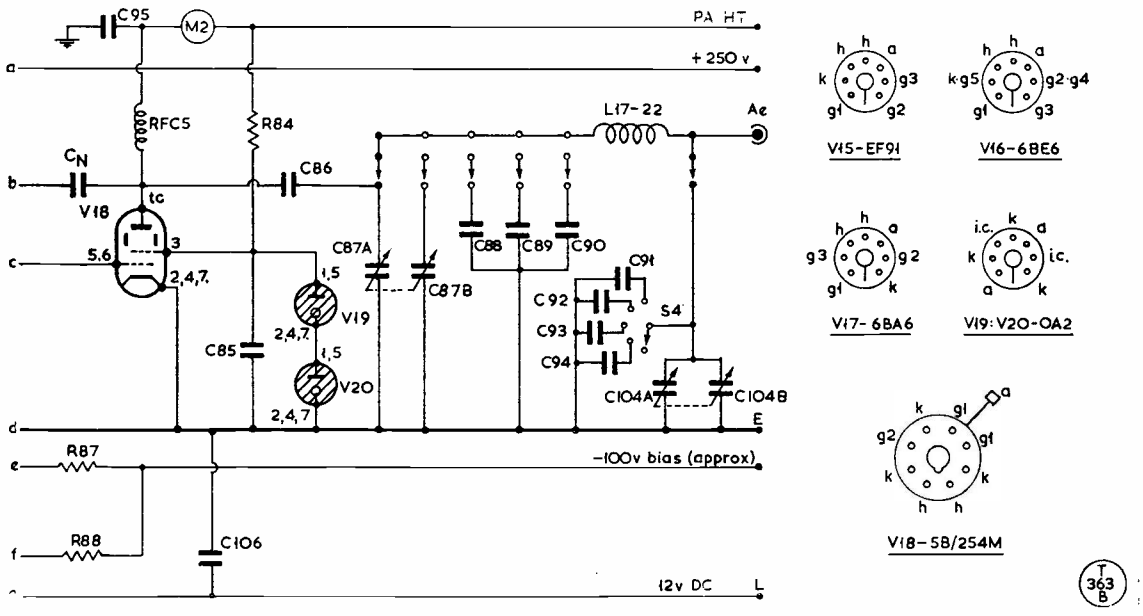


Fig. 4. The final conversion, driver and RF power amplifier section of the Exciter. The output at V18 is for all bands 10-80 metres, the small capacities C87 and C104 being selected and loaded as required for the correct L/C ratio from band to band. This is partly achieved by the way the plug-in coil mount is wired for the different bands. This section of the circuit connects into Fig. 3 as shown by the side lettering.

Since the exciter is normally run at quite a low power level no provision has been made for metering the PA screen current. Where the PA valve is to run fairly near to its full ratings or where the operator is less experienced it is advisable to arrange for screen current to be checked by including an extra switch which will enable meter M1 to be switched from grid to screen at will. The notes on tuning and loading given later will make it clear why it is so important to be able to see what the screen current is doing in a high-level amplifier.

It will be found essential to neutralise the PA if stable operation is to be obtained. The usual methods of neutralising by watching for variations in grid current or by trying to detect RF on the tank circuit by using a neon will be quite useless as they are far too insensitive. With the PA valve driven hard into grid current and with anode and screen voltages removed, it will usually be found possible to detect some RF on the tank by means of the diode probe as the tank is tuned through resonance. Cn should be adjusted for minimum RF pick up, care being taken to ensure that the tank is brought to resonance after each adjustment. This method is very sensitive and will enable the PA to be almost perfectly neutralised.

(To be continued)

TABLE OF COIL VALUES

L1, L2, L3	*All on ⅜-in. Aladdin type polystyrene former with dust core.*
L1	18 turns close wound, 26g. enamel, 5-turn link.
L2	16 turns close wound, 26g. enamel, 4-turn link.
L3	12 turns close wound, 26g. enamel, 4-turn link.
	All following on ½-in. polystyrene former with dust core.
L4	9 turns 24g. enamel, spaced 1 turn.
L5	160m. 100 turns, 36g. close wound, tuned by C73, 100 μμF.
L6	80m. 75 turns, 30g. close wound, tuned by C74, 33 μμF.
L7	40m. 25 turns, 26g. close wound, tuned by C75, 33 μμF.
L8	20m. 15 turns, 26g. close wound, tuned by C76, 25 μμF.
L9	15m. 12 turns, 22g. spaced 1 turn, tuned by C77, 20 μμF.
L10	10m. 10 turns, 20g. spaced 1 turn, tuned by C78, 15 μμF.
L11-L16	as L5-L10, but tuned by C83 (50 μμF var.), and C107, C108 50 μμF and 25 μμF respectively.
L17-L22	*wound on Eddystone* 537/538 *formers.*
L17	160m. 30 turns, 26g. close wound.
L18	80m. 20 turns, 26g. close wound.
L19	40m. 15 turns, 22g. slight spacing.
L20	20m. 11 turns, 20g. wound in former grooves.
L21	15m. 8 turns, 20g. wound in former grooves.
L22	10m. 6 turns, 20g. wound in former grooves.

Notes: These coil values should prove correct provided stray capacities are kept low. The PA coil base is an *Eddystone* type 946. Coils L17–L22 are wound on three *Eddystone* type 537 and three type 538.

R.N.A.R.S. GET-TOGETHER INVITATION

We are asked to announce that an informal get-together for radio amateurs is to be held at G3BZU, the Hq. station of the R.N.A.R.S. at the R.N. Signal School (H.M.S. *Mercury*) near Petersfield in Hampshire, on Thursday, January 28, starting at 7.30 p.m. Talk-in will be on 70·26 mc in the 4-metre band. The occasion is the School's social evening and we are told that "there will be something for everybody." For any further information, write G3JFF, *QTHR.*

THE NINETEENTH MCC

The Magazine Top-Band Club Contest
November 14-15, 1964

IT'S hardly necessary to say that the record has been broken again—it seems to happen every year, and we hope the trend will continue. This time the century has really been broken; last year we actually received 102 logs, and 95 clubs were placed, but this time 107 clubs appear in the list, the total number of logs received being 110.

It is good to see that once again three different regions appear in the first three places with our friends from the North back in the lead after three years.

1st:	**Halifax** *(Northern)*, **G3IGW**	**708**
2nd:	**Oxford** *(Southern)*, **G3RBP**	**659**
3rd:	**Cannock Chase** *(Midland)*, **G4CP** ...	**628**

The fourth place was taken by **Gravesend (G3GRS),** who won the event two years ago, and fifth came **Grafton (G3AFT)**—newcomers to the high places, although very regular contestants.

The Top Scorers

Every possible congratulation to **Halifax,** the winners, who used the station of **G3IGW.** The transmitter was described as "Home-brew, with a 5763 PA"; the receiver was an Eddystone 750; and the aerial a 200ft. end-fed wire. And G3JGW remarks that "shortage of CW ops. prevented their entering for the past two years." They certainly have put things right this time!

Oxford (G3RBP), runners-up last year, repeated the medicine and once again achieved the highest number of Club contacts (this time by a handsome margin). The operator was G3RBP, with G3JLE logging; the transmitter a crystal-mixer type with an 807 PA; receiver an HRO with 85-kc IF added; and the aerial a 300ft. horizontal, 75ft. high at its peak.

Third place was very creditably achieved by **Cannock Chase** on their first MCC entry, using G4CP's station at Walsall. Here the transmitter was a two-stage affair with an EF-50 and 807, the receiver an AR88D and the aerial a 250ft. wire, centre-fed with coax. The operators were G4CP, G3LUP and G3RSX.

Gravesend (fourth) and *Grafton* (fifth) have already been mentioned. In view of the very large number of entries it is felt that everyone in the Top Ten certainly deserves high praise—so we will continue! Sixth position was taken by *Ash Green* (G3KMO), who was fourth last year and has often managed a very high score; seventh came a club only just formed—*Kings Norton Contest Club* (G3GVA), who will be more than pleased with this result. *Reigate* deserve a special pat on the back for steering one of their *three* stations—the "B" station, signing G3FM—into eighth place. Finally, equal ninth came two old supporters in the shape of *Surrey (Croydon)*, G3SRC and *A.E.R.E. (Harwell), No. 2* station, G3HS. Well done, everyone in the Top Ten. In fact, we should say, everyone with a score of 400 or more can congratulate themselves on a good week-end's work.

The Scoring

Now we come to *that system!* It has become almost traditional, in MCC, for the organisers to be very frank about the scoring system, the reasoning behind it, and the grouses it provokes. Not so much a system—more a discussion group! This year it seems to have pleased everyone except the GM's, who were rather downcast about it. They said that last year's scoring method, giving 10 points for a contact between GM and the South, made the southerners keep their ears open; and that this year's gave them no encouragement to do so. (But the fact was that a Southern station, if he was to win, simply *had* to hear and work the GM's, however many points they accounted for.)

Had the *Radio Club of Scotland* (GM3RCS), this year's highest GM scorer, made as large a number of Club contacts as did GM3OBC, last year, they would have been in the first six; and, as this time more stations were active, had they made as good a score in relation to the number of stations on the air, they might even have hit the Top Three. No—the scoring system did not really penalise the GM's, many of whom had very creditable totals, such as GM3RCS (492) and GM3SIG/A (485). They just did not have a station, this year, with all the necessary attributes for a win; but all credit to them, just the same.

Remarks from the other regions amused the organisers very much, especially in view of the order in which they came in. First to comment was G6BQ, sending in the highest score seen at that time, on behalf of *Gravesend* (G3GRS), and saying that the scoring system was such that a Midland station was practically *bound* to win.

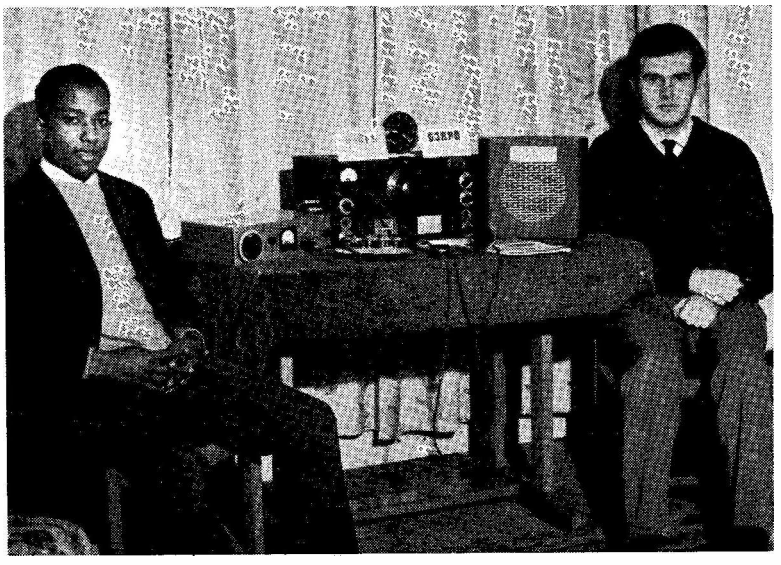
Next came the entry from *Cannock Chase* (G4CP), some 20 points higher than G3GRS and apparently proving their point. And G4CP wrote "No moans on the scoring system, but if a Southern station has won, we would say very good luck to them and well done." Then the *Oxford* entry

(G3RBP) arrived—some 30 points higher than G4CP, and putting the Southerners, as we imagined, on top. Finally, the Northern bombshell, *Halifax* (G3IGW) turned in the top score of all, some 50 points ahead of the runner-up, and put paid to the whole argument.

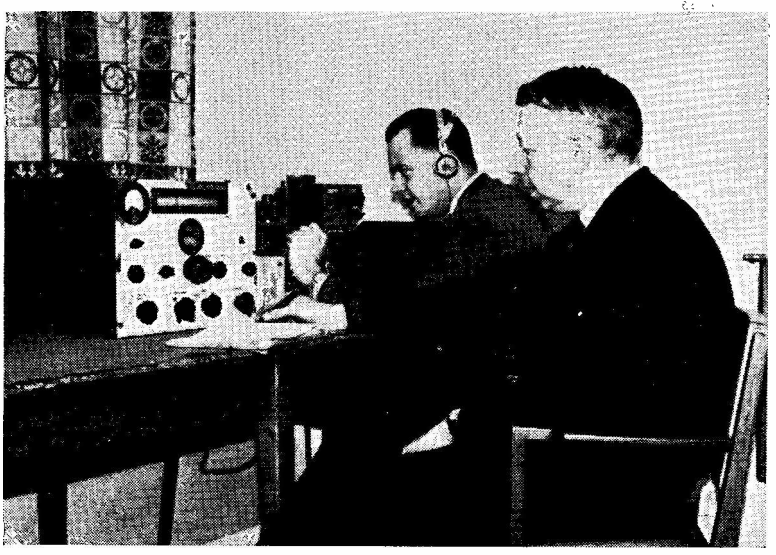
Once more the fact has to be rubbed in that scoring systems are *not* devised to make it possible for all stations to achieve the same score! They are supposed to give an outstanding station—with good signals *and* good operating—a reasonable chance of coming in the first three, whichever region he may be in. And as we have three different regions in the first three, we feel that the multiplier system did not lead us too far astray.

There's always someone with a complaint, though they were pretty good-natured this year, and someone can always seem to devise a better system. It might be a good plan, for future years, to revert to the old basis of equal points for every QSO, and the devil take the hindmost . . . and then let each Club work out its own handicapping system and decide what its position *really* was. Almost anyone could win!

As a matter of interest, we show, once again, the numbers of inter-Club contacts made by the Top Ten. (See Table II). As happened last year, the runner-up (G3RBP) would have been the winner on an equal-points basis. Without detracting in the least from his fine performance, it is obvious that his central position in the country—almost inside the Midland region but still within easy range of the numerous southerners—gave him some degree of advantage.



The Grafton Radio Society, signing G3AFT, came out a very creditable fifth, with 564 points, in the 1964 MCC — a position much improved over theirs of recent years. The gear consisted of an HRO-5T, and the Tx was a 3-stage job using a 5B/254M in the PA; the aerial is described as "a 3/4-wave Marconi, with a 50ft. vertical section, and buried radials" — it certainly put out a very potent signal. Operators on G3AFT were Neville Bethune (G3RFS), left; and Keith Spicer (G3RPB).



Reigate Amateur Transmitting Society's "B" station signed G3FM for MCC, gaining a very good 8th place with 539 points. Operators were G3RCY and G3FM (nearest camera), assisted by G3RIN as logger (unable to be present when this picture was taken). Their Tx ran an 807 in the PA and, this transmitter being installed separately from the operating position, has a remote VFO; receivers were an AR88D and a CR-100, and two aerials were available: A 262ft. wire, end-fed, and a 55ft. vertical.

Multiple Stations

Last year, *Reigate* started something by entering three separate stations. This enabled them to make full use of all their potential operators, and they did the same this year. *Crawley* followed their example, and also entered three; *A.E.R.E. (Harwell)* put in two, as did *Sheffield* and *Burnham-on-Sea*. Many other clubs, of course, were hard put to it to find enough competent CW operators for *one* station.

Operating Standards

These were very high this year, most stations being fast, accurate and intelligently handled. But that use of "BK" when no Break-In was really available continues to annoy people who know what "BK" really means.

[over

The fact is that "BK" has just taken the place of "K" in many people's minds, and now means just that and nothing else.

Disqualifications for bad notes introduce a slight disappointment. Two stations were particularly bad on the first day, and the judges were almost speechless while following one station, with a real "rock-crusher," to whom they would have given T6 or T7, who was collecting T9 reports from all over the place. Obviously most people simply can't adjust their reflexes to send anything but a "9" as the third figure in the group. Not so *Crawley*, who comment: "You will notice that we gave one station T7 in the early hours of the Contest. How, in this day and age, people can still put such a din on the air, on the lowest frequency band still available to us, is a point worth investigating."

Running G3SRC of the Surrey Radio Contact Club (Croydon) into ninth place, tied with Harwell No. 2 (G3HS) — on the left, G3BFP, with G3MCX. Their transmitter was the 160m. section of an all-band SSB rig, the receiver an AR88D, and the aerial a loaded 160ft. wire. The station is that of G3BFP. *A G6LX print*

Comments from Contestants

As always, the general remarks sent in by many of the entrants were very interesting, and we quote some of them herewith. But with more than 100 logs to clear, there isn't room for them all, and we are omitting some of the intensely intricate and detailed explanation of why the scoring system couldn't possibly work! We'll take them as read, and quote some of the others, but briefly, starting from the top and working downwards in order of placing:

Silverthorn Radio Club, G3SRA, in the 19th MCC — left to right, standing, G2HR, G3RJI, and SWL Dilworth; foreground, SWL King, G3RKJ and SWL Faiers. This was essentially a Club effort, under the guidance of G2HR, and they made 375 points to get into 34th place — a very good showing out of an entry of 110 Clubs.

"Now suffciently large entry to confine it to clubs only" *(Halifax)* . . . "Made many more contacts by calling CQ than by listening for others doing so" *(Oxford)* . . . "First effort and very enjoyable. Operating of high standard, QRM terrific. Must have been 125 clubs active" *(Cannock Chase)* . . . "A better scoring system, but not enough activity from GI, GC and GD" *(Grafton)*.

"Found that most 'locals' were harder to work than more distant stations" *(Ash Green)* . . . "Club only just forming, no time to get 'official' coding, so we used 'KI.' Thought we would put in our genuine 10 watts and see how it went" *(Kings Norton)* . . . "The usual good fun associated with MCC; but very few stations used the first 20 kc or so of the band *(Surrey)* . . . "Our congrats to G3RBP, 3GRS and 3GVA for the best operating heard"

TABLE I:

Positions and Scores, Nineteenth MCC

	CLUB	REGION	POINTS
1.	G3IGW, Halifax	N	708
2.	G3RBP, Oxford	S	659
3.	G4CP, Cannock Chase	M	628
4.	G3GRS, Gravesend	S	605
5.	G3AFT, Grafton	S	564
6.	G3KMO, Ash Green	S	554
7.	G3GVA, Kings Norton Contest Club	M	541
8.	G3FM, Reigate " B "	S	539
9.	G3SRC, Surrey Radio Contact Club	S	535
	G3HS, A.E.R.E., Harwell, No. 2	S	535
11.	G3TRF, Maidstone Y.M.C.A.	S	525
12.	G3ERD/A, Derby	M	510
13.	G3EKW, Nottingham	M	507
14.	G3PIA, A.E.R.E., Harwell, No. 1	S	504
15.	G2FJA/A, Medway	S	495
16.	GM3RCS, Radio Club of Scotland	GM	492
17.	G3RCM, Sheffield No. 2	N	489
18.	GM3SIG/A, 92nd Sig. Regt., Forfar	GM	485
19.	G3AHD/A, Liverpool	N	482
20.	G3GGS, Chorley and Leyland	N	470
21.	GW6GW, Blackwood	GW	462
22.	G3RCW, North Notts	M	460
23.	G4JW, Sheffield No. 1	N	455
24.	G3LCS, Wolverton	S	452
25.	G3NKS/A, Northampton College (London)	S	450
26.	G8TA/A, Wolverhampton	M	446
27.	G3PEO, Cotswold Radio Contest Club	S	416
28.	G3TDD, Hounslow	S	411
29.	G5BK/A, Cheltenham	S	407
30.	G3GJL, Worcester	M	404
31.	G3ERN, Harlow	S	401
32.	G3SWH, Bristol	S	391
33.	GW3ITZ, RAF Sealand	GW	387
34.	G3SRA, Silverthorn	S	375
35.	G3AYC, BBC (Langham)	S	372
36.	G3LRS, Leicester	M	371
37.	G3SWE/A, S.W. Essex Technical College	S	367
38.	G3REI, Reigate " A "	S	360
39.	G30WM, University of Newcastle	N	352
40.	GM30BC, Leven	GM	350
41.	GW3PMR, University College of N. Wales	GW	345
42.	G3TIR, Crawley " A "	S	343
43.	G3HOX, Manchester	N	340
44.	GM3LUN/A, 65th Sig. Regt. (T.A.)	GM	339
45.	G2ASF, Coventry	M	337
46.	G3IIU, Acton, Brentford and Chiswick	S	334
47.	G3RAL/A, Loughborough	M	333
48.	GM3TKV, Moray Firth	GM	330
49.	G3RZI, East Worcs.	M	329
50.	G3GIW, Burnham-on-Sea No. 1	S	328
51.	G3SDW, Greenford	S	327
52.	G3ILO, Dursley	S	326
53.	G3SPY, G.E.C. Apprentices (Coventry)	M	322
54.	G3BZU, Royal Naval A.R.S.	S	320
55.	GW3NOP/A, Newport Mon.	GW	317
	G3NHZ, G.P.O., Dollis Hill	S	317

	CLUB	REGION	POINTS
57.	G3PAW/A, Magnus Grammar School	M	315
58.	G3BXF, Rugby	M	313
59.	G3CIO, Royal Sigs., Catterick	N	311
60.	G3GDT, BBC (Ariel)	S	310
61.	G4BP/A, Scarborough	N	308
62.	G2XP, Sutton and Cheam	S	306
63.	G3GHN, Clifton	S	305
64.	G8AB/A, Loughton	S	295
65.	G3PIZ, East Cheam	S	291
66.	G3MSB, Scunthorpe	M	289
67.	G3RBZ, Lymington	S	288
68.	G3SAD, Stevenage	S	287
	G3EFX/A, Harrow	S	287
70.	G4QD, Burslem	M	285
71.	G3ASR/A, Edgware	S	279
72.	G3LHZ, Crawley " B "	S	277
73.	GD3HQR, Isle of Man	GI/GD	264
74.	G3IVL, Bath Spa	S	261
75.	G3HTI/A, Grimsby	M	258
76.	G2CUZ, Ainsdale	N	248
77.	G3RAE, Reigate " C "	S	241
78.	G3COY, University of Keele	M	237
79.	G3DDI, South Shields	N	234
80.	G3JTW, Marconi Apprentices (Chelmsford)	S	228
81.	G3JFY, Burnham-on-Sea No. 2	S	227
82.	G3LDT, Macclesfield	M	216
83.	G3PMZ, Signal House (Liverpool)	N	215
84.	G3TLM, Guildford	S	213
85.	GW3TMP, Leeswood	GW	211
86.	G3PYY, Newark	M	210
87.	GW3HGL, Conway Valley	GW	201
	G3FVA, South Manchester	N	201
89.	G3KTA, Purley	S	185
90.	G3LLK, Newbury	S	180
91.	G3MAR/A, Midland	M	168
92.	G3PAD, Paddington	S	155
93.	G3SLM, South London Mobile Club	S	154
94.	G3RXJ, Crawley " C "	S	152
95.	G6QN/A, Wimbledon	S	150
96.	G3LPT, Sole Bay	M	138
97.	G3HNR, Northern Polytechnic (London)	S	135
98.	G3CMH, Yeovil	S	116
99.	G3RVH, No. 1 M.H.U., Northwood	S	114
100.	GI6YM/A, City of Belfast	GI/GD	111
101.	G3LAT, B.A.C., Hurn	S	107
102.	G3STC, Sunderland Technical College	N	104
103.	G3MDW, Northern Heights	N	98
104.	G3KEL, Morecambe	N	76
105.	G3PRC, Plymouth	SW	63
106.	G3HEV/A, Ravensbourne	S	49
107.	GM3HRZ, Kinloss	GM	44
	Excluded Under Rule 8		***Claimed Score***
	G2AMX/A, Burnham Beeches	S	268
	G3GBU, Stoke-on-Trent	M	202
	Excluded Under Rule 9		
	G3STA, Verulam	S	226

(A.E.R.E., Harwell) . . . "How do some stations expect to QSO when they 'net' about 1 kc off frequency?" *(Maidstone)* . . . "Judging by a few of the notes there must have been a sale of surplus LZ and YO Klub transmitters!" *(Medway)* . . . "The G's must have more incentive to work GM stations, and the contest should run a bit longer, giving them time to work each other and then look for the weaker stations" *(Radio Club of Scotland).*

"Think we should move up by about five places over last year's score" *(Liverpool)*—sorry, but it was only two! "Only objection to the scoring was when the figure 3 flew off the old typewriter on the last QSO!" *(Chorley and Leyland)* . . . "Being separated from the Yorkshire boundary only by a good downwind spit cost us 166 points" *(North Notts.)* . . . "Too many stations changing frequency with their PA's switched on" *(Wolverhampton).*

Common Complaint

At this stage we arrive at a complaint from *Hounslow* which was echoed by several other clubs: "Pity a few more stations didn't organise their checking systems. Several minutes were wasted, convincing stations either that we had or had not worked them before." Practically every log we received had calls scored out and marked "Duplicate," or "Already Worked." Part of the preparation for a contest like this is surely to produce some kind of wall-chart on which stations worked can be entered in orderly fashion so that *all* operators can see them at a glance.

To proceed: "One well-known station should be penalised for QSY'ing on full power, with el-bug dots going full blast!" *(South West Essex)* . . . "Very, very few stations replied to our CQ's. 85 per cent of our contacts were made by calling stations" *(Leven)* . . . "Nearest local was 30 miles, the next 50 miles" *(North Wales)* . . . "All contacts made from location in Kincardine County" *(65th Sig. Regt. TA).*

"Much was learnt and many ideas for improving operating technique were discussed at the Club meeting on the Monday after the contest" *(Coventry)* . . . "It always amazes us to hear the number of stations calling CQ, nearly zero-beat with a GM" *(G.P.O., Dollis Hill)* . . . "We are only a small Club, but we have a lot of fun" *(Loughton).*

Conditions

On reading through all the comments, the judges were completely mystified about "conditions." Roughly half the correspondents say that the Saturday evening was excellent, with things deteriorating on the Sunday . . . and the other half insist that it was the other way round! Since most of the Clubs seem to have made roughly the same number of contacts on both days, these remarks must surely be backed by imagination and little else? Perhaps some areas were slightly better on the Saturday, some on the Sunday.

Remarks common to nearly all contestants:

TABLE II

Club Contacts made by the Top Ten

Oxford, G3RBP	209
Gravesend, G3GRS	190
Cannock Chase, G4CP	184
Halifax, G3IGW	183
Ash Green, G3KMO	181
Grafton, G3AFT	180
Reigate "B," G3FM	174
A.E.R.E. No. 2, G3HS	172
Surrey (Croydon), G3SRC	168
Kings Norton, G3GVA	160

TABLE III

Regions — Average Placings

Region	No. of Entrants	Average Position
GM	6	45th
Midland	22	51st
Southern	54	53rd
GW	6	54th
Northern	16	57th
GI/GD	2	86th
South-West	1	105th

TABLE IV

Top Scorers in Each Region

Northern

1.	Halifax, G3IGW	708
17.	Sheffield No. 2, G3RCM	489
19.	Liverpool, G3AHD/A	482

(16 entries)

Southern

2.	Oxford, G3RBP	659
4.	Gravesend, G3GRS	605
5.	Grafton, G3AFT	564

(54 entries)

Midland

3.	Cannock Chase, G4CP	628
7.	Kings Norton, G3GVA	541
12.	Derby, G3ERD/A	510

(22 entries)

GM

16.	Radio Club of Scotland, GM3RCS	492
18.	92nd Sig. Regt., GM3SIG/A	485

(Six entries)

GW

21.	Blackwood, GW6GW	462
33.	RAF Sealand, GW3ITZ	387

(Six entries)

Congestion, as ever, in the 1820-1830 kc sector, thinning out either side; Many stations finishing a contact and immediately calling a long CQ, although someone was QRX for the very shortest of calls; Southern stations seemed keener on working each other for quick ones than on looking further abroad for "rare ones;" and, from quite a number of new and inexperienced Clubs — why do some of these people send so *fast?*

Technical Hitches

A surprising number of Clubs with scores down at the lower end of the table explain that they were off the air for varying periods with technical troubles. Most unlucky of all were *Ainsdale,* whose mains supply went off on the Saturday afternoon and wasn't restored until 2046 hours! Real bad luck, that. A number of aerial relays appeared to stick or misbehave; a few keying relays wouldn't key; and an unaccountable number of aerials refused to load up properly . . . although one would imagine that all this would have been checked days in advance! But they're *learning* all the time, and quite a few go out of their way to say just this.

Guildford & District Radio Society signed G3TLM in the 1964 MCC, their operators being G3TCU and G3FVV (logging), and G3OLM with G3OXI in the background. Their 213 points put them into 84th place.

Some of the Clubs who took no chances, but had stand-by equipment at the ready, even found that they had to use it! Surprising how unreliable a simple 10-watt transmitter can be, these days, it seems.

Neat Top Band rig at GM3RCS, of the Radio Club of Scotland. The station was specially assembled for the 1964 MCC; the operators were GM3LTB, GM3SAN (seen here) and GM3SJU. Their Tx was to a "Short Wave Magazine" design, using a 6BW6 in the PA, and full BK with a valve-type T/R switch. The receiver was a Minimitter MR44/II, and the aerial an inverted-Vee with a maximum height of 38 feet. In 16th place, and leading the Scottish entry, GM3RCS made 492 points.

Finally, all credit to those clubs who, rather than flogging their "ace operator" to death in order to win, made the event an opportunity for training some of their less-experienced juniors. *They,* possibly, are the ones who will be winning future MCC's. And we won't mention the name of the Club who cheerfully wrote "We know we're a lot of lids, but we didn't half enjoy it!" In fact, cheerful enjoyment is the theme running through the whole entry.

Postcript on Scoring

Table III shows how many stations from each region took part, and the *average* position held by each region (*i.e.* the sum of all the placings, divided by the number of entrants). On the evidence of this, the GM's did fractionally better than the others. And Table IV shows the highest scorers in each region and reminds us all that competition *within the regions* is an aspect that shouldn't

be overlooked. If you think the scoring system decrees that your station can't win, you can at least try to beat all the others in your own region!

Specials

An interesting feature of MCC is the number of "special" or unusual stations entering. We have groups from the BBC; the G.E.C. and Marconi Apprentices; the GPO at Dollis Hill, several Universities and Colleges and, of course, the R.A.F., Army and T.A. clubs.

Worthy of special mention among the latter is GM3SIG/A, whose full title is 92nd Royal Signals Regt., A.E.R., Amateur Radio Society, and these chaps went up to Forfar especially for the Contest, as a "training week-end." Their C.O. is Lt.-Col. M. George, G2CAV, and their three operators were G3LOV, GW8PG and GM2HIK, with GM3RVK, G3GVV and Bob Dewars as the log-keepers. The Regiment has 16 licensed amateurs, and 27 members of the Club . . . and they write to say how much they enjoyed it all.

Invigilation

As mentioned in previous years, this Contest is always closely monitored, from strategically placed stations, the operators of which—who have been doing the job for many years now—know exactly what to listen for, such as QSO's made out of time, bad notes and inconsiderate operating (which is a different thing from "bad operating"). Their reports are available to the judges if action under the rules has to be considered.

Logs

As usual, some Clubs had not read the rules, and the logs were wrongly set out; but on the whole they were very good, gave the judges little trouble, and represented some pretty hard work on the part of club scribes and volunteers—they get longer each year, of course!

Very useful check logs came in from *D. L. A. Law (Leicester)*—a regular supporter and a very much appreciated one; from *G3IRM (Bury St. Edmunds)* and from *P. J. Lennard (Wartling)*.

One log arrived too late for inclusion—a distinct improvement on the last few years, when six or seven have had to be described as "claimed but unchecked," and not placed as a result.

As a final footnote to this year's MCC story, it might be mentioned that those who would like to compare how they did this year with last will find Table I for 1963 on p.602 of the January 1964 issue of SHORT WAVE MAGAZINE.

And so we leave the Nineteenth MCC and look forward with interest to the **Twentieth,** next November. Thanks to all who helped to make this one such a thorough success.

A note, now, to all Club Secretaries, reminding them that the next lot of Activity Reports must be with us by the next deadline of **Friday, January 15.** Address them to "Club Secretary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1.

And a Happy New Year to all club personnel, of every rank—those who run them, those who write to us about them, and those who just *read* about them! The very best wishes for their prosperity in 1965—and we hope they will continue to tell us all about themselves.

HON. SECRETARIES PLEASE NOTE

Normal Club reporting will resume with the February issue, for which the closing date is Friday, January 15, addressed: "Club Secretary," Short Wave Magazine, 55 Victoria Street, London, S.W.1.

LET'S CALL IT "GUNK"

Proposed new word for the vocabulary—*Gunk*, meaning strictly ex-Govt. surplus. Sounds a bit better than "junk" (or Junk Sale) because in fact much Govt. surplus is very far from being junk.

PASSING OF ANOTHER PIONEER

The death was announced, on December 14, at the age of 85 years, of C. S. Franklin—an honoured name in the history of radio communication and engineering. He was one of Marconi's earliest collaborators, and was with the Marconi Company from 1899 till 1939. Though the popular press mentions him only as "the designer of 2LO. the first British broadcasting station," in fact his achievements far transcended this (purely incidental) professional commitment.

For C. S. Franklin was the first radio engineer to grasp the significance and the possibilities of directional beam transmission for long-distance communication, and in this he was backed to the full by Marconi himself. It was Franklin who designed and created what became known as the Marconi Beam System, from which was developed the Empire Chain of Wireless Stations, to give Britain, in the mid-war period, an international radio communication network, on short wave, unmatched by any other country.

A granite column, erected in 1937 at Poldhu in Cornwall by the Marconi Company, records the details. When C. S. Franklin retired in 1939 he built himself a bungalow at Poldhu and devoted his remaining years to private research in the field of communication by radio.

FILM FOR CLUB LOAN

Arthur Robinson, G3MDW, hon. secretary of the Northern Heights A.R.S., writes that they have a tape-recorded lecture by W1BB, the famous 160m. DX operator, available for free loan (except for payment of registered post both ways) to any Club that may want to hear it. Apply in the first instance to G3MDW, *QTHR*.

MORE MODIFICATIONS FOR THE HE-30

TO IMPROVE GENERAL PERFORMANCE

R. WILSON (G3GDJ)

THE Laffayette HE-30 is a good general-purpose receiver which, with a few modifications, can be turned into a very useful communications Rx. The modification discussed here were carried out over a period of weeks.

Beginning with the front end of the set: First the aerial terminal A1 was removed and a coaxial socket fitted in its place. Next the cathode resistor of V1, the RF amplifier valve, was changed from 330 ohms to 68 ohms, giving considerably more gain. The mixer stage was then investigated, as second channel interference was apparent on the 14 mc band. It was found that the grid coupling condenser (C5 in the basic circuit diagram) was much too large (250 $\mu\mu$F) so was replaced by 68 $\mu\mu$F with a 33-ohm resistor in series. This also had the effect of increasing the front-end selectivity. Band C, 4·8 to 14·8 mc, will now require retrimming in the *mixer* stage. The trimmer (CM2) will be found to have two peaks. The peak nearer to maximum capacity is the correct one. Should the other peak be used, no amateur signals will be found in the 14 mc band, only commercial signals, as the coverage will alter.

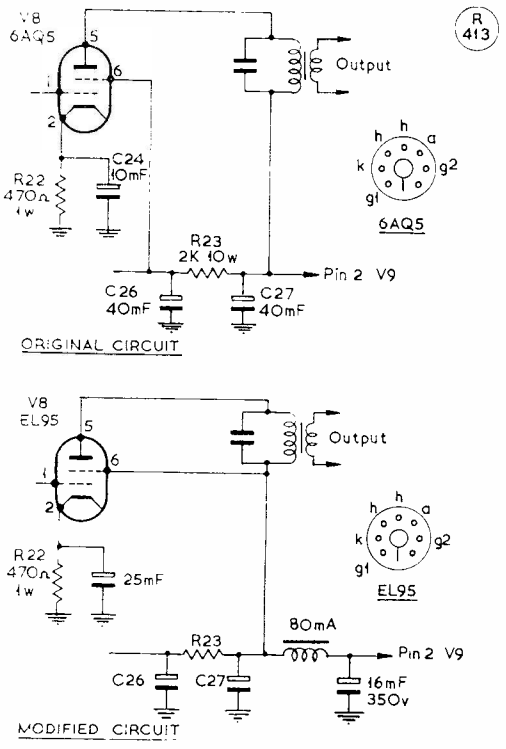


Fig. 1. The original output end of the HE-30, as modified by G3GDJ and explained in the text.

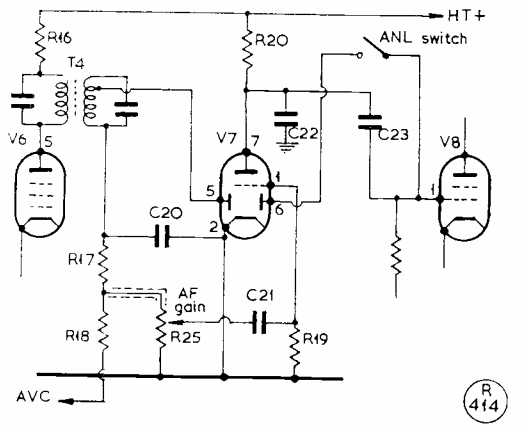


Fig. 2A. The original circuitry involving the detector and AVC line in the HE-30. Some suggested modifications are shown in Fig. 2B. It should be noted that the circuit designations are in accordance with the manufacturer's handbook on the receiver.

The oscillator valve HT is switched off during "send" periods, so R7 of 1K was disconnected from the Function switch and taken to the main HT line leading to R23 (of 2K, 10w.) the smoothing resistor. The stability of the oscillator is improved by this change.

It was found that distortion became apparent on strong signals with the noise limiter in circuit, so it was disconnected and is to be replaced by a better type later.

Output End Modifications

V8, the output valve, was changed for an EL95; this is a low-consumption type giving approximately 2·5 watts output. It plugs into the 6AQ5 socket without any wiring changes, but the lead to the screen (pin 6) is now taken to the reservoir end of R23, and the bias condenser (C24) changed to 25 μF. The output transformer remains a fair match, so does not require to be changed—*See* Fig. 1.

The lead from the cathode of V9, the rectifier valve, to R23 was then broken, and an 80 mA smoothing choke fitted, with a 16 μF condenser wired in as a reservoir. The two 40 μF condensers C26 and C27 are retained, as in Fig. 1 modified.

The AVC system was found to be unsatisfactory so the unused diode of V7 (pin 6) is now used as the AVC rectifier.—*See* Fig. 2. The simple detector circuit was revised, and a series noise-limiter also added. The noise limiter can be wired in circuit permanently if required, and the switch used for

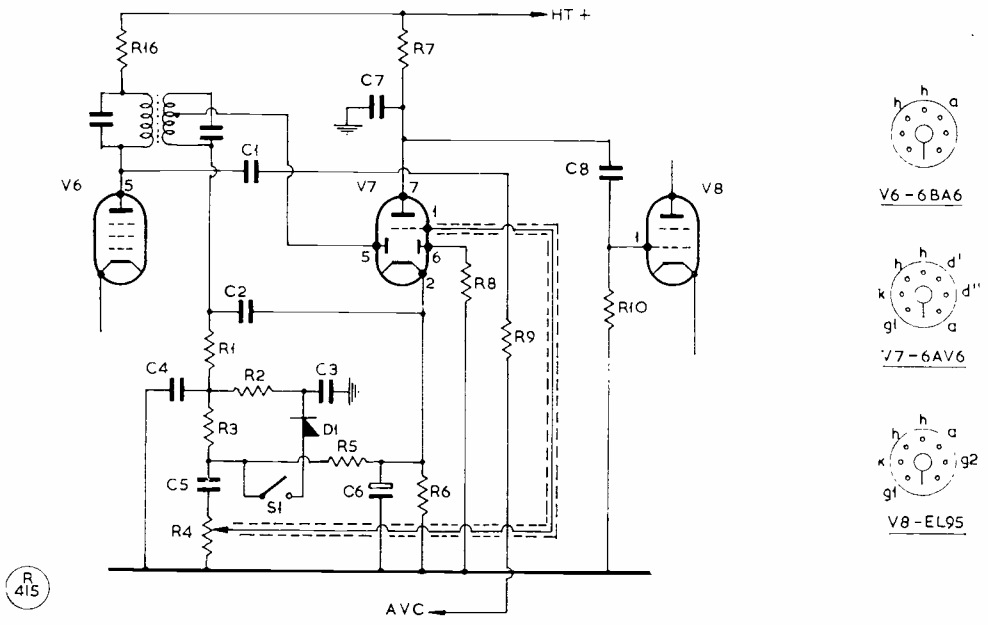


Fig. 2B. This is the circuit of Fig. 2A, as modified in accordance with the details given in the text. The switch Sw controls the new noise-limiter circuit, taking the diode D1, an OA70. The first IF transformer is T4, as in Fig. 2A, and R16 is as in the original. These fairly extensive modifications, for which all values are given in the table, are claimed by G3GDJ to improve the HE-30 considerably.

Table of Values

Fig. 2. HE-30 Circuit Modifications

Original

C20, C22 = 100 $\mu\mu$F
C21, C23 = .01 μF
R16 = 1,000 ohms
R17 = 47,000 ohms
R18 = 2.2 megohms
R19 = 4.7 megohms
R20 = 220,000 ohms
R25 = 0.5 megohm
T4 = 3rd IF xformer
V6 = 6BA6
V7 = 6AV6
V8 = 6AQ5

Modified

C1, C2,
C4, C7 = 100 $\mu\mu$F
C3 = 0.1 μF
C5 = 0.5 μF
C6 = 25 μF, 25v.
C8 = .01 μF
R1, R3 = 47,000 ohms
R2, R8,
R9 = 1 megohm
R4 = 0.5 megohm
R5 = 1.5 megohms
R6 = 2,700 ohms
R7 = 220,000 ohms
R10 = 0.47 megohm
R16 = 1,000 ohms (*as original*)
D1 = OA70
V6 = 6BA6
V7 = 6AV6
V8 = EL95

Note: All original circuit designations are in accordance with the manufacturer's handbook.

another accessory, *e.g.*, a 100 kc xtal calibrator.

Other modifications are possible, but it will be found that with those as described here, there is a tremendous improvement over the original, with a performance now equal to a much higher-priced receiver.

Work is now in progress to make the BFO less susceptible to changes in circuit potentials, this being inclined to alter frequency as the IF gain control is operated.

(*Editorial Note:* The first article on some HE-30 modifications appeared in the August 1964 issue of SHORT WAVE MAGAZINE, and dealt with changes on the audio side).

NOTES ON THE R.A.E.

From the report of the City & Guilds of London Institute, we get it that the Radio Amateur's Examination of last May produced a total of 849 U.K. candidates passed (66·5 per cent), compared with 862 passes (70 per cent) the previous year. The Examiner's general comment was that the standard was rather lower this last time, though as usual there were many very good answers to several of the questions. Candidates were weakest on Q.6, on the ionosphere; on Q.7, properties of material as conductor or insulator; and Q.9, use of an artificial aerial.

Specimen question papers for recent years can be obtained from the Sales Section, City & Guilds of London Institute, 76 Portland Place, London, W.1, price 2s. per set per year (last three years only). An additional 1s. will bring the syllabus for the Examination as well.

The terms and conditions for the issue of a U.K. amateur transmitting licence can be obtained on request to: Radio Services Dept., Radio Branch, Amateur Licensing Section, G.P.O. Hq. Building, St. Martin's-le-Grand, London, E.C.1.

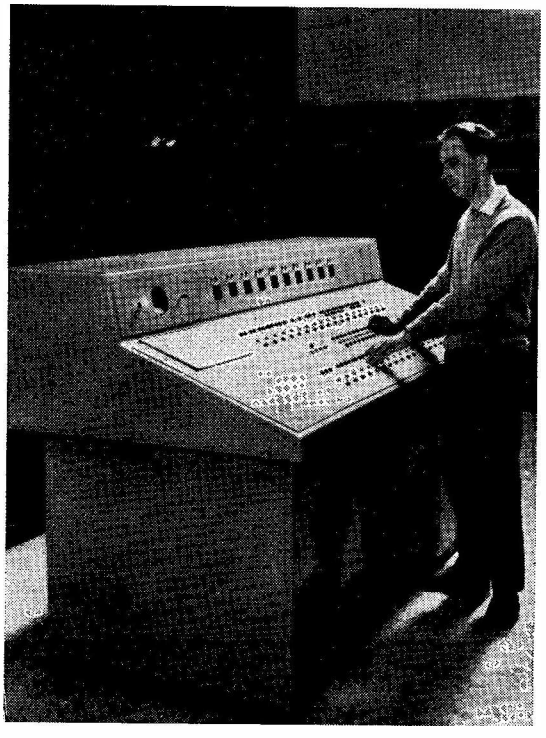
SOME NOTES ON RADIO AUSTRALIA

AERIAL INSTALLATION AND SWITCHING

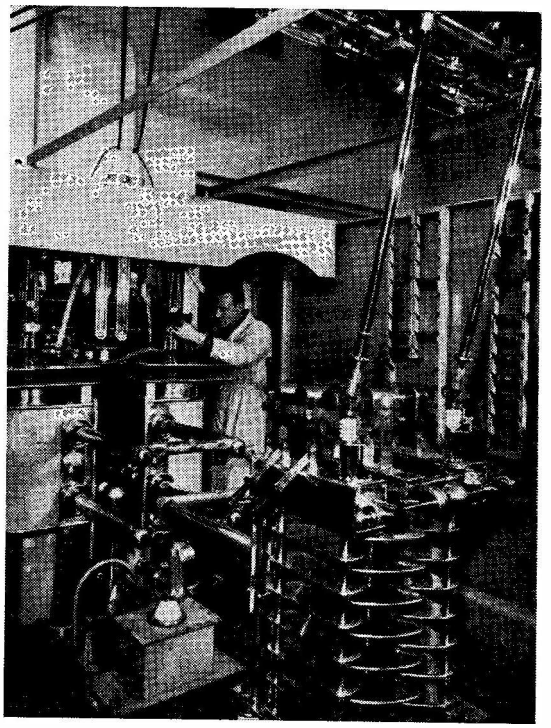
This is one of our occasional general-interest articles, intended to keep readers informed of some of the interesting things that happen in the sphere of commercial radio communication and broadcasting. Radio Australia has a large transmitting schedule in the regular 11m., 16m., 19m., 25m., 31m. and 41m. short-wave broadcast bands.—Editor.

RADIO Australia is the overseas service of the Australian Broadcasting Commission and transmits more than 40 hours of programmes a day in English, French, Indonesian, Mandarin, Japanese, Thai Vietnamese and Cantonese.

Recent improvements are based on the installation of a new type of rotary aerial switch, at the main transmission centre at Shepparton in the State of Victoria. The system eliminates 21 aerial switching stations previously in use, and gives Radio Australia transmitters the maximum availability of 36 aerials at any time.



The control console for the 36 aerials in the Radio Australia radiating system, giving world-wide coverage and directivity as required. Aerial system, transmitter and frequency can be switched in a matter of seconds.



You may be running what in Amateur Radio would be called QRO — but look at this for a tank circuit! The output end of the RF power amplifier on one of the 100 kW HF transmitters for Radio Australia, at Shepparton, Victoria.

In the previous system, one switch controlled three aerials. A switch fault could put all three aerials out of action. This was a big handicap in peak loading. It also caused much extra work in switching programmes around the whole network to give an uninterrupted broadcasting service.

Externally, the switching matrix is constructed of a grid of steel beams, forming a vertical cylinder 28 ft. high, and radiating 25 ft. from the central transmitter terminating structure. The switch is formed by 10 aluminium arms, each 25 ft. long, which move horizontally round the inside surface of a semi-circular frame. Another 36 arms of the same size, each capable of moving vertically over the full height of the frame, are arranged so as to traverse the outer surface.

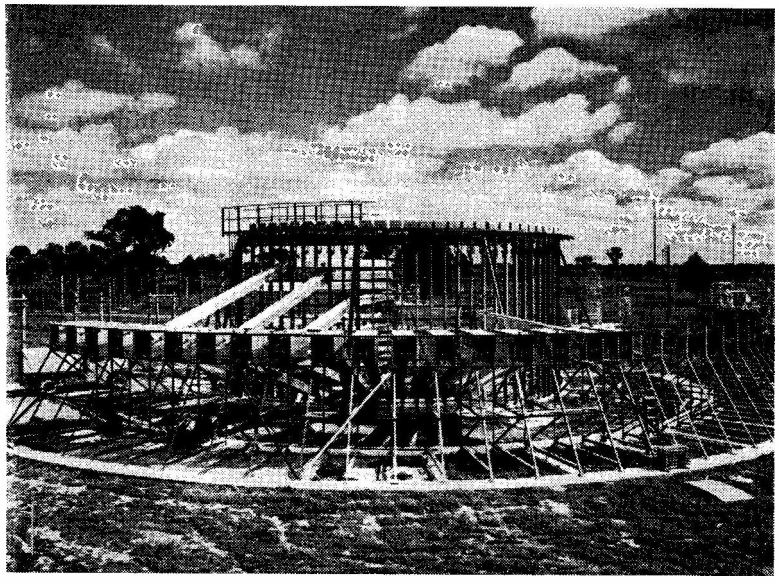
All 46 arms are motor-driven by remote control from the transmitter building. There the duty technician sits at a console, with full control of all 36 transmitting aerials on the 600-acre site, to which the 10 high-power transmitters can be instantly connected.

Over the 600 acres of irrigation pasture (Shepparton, on the Goulburn River, is a principal Australian fruit-growing area) the 36 main aerial

masts of the station rise 210ft. The masts are of lattice steel design, supported by guy cables that are kept taut by heavy counter weights. They tower over dozens of smaller poles, along which run the transmission lines. This feeder system involves 200 motor-driven switches acting as junctions through which 12 miles of arterial wires are channelled.

The radiated power is directed at low angle over the surrounding country on three main beams. One goes to Europe across Asia with a reflex to South America; a North American beam reflexes to Africa; and a powerful North Pacific beam covers the Far East and Japan. The transmitters occupy one side of the main hall in the transmitter building, with their control desks in the centre.

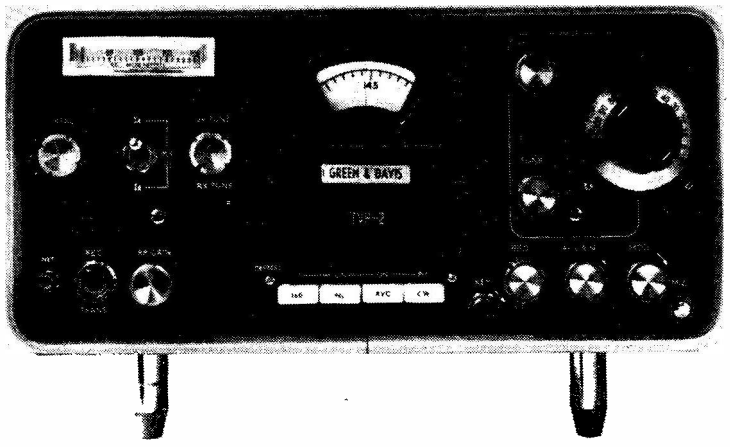
At Lyndhurst, 12 miles from Melbourne, Radio Australia has a subsidiary station. Here there are nine aerial arrays—five to Australia's north, South East Asia. and South Pacific, and four to Asia and Europe.



What an aerial switching panel for a QRO broadcaster can look like — the outdoor unit, under construction, for switching ten of Radio Australia's high-power HF-band transmitters in conjunction with a 36-aerial system giving directional coverage to all parts of the world.

Lyndhurst's HF transmitters are also used to provide alternative relays for the internal broadcasting services of the Australian Broadcasting Commission. They beam to localities in the Australian outback that are beyond the medium frequency range of the Commission's domestic network.

Split-second timing schedules between Shepparton and the Radio Australia studios in Melbourne are maintained by land-line, programme services originating in various States of Australia. They are collated in Melbourne for Radio Australia, where news bulletins, talks and continuity features are translated into various languages before being fed to the Shepparton transmitters.



The Green & Davis TVR-2 is a transistorised 160/2m. transceiver, featuring modular construction, the only valve used being a 7558 for the PA — this could be replaced by a suitable transistorised PA when it becomes available. In all, 28 semi-conductors are involved for Rx and Tx, construction is on printed circuit boards, and each module is separately screened, with the oscillator and mixer stages in die-cast boxes.

COMMUNICATION and DX NEWS

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

AFTER an overdose of the Season of Goodwill, one more or less *has* to send New Year's Greetings, not only to one's friends (which is pure pleasure), but to all sorts of characters whom one could just possibly bear to be without for a year or two. One would like to send them tangible presents, of course, and one would have a lot of fun choosing them. For instance, old Dot-Happy Charlie, whom one might term "the gentleman who is not quite in control of his electronic auto-sending device" would receive the biggest and heaviest left-foot operated contact-breaker that we could find in the junk yards.

Old Windy Willie, who babbles away every Sunday morning on Top Band, Eighty and Forty, saying exactly the same things as he has said every Sunday morning since the GPO issued his licence, would receive a tape-recording of his standard sermon, which would make it unnecessary for him ever to use a microphone again.

Some of our friends the Primitives, who have perpetuated 1929-type signals (both phone and CW) and use their stations as working models of museum exhibits in Kharkov (or Bucharest, or Zagreb, or almost anywhere you care to mention) would receive a large glass case with a push-button on the facia. This latter would be connected to a small explosive charge hidden in one of the legs.

And our friends the Contest-Bashers, who have conditioned their reflexes into surviving entire week-ends of St. Vitus' Dance, would receive a supply of tranquillisers (to be taken on Friday evenings) which would keep them in a coma for twenty-four or forty-eight hours, waking them up in a state of extreme euphoria when it was all over.

Notorious breakers-in would receive a jumbo-size QSL card worded "I am not deaf—I'm just ignoring you"; others, who seldom sign at all, and then sloppily, would also receive a QSL inscribed "ZCL." They would have to dig out their "Z" code to find that it meant "Transmit Your Call Letters Intelligibly." Oh, one could go on for a long time, having lots of fun. What a pity that none of us have the time to enjoy such harmless amusements.

After all that, we simply wish all readers a Happy New Year, including a steady improvement in DX conditions, a welter of contacts with new countries and an increasing enjoyment of everything that they choose to do on the bands. And this goes for all types, whether they are experimenters, constructors, operators, natterers or just plug-in appliance users . . . may 1965 be a good year for them all.

Around the Bands

The usual winter pattern prevails, except that, at the time of writing, *Twenty* seems to be a lot better than it was at this time last year. Its behaviour nowadays seems to be almost independent of sunspot numbers! The fade-out comes early, of course, but that will already be changing very noticeably.

Fifteen has been an unreliable proposition, but there has been a nice varied bag of DX there most mornings, especially in the 1100–1300 period. More phone than CW, as always, but even the key-bashers have had quite a lot to choose from—such as FR7's, FB8's, VQ8's, VS6, VK, ZL and, as usual, most of the African countries. No shortage of W's on some days, but a complete absence on others.

Forty is the usual mixture—a good DX band with that frightful treacly

ZONE-BAND TABLE

Station	Zones Worked						Total Zones
	28 mc	21 mc	14 mc	7 mc	3.5 mc	1.8 mc	
G2DC	40	40	40	36	25	5	186
W6AM	36	39	40	37	23	9	184
G6QB	38	40	40	34	20	7	179
G3IGW	36	38	38	32	18	11	173
G3DO	39	40	40	28	24	2	173
G3HZL	27	39	39	28	14	2	149
OH3NY	32	30	40	25	10	7	144
G3NOF	34	38	39	11	9	1	132
G3PEK	2	21	35	30	17	4	109
G3RDC	3	14	38	11	3	1	71
G3IDG	20	23	17	3	2	2	67
G3OLN	2	7	11	16	3	4	42
G3PLQ	1	8	7	3	3	5	29

smear of QRM all over everything. As always in December, the W6's have been workable over the long path, 1400–1530 GMT most days. But it's a bit frustrating to hear them at about 449 (on a bad day) to 569 (on a good one) and then to note that they are exchanging 599-plus reports with DL's. The skip never seems to come just right for the U.K. Again, VK's and ZL's in plenty, when conditions happen to be right.

Eighty shows signs of DX openings most nights by midnight or a little before. Those who don't mind long sessions on the tiles will probably find some quite exotic stuff there—both on CW and SSB. But, again, there is that steady QRM level that discourages all but the bravest. CW contacts with U.S.A. are pretty easy, though.

That leaves us with *Ten* and *One-Sixty*—poles apart both in frequency and usage. Ten has almost dropped out of the news this winter; Top Band is bigger news than ever. The former we really have no comments on; but Top Band must have its own section, as always, and we make no apology for it being such a big one, this month. We are now at the extreme peak of Top Band propagation conditions, and conditions resemble those of 11 years ago; but in those years, both receivers and aerials have been improved quite a lot, and activity from far-off places has increased. So the list of Top-Band DX now looks as though it might have strayed from the 20-metre column. There's no limit to the possibilities.

DX-peditions

ZS1LB and ZS6BDS plan a trip to **Basutoland,** January 3–17. Calls not known as yet, but they hope for ZS8LB and ZS8BDS. Frequencies, 14040 CW and 14290 kc SSB; other bands will also be worked. (Thanks to LRO E. McPheat of H.M.S. *Afrikander* for this information.)

The Iraqi **Neutral Zone** (8Z4) will be activated for seven days from January 9, by W1TYQ and OD5CL, signing HZ3TYQ/8Z4. They will have a KWM-2, Heathkit Cheyenne and Drake 2A. CW on 3501, 7003, 14005 and 21005 kc; SSB on 14110 kc. For CW call 5 kc up, for SSB as instructed.

Gus Browning, W4BPD, now described by the 4U1ITU boys as "the Ambassador-at-Large" says that they are "having a ball" in Italy but will soon be on the warpath again. (This means, eventually, AC3 and AC5, but one never knows what that man might get up to!)

VP2KJ plans to operate from **Dominica** and **St. Lucia,** beginning January 17, if the financial situation permits (his own QTH is Nevis).

VU2NR should be operating from the **Andaman Is.** about the time this goes to print; and he was to be joined by VU2RM or VU2AK around Christmas, after which they may also operate from the **Nicobar Is.** CW and SSB on 7, 14 and 21 mc, according to conditions.

DX News in General

Various Easter Island sorties have been promised, cancelled and carried out, but no definite news has reached us and no one seems to have worked them . . . XT2HV (Upper Volta) reported active on SSB (14100) around 1800 . . . HC1ARE operated from Quito on December 5 and 6, commemorating the founding of the city—special QSL's and all that.

Norfolk Island activity is promised during the whole of January by VK9TL. CW and SSB all bands—QSL's to VK3TL . . . FH8CD (Comoros) quite active on 14010 CW . . . TJ1AC (Cameroons) has been reported on 14270 kc SSB, 1530 onwards.

Marcus Is.—KG6IF is active, mostly SSB on 14250, mornings around 0800 . . . Kure Is.—KH6FJL promises activity for three days during February. Meanwhile he operates on 21400 kc SSB daily (from Hawaii) and says he is the only KH6 regularly on the band . . . American Samoa, KS6, remains a rare one, but W4WIV/KS6 has been heard on 14275 SSB, 0805.

W8NRB/UA3, operating from *Moscow*, is expected to remain active until January 5—mostly 14 mc SSB. He was on the air on December 1, at the official opening of the U.S. Exhibition in that city.

Proper mess-up by the Swaziland authorities, who, for some strange reason, advised licensees of a change of prefix from ZS7 to VQ6. ZS7R actually signed VQ6R during the CQ Contest. And they have now been told to revert to ZS7! Well, it all adds to the gaiety of nations, or something . . . it would be rather fun to sign ZK6QB for the A.R.R.L. Contest. And think of what could happen on Top Band, if everyone changed prefixes for a week-end.

It seems that 9M6 has now been adopted for North Borneo, ex-ZC5; 9M8 has already been made official for Sarawak. (North Borneo must be one of the few countries that has had four prefixes since the war . . . VS4, VS5, ZC5 and now 9M6. Sometimes it seems that the paper-work is the most important thing of all.)

Tables and Ladders

Although this is an unseasonable time of year for it, the Ten-Metre Activity Table makes its first appearance this month. It shows Countries and U.K. Counties worked, with a starting date of June 1, 1964, and we hope to see it grow rapidly. (New tables always start very small!) Let us have your entries, please, however low the score, and we shall see the figures put a sudden spurt on with the arrival of the spring.

For some reason the Zone-Band Table has never caught on, although several readers praised it as a Good Idea when it was introduced. The whole thing has remained static—both as regards the number of entrants and their actual scores. The fact is, obviously, that nobody is working any new Zones these days, and that the "new boys" with very small scores don't like to show themselves.

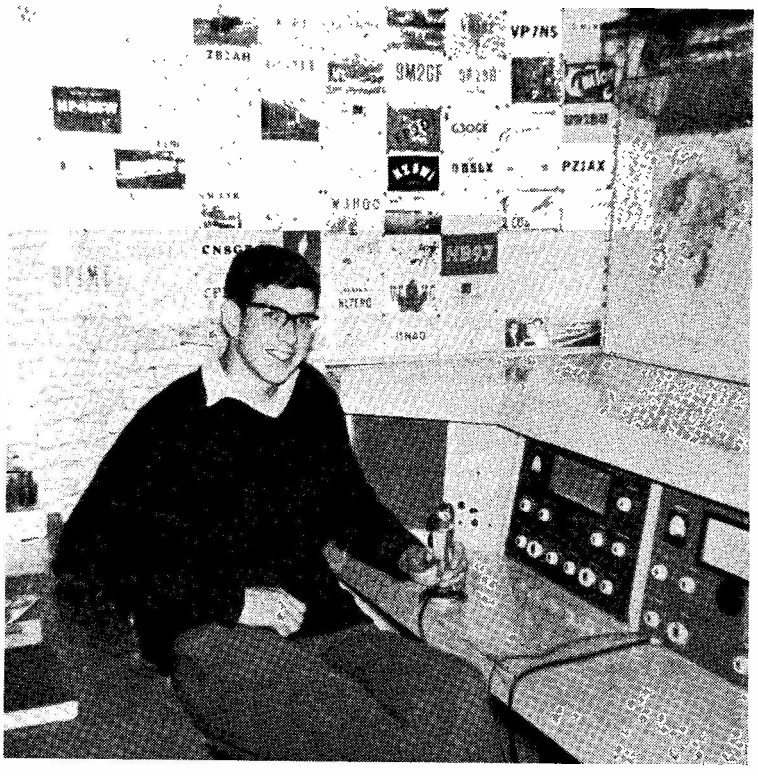
So . . . from the February issue onwards we shall revert to the old trusty and very popular *Five-Band DX Table*, in which the positions are always changing. Entries by next deadline, please (January 18), as follows: Callsign; Countries worked on each band (80, 40, 20, 15 and 10); and, finally, Total Countries Worked. The latter means what it says—*not* the sum of the five single-band columns, but the number of countries you have worked, independent of band. No bottom

limit—anyone may enter. We hope to see some of the old stalwarts back, as well as lots of new ones. Don't forget, then—the Five-Band Table starts again next month.

The Top-Band Counties Ladder has been with us for so long, in its present form, that we should also like to make a change there; innumerable callsigns have come and gone, starting right at the bottom and eventually disappearing from the top after several appearances with the " 98-98 " label. Here there are several alternatives, and we throw this discussion over to the meeting. G3REA suggests that the three columns might be " Counties Worked (Phone) "; " Counties Worked (CW) "; and Total (sum of the two figures).

Another idea is to include *Countries* worked, and to run three columns for Countries, Counties and Total (again, the sum of the two previous figures). Your opinions are sought, please, and we will organise whichever is the more popular scheme, unless anyone has other ones which they think better. No change at present—but definitely one in the offing.

We don't like to see any tables becoming static, and there is no reason why that should happen to the Five-Band Table — someone, somewhere, is working the odd " new one " all the time. (But not a new Zone, it appears.)



Neat station layout by Mike Cox, G3RWR, 3 Regina Drive, Walsall, Staffs., who was licensed in March, 1963. His gear is entirely home-built, both Tx and Rx, and he runs it Sideband, too, with a linear PA using an 813. Having tried various aerials, and different bands, he is now settled on 20m. with a Quad, and has worked about 200 countries in all 40 Zones. Not bad going, all this, when you realise that Mike is only just out of his sixth form at school, his chosen career being electrical engineering.

Top Band DX

The first of the Trans-Atlantic Test mornings (December 6) augurs well for the season. Conditions didn't appear to be exactly sensational, but there was a lot of activity, and a combined list of all the DX heard by our various correspondents on that morning makes pretty good reading. Here it is: VO1FB, VE2ATU, VE3BWY, W1BB, K1OEY, W2KHT, W2RKL, W8GDQ, K9PAW, 6Y5XG, 9L1HX, 9L1TL.

Two other surprises were the appearance on the band of SVØWZ and VE8HL/SU, in late November. The latter worked PAØPN, and the former a few G's; we hope they will stay on the band for awhile.

DX news from W1BB in a " flash " bulletin includes the following: The first VK/VS1 phone contact was made on October 25, between VK3ATN and VS1LP (now 9M4LP) . . . the latter also heard JA6AK (1880 kc) on October 31 . . . first JA/W contact was between JA6AK and W6GTI, on November 12. Active JA's are 1CR, 3AA, 3JM, 2WB, 1CNE, 2YT. Stations trying to work them are asked to remain in the 1800–1825, or 1975–2000 kc bands, listening for the JA's on their *spot* frequency of 1880 kc.

We have, for years, been lambasting G's for working in the 1800–1825 kc sector when calling W's; now it's interesting to note that W1BB is appealing to W's not to work in the 1820–1825 kc sector, because they tend to blot out Europeans (who use 1823–1827 kc very extensively). Things are getting a bit complex, with different calling frequencies and listening frequencies for all parts of the world.

ZE3JJ sends news of a Beacon station established by ZE2JV, operating on 1801·5 kc with 10 watts. It sends " de ZE1AZD " at intervals, and the carrier is off for about 18 seconds every 7 minutes. It is situated on top of a high mountain with a vertical half-wave centre-fed aerial, and has already been heard in South Africa (700 miles). Reports to ZE3JJ, please.

Other Top Band News

G3RFS worked both 9L1HX and 9L1TL on December 6; he hopes they were both genuine and that there may be a " first " here. VO1FB was worked at 0830, when he was still 449.

The most obvious phoney of all

time was heard by G6QB one evening around 2000, when a gent with a JA8 call was delivering a long, slow CQ on about 1820 kc. Unfortunately he was S9 plus 20! One can only hope that all these other new calls on the band are genuine.

G3TFX (Bexleyheath) sends a drawing of one of the curliest aerials we have ever seen, wrapped all round the house and garden . . . he got a 559 from OH3NY, his best DX so far; he also mentions that TF5TP has been worked by a few G's, and that on November 15 he heard W1BB working W5TVW and VP3CZ.

G2CUZ (Ainsdale) reports that he and G3LWQ had a three-way with VO1FB on December 3 at 0030. *All three* were members of the Ainsdale Radio Club (VO1FB is also G3LMD).

GM3TMK sends some interesting news items. On November 15 VP3CZ called CQ and was answered by lots of G's . . . GM3TMK worked W1BB at 0800 . . . OH2HK is now on the band . . . OH3NY has his walls papered with some 50 certificates, gained during 22,000 QSO's since 1948. His address is pretty difficult to get down over the air, so here it is, for those who want to QSL direct: Matti Paivio, Ruotsink. 40, Riihimaki, Finland.

A colleague recently suggested that we must be the most Top-Band-minded country in the world, relating the number of stations on the band to the number of licences. That's probably true; Top-Band is such an old-established tradition here, probably dating from the days when it was the only band we had! But that didn't last long (hands up all those who remember the 115–130 metre band?)

The fact remains that in last year's *CQ* 160-metre DX Contest the breakdown of the scoring shows that there were at least 403 U.K. stations active, as against 904 from the U.S.A. and 90 from Czechoslovakia. With our amateur population of about 10,000, and the U.S.A. current figure of 265,000, that tells its own story. All right, then—we *are* the most Top-Band-minded country in the world. Let's be proud of it.

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
Phone and CW		
G2NJ	98	98
G3GGS	98	98
G3NPB	98	98
G3REA	98	98
G5JM	98	98
G6VC	98	98
GM2HIK	98	98
GM3KLA	98	98
G3LWQ	96	96
G2CUZ	95	97
G3PLQ	92	95
GM3IKD	90	93
OH3NY	81	83
G3SED	74	90
G3NOW	74	82
G3RHM	73	78
G3PPE	60	72
G3OJE	55	66
G3IDG	51	56
G3SWH	45	69
G3SJJ	38	76
G3SXW	32	45
G3SVW	19	59
G3SVL	17	46
Phone only		
G3NPB	88	88
G5JM	72	74
G3RHM	69	70
G3REA	56	67
G3PLQ	55	58
G2NJ	54	54

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

"CQ" World Wide 160-metre Contest

And that brings us, naturally, to this year's contest. Last year's, you may remember, was notable for the presence of G3GRL and GM3IGW at the top of the world list—first and second, no less. What will this one bring? The details are as follows: Dates and Times, 0200 on January 30 to 1400 on January 31; CW only; 2 points per QSO with stations in the same country, 5 for other countries, 10 for W, VE or VO stations; Multiplier —one for each foreign country, Canadian province or U.S.A. state worked.

Serial numbers: RST plus a progressive three-figure serial starting at 001. (W/VE stations will add their state or province.) Logs to be mailed before February 28 to *CQ*, 160-metre Contest, 14 Vanderventer Avenue, Port Washington, L.I., New York. A small supply of copies of the rules, and log-sheets, is available from G6QB on receipt of a stamped addressed envelope.

The HF Bands

Ten metres seems to have died on us completely this month—not an unusual happening in mid-winter at the bottom of the cycle. Fifteen, though, has been surprisingly good. G3NOF has noted plenty of East Coast W's, both AM and SSB, during the afternoons, and sometimes the VK's in the mornings.

G3TJD (Stafford) is a new reporter to these columns, and with 100 watts to a 33ft. vertical he has already chalked up 23 Zones and 83 Countries. On Fifteen he notes CR6, FB8XX, FR7ZD, KP4, MP4, VK's, VQ8BV, VS6EY, ZE, ZS, 9J2, 9L1 and 9Q5—all on CW. On Forty he raised ET3USA, TF3AB, VK5ZP, W's, ZC4's, 5A's and 9L1MX—same mode. And he asks why everyone stays below 7060 kc—suggests that if more would use the 7060–7100 kc section we might even clear a few commercial pirates out of it.

G3HCU (Peaslake) is a well-known ten-metre specialist who will be really glad to see that band come into its own again. A 10ft. extension has put his tower up to 50 feet, above which the TH-4 beam rotates at 55 feet (and a six-over-six for Two at 65 feet). Motor-driven, with indicator in the shack . . . and a very nice high QTH into the bargain. Ready-made for ten-metre records, we should say.

Twenty metres is mentioned by nearly all the correspondents this month, but no one has anything very startling to report. G3NOF has found the band opening around 0800 and fading at 1800, but there

Reporting the HF Bands

have been some unusual openings at later hours for short periods—ZL's coming in over the South Pole, and ZS's audible at 2300. And he is about the only one to mention Eighty . . . where he says that VE1 and VO1 have been coming in as early as 2100, with W2's there by 2200.

That reminds us that there have been one or two really strange days on Forty. On one occasion East Coast W's could be worked as late at 1030, W6's *via* the long path at 1430, and U.S. East Coast again as early as 1830. Fantastic band, really, if only one could see the trees for the wood (to invert a well-known metaphor).

SWL John Fitzgerald (Great Missenden), after a lot of listening on Fifteen, says that many operators only need to hear a CQ to " fire up the band "; the trouble is that few people call CQ except on special occasions such as contests. Except, that is, for the " enlightened fraternity " who use Fifteen for skeds with Central Africa and South Africa. From those parts come many excellent signals, whose owners find nobody in Europe to work. There's a lot in that . . . CQ's are to be deplored on a busy band like Twenty, but they should be used *more* on Fifteen and Ten. Try it out for yourself.

Old Timer

A very welcome letter from George Merriman, now ZL1PL, but formerly holder of the calls AC1AX, VS6AH, G6NC and ZL2AL, and brother of the late Harry Merriman, ex-G6GM. George is still active, mostly on Twenty and Eighty CW, also with " just enough phone to keep in with my good friends who can't read CW "! He makes some kind remarks about us (bless him!), sends New Year greetings to all his old friends, and says he hopes to get going on SSB during the coming year.

More DX Gossip

G3NOF informs us that the W8BNB/7G1, mentioned last month, is on the hospital ship *Hope* (he was active from off the coast of Indonesia some years back) . . . CR4AJ was worked on 14120 kc SSB (1800) . . . VQ1GDW, also (1840), still using old VQ1 prefix . . . 9M2EB has been heard on 14104 kc SSB at 1010.

The various promised Easter Island activities are a bit nebulous, but the VE3DGX party should be there by now. They were signing VEØNM from H.M.C.S. *Scott*, off Panama, November 30.

There's some talk of a CR3 prefix coming up—for Portuguese Guinea. CR5 will then be reserved for Sao Tome and Principe . . . VKØPK should be active from Macquarie Is. from January onwards, and will be interested in working Europe . . . MP4TBJ has been active (from Trucial Oman) around 14040 kc.

The Big Squeeze

First of a short series of band-surveys . . . this time, the top half of the Top Band, in other words 1800–1900 kc. This section was explored between 1900 and 1910 GMT on December 13, by means of a single sweep from 1800 to 1900 kc and back again. The following were logged: *1802 kc*, Coastal phone; *1806*, *1811* and *1816*, S9 carriers; *1818*, VVV de SPC (MCW, spreading 5 kc either side); *1821*, VVV de DHJ 58; *1827*, RTTY (amateur ?); *1832*, " Tweeter " beacon; *1833*, VVV de DHJ 59; *1838*, Coastal phone; *1856*, Coastal phone; *1865*, *1884*, *1891*, S9 carriers; *1894* and *1901*, " Tweeter " beacons.

In between all these, anything up to 100 amateur signals. And, of course, on another random sweep a few minutes later, coastal phone might well have been prominent in that " quiet " sector between 1838 and 1856 kc, which was more or less accidentally clear the first time!

Now this is a " shared " band, and we have no legitimate grievance. If we want to make use of it, we must put up with whatever is there. But it is quite enlightening to take a look, like this, and see just what we do have to contend with.

Another thrilling instalment next month!

Propagation

This subject has been on the hook for a long time, awaiting a suitable amount of space in which to introduce it. Propagation is better understood nowadays than it has ever been, but some problems remain, especially from the amateur point of view. Have you ever been puzzled by conditions that appear to be " one-way "—sometimes in your favour, sometimes not? Have you ever found that the better of two aerials for transmitting is not the better for receiving? And, in particular, have you ever wondered how it is possible for you to get the same report from a W station as you give him, knowing that he is using a full kilowatt and a beam up on a monster tower?

It is becoming recognised, more and more, that the important factor in amateur DX communication is this: Where does the signal make its first return to earth? We know that the ionosphere is unpredictable and unreliable, but that's more or less the same for everyone, at a given time. But, after the first reflection from up above, the signal has to be reflected again from some part of the earth's surface, and this, it is argued, is the critical moment.

Single-hop transmissions seldom suffer from fading or, indeed, from any serious attenuation—hence the preponderance, for long periods, of signals from the belt within, say, 600-1000 miles (all that strong stuff from Eastern Europe, for example). But if the signal has to take off for the ionosphere a second time, things become more critical.

A Great Circle Map is enlightening, and shows that, assuming a first skip of roughly 1000 miles (or anything up to 1500 miles) a G signal directed towards the U.S.A. will hit the almost ideal reflector —salt water. A signal in the

TEN-METRE ACTIVITY TABLE

(Starting Date: June 1st 1964)

Station	U.K. Counties Worked	Countries Worked
G3OAD	17	27
G3HCU	13	19
G3IDG	4	12

reverse direction, from the East Coast of the U.S.A., will do the same. But not so for the W5, WØ, W6 and W7 call areas, to name a few—their first skip will be right off land, and in some cases mountainous desert.

Does this explain why the W6's work the greater part of their world-wide DX *via* the long path, and find Europe on the short path rather difficult? And think of the plight of someone in the dead centre of North America, whose first hop in *any* direction will descend on dry land. (And reflect on how many stations from Central U.S.A. you have ever heard, compared with the huge numbers of East and West Coast stations.) Then look at the tremendous land areas of Asia and Africa; note those places whose first hop (or even two hops) would come down on land, and ask yourself whether they are easy places to hear? It begins to make sense, and it would explain, among other things, why some G stations find the long path to Australia much easier than the short. It also confirms the suspicion that it should be much easier for G signals to get to W6 than for W6 to get to G . . . which would explain the huge power differential that seems to hold for similar signal-strengths.

A good argument on this subject does at least make one realise that the ionosphere is not the only variable factor we have to contend with. It may well be that it's only half the picture.

Late Flashes — — —

GW3PMR (Bangor) is ex-G3PMR of Retford, and he notes the advantage inherent in the new prefix. On Top Band he has worked 60 counties and 13 countries since last October; from Retford it took him two years to obtain a score of 55 and 12!

G3SVL (Romford) finds that nearly all his new-county QSO's on Top Band are with G3S - - or G3T - - stations . . . on the other hand G3SWH (Bristol) says that out of the total number of G3R, S and T calls issued (roughly 2000, we make it) only a very small percentage ever operate CW at all. He thinks the worst thing the licensing authorities ever did was to abolish that " first year on CW only." (We have often felt that any rumour of a second Morse test after five or ten years would cause a colossal panic!)

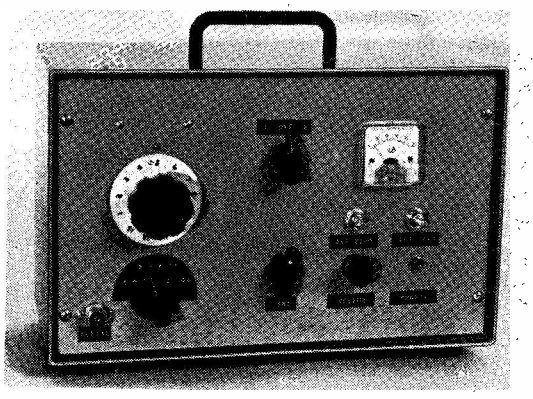
Those who read recent press reports about violent volcanic activity, which forced a meteorological party to abandon Raoul Is., on the Kermadecs, may have wondered about the safety of ZL1ABZ (who has kept those islands on the air for many years past). All is well—he had already left.

Apart from the W8BZB/MM operation already mentioned in connection with Guinea, WA2WUV should by now be active and signing 7G1H . . . Wake Island on Forty: KW6EI is said to be on 7020 kc with 125 watts and a ZL Special . . VR6TC is reported active on 21060 kc (2000 GMT, working W's) and now there are reports of a VR6QE as well . . . FK8AB, 8AC and 8AU said to be on 14120 kc SSB, 0700–0800 most days.

On pp.690–693 of this issue, you will find up-to-date Prefix Lists—put there so that they can be detached if required.

Sign-Off

This month's deadline was so early, and posts getting so confused by then, that many " regulars " have not appeared. We hope to see them in full force next month, when they will have much more time, since the deadline is **Monday, January 18.** This gives everyone plenty of time to get an entry for the *Five-Band Table*—the more the merrier. And don't overlook the Ten-Metre one, either. Address everything to " Communication and DX News," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And now we wish you all a Happy New Year—may 1965 bring in all the DX you need, and all the enjoyment you can derive from Amateur Radio. To all users of all bands, all modes, all sizes and all ages—all the best in 1965, 73 and — BCNU.



The new " Telecomm." Portable Field Strength Indicator and Test Set, type FS8/T. It covers all channels in the TV Bands I and III, with display on a robust m/c meter. The instrument is designed round a transistorised superhet circuit, powered by two 6v. PP1 batteries, on which the total load is only 30 mA, to give months of life. The channel selector switch brings in Ch. 1-13, and other controls are for fine tuning, output control and pre-set zero adjustment.

SWL • • • • • •

HOME-CONSTRUCTION ?—CONVERSIONS TO CW—WATCH TEN METRES— PROGRESS AND ACHIEVEMENT

IT has been apparent for quite a long time, from our correspondence, that hardly anyone is interested in building receivers these days. The average SWL just doesn't *want* to build anything; he may have a go at some pretty extensive modifications and improvements to war-surplus stuff, but when it comes to getting together a collection of components, a chassis and a cabinet, he simply is not present—though he might go in for a kit.

This is one of the modern trends that we just have to accept. It stems from two quite different influences. First, "affluent society," the so-called, thinks quite differently about spending money on electronic devices; and secondly, the construction of a worth-while receiver from scratch has become a vastly complex procedure. In pre-war days, anyone with a couple of pounds to spend could build himself a useful receiver—and, moreover, have it on the bench and working in a few days. If he had a tenner, or even a fiver, handy, he could quite easily build a transmitter too!

Nowadays, the general feeling is that if you can afford the total array of bits and pieces required for a really modern receiver—or a kit to build one from—you might just as well add a few pounds and buy the thing ready-made. The point is that only one person in thousands can now *design* his own gear; and there seems to be very little to praise in the mere act of copying someone else's design by a laborious term of assembling and constructing.

It was put rather nicely by a colleague, a little while back, who said: "You just don't build *your own* receiver . . . you build someone else's, and you do all the donkey-work of assembling it, which is better done by skilled workers in a factory . . . and when it's all over you haven't saved very much, and you can bet that it won't be as reliable or trouble-free as the factory job."

So it looks as though we are coming to the end of an era. The homebrew station is already a rarity; it will become even more so. It will never disappear altogether, because there's always *someone* who gets a kick out of constructional work. But such types are getting pretty scarce.

The DX-Chasers

The possession of a ready-built receiver doesn't deter any SWL from chasing new DX all over the bands; more than half of the letters we receive each month are simply short notes to add a list of prefixes to those already heard, and thus to climb up the HPX Ladder a few more rungs. If there ever was any doubt about the popularity of DX-chasing for its own sake, these types would dispel it.

Now that *D. Douglas (Dundee)* has re-appeared in our midst, note that the three top places on the ladder are all occupied by Scottish listeners. There is probably some good reason for this, but we can't see it at present—especially as the GM boys in the transmitting fraternity are always complaining that they can hear the Sassenachs working DX which isn't audible up there.

This month there have been more changes in the positions on the ladder than ever before, and quite a few additions. Most people, by now, understand what the HPX business is all about, but we have to enlighten one of this month's correspondents—the listings are for *different* prefixes heard, meaning one of each! (This chap sent in a list and made his total by adding up 19 UA3's, 21 UB5's, 24 W2's and so on.)

One more note: Although the CW boys are far behind the phone enthusiasts, numerically, it is good to note that the top scoring figures are gradually getting closer together. The CW totals are higher than any we have had since the Ladder was started five years ago. (And we might add, here, a plea for still more CW listening. One would think that *all* those who hope to acquire a callsign of their own in the next year or so would be chasing CW for all they are worth. There's nothing like it for reaching code proficiency.)

The present happy hunting-grounds seem to be Twenty and Eighty. Although the 15-metre band is far better than most of us had expected it to be, this season, not much listening seems to go on. Why? But Twenty is very good, especially between 1300 and 1800, by which time it has usually faded out. And it must be this that accounts for the popularity of 80-metre listening—there's nowhere else much to go in the evenings, unless you can stand Forty, which most listeners can't!

Encouragement

Terry Popham (Exeter) writes: "I am determined to take my R.A.E. in May, *or else*. The amateurs in our club don't half nag you about it!" Then, later, he asks: "What I want to know is, what do you do when 10, 15, 20, 40 and 80 are dead by 8 p.m. and you have plenty of time to spare?" Well, the answer's obvious to us—you get down to R.A.E. and Morse! (But whoever said that 40 and 80 were dead by 8 p.m.?)

A. W. Nielson (Glasgow), sitting up there on top of the Phone ladder, sends an analysis of the Zones and Countries he has logged during the years 1962, '63 and '64. This shows that his figures for the current year are well down on all bands—but partly due to less activity by SWL Nielson himself. However, he spent quite a bit of time on Forty, where he collected several new countries, and he is hoping that Eighty will bring in the real DX this winter. His main trouble is the B.R. power lines, parallel to his "poor little 33ft. Windom,"

and he wonders whether an indoor aerial, using a Joystick or some-such arrangement, might be better. (It could be, especially if up at a decent height.)

Point about QSL's

Most SWL's seem to think QSL's important just as a means of verifying that they really *have* heard so-and-so. A few of the younger and simpler ones treat them merely as pretty wallpaper, and amass the largest possible number. But don't overlook the other aspect, brought out by *D. H. Foster (Rainham)*: "Just as amateurs like to receive good reports, I really enjoy receiving QSL's which tell me something about the station at the other end; the operators' interests, and so on. However, many people don't have the time to send something of this nature." A growing number, we notice, do go in for *printing* something of this sort on their QSL's—especially the W's. Even if they don't tell you much about the operator and his family, a lot of them have interesting things to say about the place where they live. (And at least two members of SHORT WAVE MAGAZINE staff do the same.)

Old Timer Returns

A regular reporter to the old *Short Wave Listener*, until it ceased publication in 1953, was *H. M. Graham (Harefield)*—and very proficient he was, too. Now he has returned to the fold, chiefly because, during a bout of 'flu, he tuned around the short wave-band of the domestic receiver and heard "weird noises" which turned out to be SSB. The bug bit again—a Codar CR-66 was acquired, and an HPX score of 278 has already been achieved. Comments: "The QRM and the invasion of the amateur bands by all and sundry, compared with the old days, just appals me. As for car QRM on 10 and 15—it's just murder. I thought all cars were fitted with suppressors these days?" But SWL Graham also comments that some of the old familiar voices from 'way back are still in evidence—notably W1JFG and HC1FG.

Stewart Foster (Lincoln) admits to having been "converted," and he is now busy learning CW. And apart from covering most of the bands, especially 80, which he says is improving, SWL Foster has been indulging in some BC listening on the medium wave-band, where, in the small hours, he has logged about 12 U.S. stations, 7 Canadians, and "Radio Americas" on Swan Island (1160 kc). This is a good pointer to conditions on Top Band.

Michael Woollin (Leeds) suggests that if some of the Europeans who do nothing but call CQ on Twenty would only move to Ten, the latter band would become "active" and would release a bit more space for the DX types. And he adds: "I heard a G3T- - calling CQ the other day; a station replied, but after about five seconds there was the G3T- -, at it again. Perhaps another couple of years at the receiver would have been good for him."

P. J. Lennard (Wartling) had a good Top-Band listening session during MCC, for which he rigged up a 370ft. wire between two trees. It was 18ft. high at one end, but only 7ft. at the other, but results were very good, and his Check Log proves it. On the other hand, he logged VK3MO on 20-metre AM, using a BBC/ITV television aerial and a PCR-2 receiver!

J. P. Fitzgerald (Great Missenden) points out that all the prefixes in his list (291) have been logged on AM, with a WH837 8-transistor single-conversion superhet, and the six-band aerial described on p.84 of the April, 1964 issue. Now he, too, has been forced to take up broadcast listening again, owing to the early closure of the bands; he recommends the Radio Amateurs' section of "Swiss Merry-Go-Round," which is compiled by MB9GX. This goes out on 7110 and 9665 kc, 1230 GMT on the second and fourth Saturdays. And he adds that the Top Band DX boys should have a field day or two this season, judging by DX reception on medium waves—as already mentioned.

M. G. Allen (Heston) is a newcomer who has graduated from a PCR-2 and 6ft. of wire to an HE-30, a preselector and a 45ft. outside aerial. He recommends the receiver, but wonders why he gets BBC FM stations on the 10-metre band! And he queries the calls YL3CK, ST1CE and QS4JZ . . . we should place the first two as YO3CK and SP1CE, but who that "QS" is—any guesses?

P. Crull (New Romney), another newcomer, uses a Codar CR-66 and likes the 15-metre band, on which he heard three VK's on phone one morning around 1100. He also asks whether WN and WA count separately for the HPX ladder—they certainly do. *All* different prefixes count.

Eighty Metres

The particular kind of patience (together with a pair of ears with built-in filters) required for 80-metre listening is not very common. There are a few, however, who manage to pull it off, and it's pretty rewarding. *James Brown (Llandaff)* says it is hotting up, with W's and VE's by 0030 most nights. *Iain Mackay (Dingwall)* was logging W5's and 7's, working a ZL, as late as 0930-1005 GMT; and, of course, the East Coast W's at nights.

Nick Perry (Farnham) reports several VK's including VK5MO, in the early mornings, and wonders whether KR4AJ was genuine or a pirate. And several others have found that the 80-metre band is invaluable for filling up some of the gaps in their European prefix collections!

Another Old Timer

W. H. Gundill (Dewsbury) started listening in 1924, and kept at it (including VHF) until 1960, when he "got fed up and went QRT." This summer, though, the bug bit again; he got a National NC-140 and a Codar preselector and was back in business. Since then he has been experimenting with home-built preselectors for 28 mc only—one with a 6AK5 and the other with an EC92/EC91 cascode arrangement. With various aerials for the 28 mc band, SWL Gundill keeps up the interest and finds all kinds of

conditions prevailing at different times. On one occasion the band was full of UA, UB5 and UW3 phones, some of them calling W's; commercial CW harmonics were spread all over, the noise level was high, but it dropped off later (this was at midday).

On other occasions the Africans are coming in, with a few stray Europeans. The G stations are seldom heard from further than about 25 miles. And if the band seems dead, attention is transferred to 21 mc!

On the subject of the 28 mc band, we can only advise readers to keep an eye on it, especially during the hours of daylight; it is the most unpredictable of all our HF bands, and could easily burst into activity during this coming spring. At all events, a slow but steady improvement can be counted on, over the next four or five years, until it may well have become the most interesting band of all. And —for the benefit of readers whose experience doesn't go back to the last sunspot peak—*Ten* in full cry produces stronger signals, and sometimes more of them, than any other band; in fact it becomes almost too easy.

Quotes from the Post

"I get great pleasure from the challenge offered, and overcome, in gradually mastering and reading Morse. To me it is like learning a new language" *(R. de Buis, Felixstowe).* . . . "The HPX Ladder has been with us a long time now, and I would like to see a new table similar to the Zone-Band Table recently put in 'Communication and DX News.' To make this table that little bit harder, only Zones confirmed should count" *(David Whitaker, Clitheroe).* . . . Well, what do readers think? The HPX Ladder doesn't have to go on for ever, if someone can think up a better idea.

"I have two questions — is the ZT1 prefix genuine? And is there any potential in RTTY receiving, and would it have to be used in conjunction with a communications receiver?" *(Michael Silverstein, London, N.W.7).* . . . To the first, we've never heard of such a prefix; to the second — receiver *stability* is the main requirement. Even some communication receivers (so-called) are not so hot in that department, but the good ones are perfectly suitable. There is enough RTTY on the air to make reception interesting — and it is quite good fun getting the machinery going!

"Started listening on a broadcast receiver about 2½ years ago, on 160, 80 and 40. Then I found a teacher at my school was an amateur and I became aware of a new hobby, so I bought myself a BC-348K and hope to get a converter for 10 and 15 metres" *(Neil Robson, Corbridge).* . . . "Just received QSL's from 6O1, T12 and HC9 (*via* bureau) after a period of 420 days. Not bad, but I would have delivered them personally, quicker. My pet hate is people who address QSL's to 'Scotland, England!'" *(David Douglas, Dundee).* . . . "I've been made secretary of the school Wireless Society, which doesn't involve much except tinkering with tellies and selling them off! But I'm hoping to construct some sort of beam soon, as I can get hold of some aluminium tubing. For CW, I'm using your method of 'just listen,' and I think it works FB if you stick to it." *(Rupert Bruce, Uppingham).*

"I'm sorry for those SWL's without BFO's, because as far as I can see all the really good DX is on SSB" *(David Fitzgerald, Dublin).* . . . "I got the *Magazine* by accident—our newsagent had a left-over copy which I bought! It soon became evident that if I wanted to go further in the field of short waves I would need a new receiver. Now I have an HE-30 and about 20ft. of wire wrapped round the room" *(John Batten, Bargoed).* . . . "First receiver I used was a radiogram, then a 7-transistor SW

Correspondence for the next appearance of this feature, in the March issue, should reach us not later than January 29, addressed: "SWL," c/o The Editor, Short Wave Magazine, 55 Victoria Street, London, S.W.1. Good photographs of SWL interest are always wanted for publication and are paid for on appearance.

SWL • • • • • • *continued*

HPX LADDER

(Starting January 1, 1960)

Qualifying Score—150

SWL	PREFIXES	SWL	PREFIXES
PHONE ONLY		*PHONE ONLY*	
A. W. Nielson (Glasgow)	665	H. M. Graham (Harefield)	278
D. Douglas (Dundee)	648	M. G. Allen (Heston)	270
R. J. C. Coats (Cowie)	641	D. H. Foster (Rainham)	266
T. R. Popham (Exeter)	614	R. L. Richmond (Alloway)	265
R. Hunter (Kenton)	609	G. Christie (Gainsborough)	255
R. Williams (Birmingham)	600	B. J. Turner (Westcliff)	255
L. Margolis (Ilford)	594	R. V. Bruce (Uppingham)	240
S. Foster (Lincoln)	557	C. G. Ivermee (Reading)	231
B. Curnow (Plymouth)	511	R. S. Finley (Harrow)	208
P. Etheridge (Hull)	500	H. Wolton-Carr (Cambridge)	204
D. A. Whitaker (Clitheroe)	494	W. J. Angerson (Leeds)	201
A. H. Pardoe (Stourbridge)	467	A. Papworth (Over)	200
A. Huggett (Lamberhurst)	460	A. Parker (Chesham)	190
K. C. Staddon (Stroud)	459	N. Robson (Corbridge)	185
C. N. Rafarel (Poole)	448	P. A. Holliday (Nottingham)	185
P. A. Cayless (Exeter)	447	J. Butler (Bargoed)	173
P. Baxter (Winchester)	434	R. C. Booth (Stanmore)	171
P. J. Lennard (Wartling)	420	L. J. Carter (Spalding)	171
M. Woollin (Leeds)	407	D. Rogers (Wrexham)	170
C. Pedder (Preston)	352	D. E. Fitzgerald (Dublin)	170
A. Stone (Kidderminster)	338	C. Freeman (Nuttall)	165
M. J. Summers (Market Harborough)	335	C. Dillon (Bath)	164
J. E. Hart (Leeds)	326	D. Griffiths (Ilford)	162
J. R. Daws (Leeds)	298	N. Perry (Farnborough)	158
D. Poulter (Morden)	292	*CW ONLY*	
D. Dewar (Morden)	292	B. Curnow (Plymouth)	547
C. Whaley (Cambridge)	292	R. Hunter (Kenton)	538
J. P. Fitzgerald (Great Missenden)	291	P. J. Lennard (Wartling)	479
A. F. Roberts (Kidderminster)	285	J. D. Williams (Winchester)	385
D. C. Parker (Redditch)	285	R. de Buis (Felixstowe)	257
M. Shaw (Bromley)	285	P. Etheridge (Hull)	220
B. Turlington (Braunstone)	282	D. Douglas (Dundee)	209
I. A. Mackay (Dingwall)	282	M. Woollin (Leeds)	201
		J. F. Hudson (Birmingham)	157
		D. H. Foster (Rainham)	151

(NOTE: *Listings include only recent claims. Failure to report for two consecutive issues of "SWL" entails removal from the Table. Next list, March, 1965 issue—deadline, JANUARY 29.*)

broadcast job, and now an Eddystone S.504" *(Derek Poulter, Morden).*

On the subject of SWL's and their progress through the various familiar stages, we have been struck by the large number who are now being introduced to short wave listening, for the first time, by the various transistor portables that cover some of the bands, however inadequately. It is this very inadequacy that sends these chaps looking for something better, and at present one of the favourites appears to be the HE-30. And after that —what? Very seldom, as we said at the beginning, do we hear from anyone who plans to build his own receiver; so the future plans are determined almost entirely by the little matter of expense. If *that* is not a factor, there is virtually no limit. When shall we first hear from an SWL who has just bought a Racal RA-17 . . . or an HRO 500?

And talking of progress, *Chris Rees (Hatch End, Middlesex)* writes to explain why we've not heard from him for some time—he is now G3TUX. He took his Morse Test on the morning of December 4, and had his ticket by the afternoon! He says that though his problems are now on the Tx side, he will continue to take a great interest in this feature—from which, in his opinion, there is much to be learnt.

Short Points

Chris Woodward (Norwich) says that he is always hearing and reading that the bands are dead, and conditions are bad. If this is so, he is afraid that he will be "drowned with stations" when they are good! Too true—if the new sunspot cycle goes up to a really high peak, we're *all* going to be "drowned with stations." Sensitivity will matter little; selectivity will be everything.

H. C. West (Blundeston) listens in slightly peculiar circumstances, with a "12ft. dishbowl" aerial (we don't know that one) out of his window; and he says he gets a good laugh when he hears two W2's working each other, each with 5-element beams on big towers, and he looks at his "dishbowl and mop-handle." He has a four-valve battery receiver and an SSB attachment, home-brewed, and is not short on the DX, especially on Twenty.

C. Pedder (Wedmore) thinks the present tendency for amateurs to use higher and higher power (even with the advantages of SSB) is to be deplored, and thinks that 100 watts p.e.p. should be ample. He hopes to have his own licence in 1965, when he will be at Cambridge.

The deadline for our next appearance, in the March issue, will be **Friday, January 29.** Meanwhile, a Happy New Year to all our readers, and may 1965 mark the beginning of a long cycle of better conditions and more interesting DX. Happy Listening!

Do You Know That —

—— A right-angled soldering-iron bit, for transistor and similar small work, can be made by wrapping two or three turns of thick copper wire round the existing bit, twisting the ends together tightly, bending, and then filing to a point. 14g. will form a bit to about 1/8th in. diameter. *(W. Puffett, Upstreet, Kent.)*

—— The resonance of a coil inside a screening can be determined by connecting one side to a signal generator, suitably attenuated, and the other to the input terminal of a receiver, *e.g.* if the Rx is set to, say, 7 mc and the coil is resonant at that frequency, the input signal will be reduced to a low level. Thus, by a process of searching on sig. gen. and Rx, the resonant frequency can be found. *(GW3TLW.)*

—— Burnt-out elements from round-bar electric fires make good coil formers for experimental and mobile work when the old wire is removed. About 200 turns of any reasonable gauge of wire can be accommodated and, since the former has a central hole, it is easily mounted in a /M whip assembly. *(C. H. Richards, London, S.E.21.)*

—— A small magnifying glass suspended in front of the centre dial of an AR88 receiver makes the divisions much easier to see, and so seems to increase the band-spread! *(G5ZN.)*

—— If you have trouble tuning a weak signal on a portable Rx, take it near any rising cable or piping and the strength of the signal will improve considerably. *(P. Brooke, Salcombe.)*

—— A rubber grommet makes a convenient mount for many types of transistor. Simply select a grommet which fits snugly over the case of the transistor, drill out the appropriate chassis hole for the grommet, and push in the transistor. *(G3SHM.)*

—— Neat and effective two-pin plug-in coils, for use in GDO's, FSM's and similar types of equipment, can be made up on the standard 0·3in. dia. formers as found in the IFT cans of old TV receivers. These formers have half-inch fixing centres and, by mounting solder tags on 6 BA bolts in these holes, and bending the tags vertical, the former will be found to be a perfect fit in the standard FT-243 xtal holder. These formers also have the additional advantage of being threaded for a slug. *(G3TQF.)*

—— Discarded TV receivers, taken by dealers in part exchange against new sets, can often be had for an old song. Careful stripping down will yield a great variety of very useful parts, even if as a receiver the set is dead. And even at that, its sound or vision circuits may be found to be in working order.

—— A stubborn slug in the core of a coil, which cannot be urged to turn without risk of damage, can usually be shifted by the application of a few drops of carbon tet. (good old *Thawpit* again). This will dissolve the " goo " used to lock the core, and leave it free to be twiddled. (*G3TFR.*)

D-Y-K-T will print any good idea you may have that can be expressed in a couple of sentences—and pay a half-guinea for those used. But for the time being we are laying off discarded ball-point pen cases, unless something really clever is suggested. For this feature, no circuitry or drawings—just a wheeze or notion explicable in words.—*Editor.*

RF PRE-AMPLIFIER FOR SEVENTY CENTIMETRES

TROUGH-LINE LAYOUT FOR DISC-SEAL TRIODE

C. E. DEAMER, Grad.I.E.R.E. (G3NDC)

The amplifier described in this article is one which has been in use at G3NDC for some considerable time and is the result of much experimentation with amplifiers of this type. A grounded grid triode circuit is used in which the signal is applied between cathode and grid and the output obtained between anode and grid, the grid being common to both input and output circuits. For this reason the circuit is sometimes referred to as a common-grid circuit.

In these amplifiers feed-back is likely to occur from anode to cathode *via* the anode-to-cathode inter-electrode capacity and by coupling between input and output circuits across the grid lead inductance. It is, therefore, necessary to reduce these effects to a minimum by careful screening; to minimise the total anode-to-cathode capacity; and use multiple grid leads to reduce the grid lead inductance.

When considering types of valve to be used (the M-O A.2521 being a good example) it is seen that they have several grid connections—in the case of the A.2521 there are five which, when all soldered directly to an earthed screen placed across the underside of the valve socket, greatly reduce the effect of grid lead inductance. Since the more numerous the grid connections the better the stability, it is a natural step to the disc-sealed type of valve on which the grid connection is a *continuous ring* round the body of the valve; this may then be considered to be made up of a very large number of individual connection points.

Fig. 1 shows the circuit used and Fig 2 the method of construction. The amplifier is built in a trough made from 18g. copper, and is thus known as a "trough-line circuit." The input signal is applied to the cathode through C1, which acts only for D.C. blocking, and satisfactory performance is achieved without tuning this input circuit.

The output circuit is a half-wave line tuned by a small variable capacitor Ct at its end (made from two little brass discs) and the line is tapped to provide the output connection *via* C2. The position of this tap and the value of C2 play an important part in the determination of bandwidth and power gain.

Heater and cathode are maintained at the RF potential, by the use of the connecting chokes RF C1-3 and the anode D.C. supply is similarly isolated by choke RFC4.

The anode line forms an effective inductance, such that at resonance it tunes out the anode-to-grid inter-electrode capacity. For those who have an interest in the technicalities the method employed to find line length and value of trimmer capacitance, for a given frequency range, is outlined in the Appendix on p.685.

The value calculated for Ct will be extremely small and the range obviously even more so, and it may be of interest to mention that a means of increasing this value is to move the point at which it is attached along the line towards the anode. The basic theory as expanded in the Appendix. should not be looked upon as the complete design principle of this type of amplifier since it neglects many factors which are unknown quantities—for instance, the grid lead inductance—but it certainly gives a starting point from which the construction sizes may be worked out. It is necessary to make adjustments once the amplifier is constructed but these are by no means complex, and, since it is obvious when the amplifier is functioning satisfactorily, should present no problems even to the most inexperienced beginner.

Construction

The first step is to make the trough which is fabricated from 18g. copper sheet, cut and folded to the size shown in Fig. 2, and joined at the corners by soldering—preferably with silver solder,

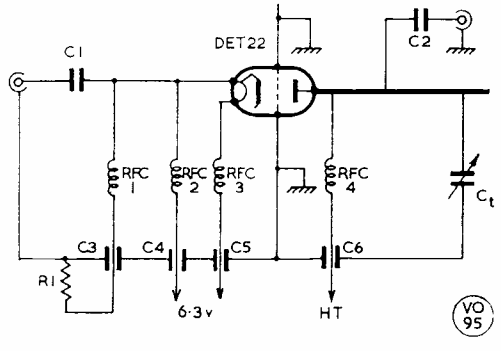


Fig. 1. Circuit of the 70-centimetre pre-amp. described by G3NDC, using a DET-22 in grounded grid. A physical layout for the trough, with dimensions, will be found in Fig. 2.

since the use of soft solder on these joints may cause some embarrassment later when attempting to solder other parts in place!

Holes for the feed-through capacitors may be drilled in any convenient position, but the location of these condensers, as shown in Fig. 2, may be used as a rough guide. The valve seat and screening partition, which together form the grid connection, are made by cutting a piece of 16g. copper sheet to fit inside the trough, cutting a $\frac{5}{8}$-inch hole in its centre, and soldering over this hole a $\frac{1}{4}$-inch length of copper tube having an internal diameter of $\frac{1}{4}$ inch. Once again silver solder should be used in order to simplify final assembly.

When the short length of tube is fixed in place a few slits should be cut in it to improve the electrical contact capacity by making the tube wall flexible to some extent.

Provided that silver solder has been used where advised, there will be no problem in soldering this copper sheet in position in the trough, with soft solder, at this stage. If, however, the constructor has been forced to use soft solder, the application of wet cloths to the other joints while fixing this in place with a large soldering iron may make the job the more possible.

The line is made from $\frac{1}{4}$-in. copper tube, and is connected to the anode by means of another short length of $\frac{3}{4}$-in. inside diameter copper tube. (Tubing of the type recommended for the line is used as oil piping on some cars, and the necessary length may be obtained from a garage). This line is held in position one inch from the bottom of the trough, by blocks, which in the case of the amplifier described were made of P.T.F.E., but a satisfactory item may be produced using perspex.

Connection for cathode and heater are very much a case of what-have-you, since to make a soldered connection direct is not advised. That used for the centre pin can be a clip of the type used on D1 diodes with the hole slightly enlarged; these may be found in large numbers in ex-Government equipment. The tuning condenser Ct is made by soldering a brass washer on to the end of the line and another on to the head of a brass bolt. The bolt is screwed through a nut soldered to the bottom of the trough, or a hank bush, and in this way the plate spacing can be varied.

Belling-Lee input and output sockets were used, but this is largely a matter of choice and availability, although it must be remembered that a *very great loss* can occur if a poor quality plug and socket are used.

Setting-Up Procedure

Before an attempt can be made to tune this amplifier a convertor must be obtained, unless access to test equipment of the appropriate type is available, and that used to test the amplifier described was a home-built version of the 70 cm. converter described by G2DD for SHORT WAVE MAGAZINE for March 1953. The procedure is quite simple, being to tune a signal if possible on the receiver *via* the convertor, connect RF amplifier and tune for maximum output by adjustment of Ct. (It is advisable to provide a stop on this adjustment to avoid the possibility of short circuiting HT to trough). In the absence of signal, tune for maximum background noise. Should difficulty be encountered, bend the open end of the line down nearer to the bottom of the trough until the line is found to tune correctly, an operation which should be carried out with the HT supply disconnected.

Table of Values

Fig. 1. Circuit of the 430 mc Pre-Amp.

C1	= 57 $\mu\mu$F	R1	= 68 ohms (mounted outside trough)
C2	= 10 $\mu\mu$F	RFC's	= *see table below*
Ct	= *see text*	V	= DET-22 (CV273)
C3, C4, C5, C6,	= .001 μF, ceramic feed-through		

INDUCTANCE DATA

Length of Line	=	18 centimetres
Diameter of Line	=	Quarter-Inch
Tap position, from Anode	=	8 centimetres
Line to Trough Spacing	=	One Inch
Diameter of Discs for Ct.	=	Half-Inch
Trough Dimensions	=	As given Fig. 2
RFC's 1-4	=	14 turns 20g. close wound to $\frac{1}{4}$-in. inside diameter

PERFORMANCE DETAILS

Va	250 volts	Band Width (at 3 dB),	10 mc
Ia	23 mA.	Power gain, 13 dB	(16 times approx.)
Vh	6.3 volts		
Ih	400 mA.		
Centre Frequency,	450 mc	Noise factor	
Tuning Range, ±	30 mc	(very approx.),	6 dB

Performance

In operation this amplified is found to be very satisfactory, although the more experienced amateur may consider a parametrics type to be preferable. If the constructor has to consider the cost, as most of us do, then the gain obtained per shilling spent. in dB's of course, for this amplifier make it a sound economic proposition and in this respect rather superior to the parametric amplifier.

An improvement may be obtained by silver plating the copper parts of the amplifier although the change was found to be very small and probably of interest only to the perfectionist striving to squeeze out the absolute maximum—but it certainly improves the appearance.

It is hoped that this article will help those just starting on the 70 cm. band, as well as being of interest to those already well established, and perhaps even arouse the curiosity of those who have not yet tried the pleasures of a band on which a complex antenna system is smaller than the usual ITV array.

Finally, it might be mentioned that this amplifier is not a "one off" item. Several have been built and put into commission without encountering any serious difficulties.

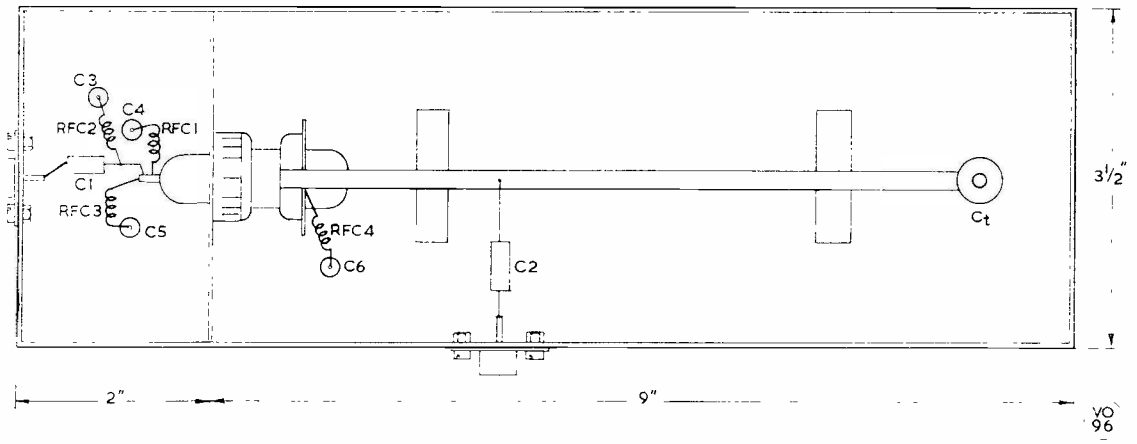


Fig. 2. This sketch is to almost exactly half-size, and shows the mechanical layout of the circuit of Fig. 1. The valve is a disc-seal triode, type DET-22, in which the grid connection is made to a copper ring, this forming the earthing point when the valve is mounted in the screening panel. The depth of the trough is two inches, and other details are given in the text.

APPENDIX

In the case of a rectangular trough, the line is necessarily very much nearer one face than another. and under these circumstances the characteristic impedance of the line is given by:

$$Zo = 276 \log_{10} \frac{D}{d} \text{ ohms.}$$

Where d is the diameter of the line, and D is the distance between the centre of the line and the nearest face of the trough.

Since it may be reasonable assumed that Zo is about 160 ohms:

$$\frac{D}{d} \simeq 4$$

The line is open circuit at one end and for a given length the impedance at the anode end may be calculated from:

$$Z = \frac{-\,j\,Zo}{\text{Tan } \emptyset}$$

$$\text{Where Tan } \emptyset = 2\,\frac{\pi\,L}{\lambda}$$

L is the physical length in centimetres and λ is the wave length in centimetres.

At resonance, therefore,

$$j/W\,Cag = -\,j\,Zo/\text{Tan } \emptyset$$

$$\text{or} \quad \text{Tan } \emptyset = W\,Zo\,Cag = \frac{2\,\pi\,L}{\lambda}$$

where W is $2\,\pi\,f$

When the tuning condenser is placed near the open end of the half-wave line, this situation is changed slightly so that at resonance

$$j/W\,Cag = \frac{Zo\,Zr + j\,Zo\tan\,\emptyset}{Zo + j\,Zr\tan\,\emptyset}$$

where $Zr = -\,j/W.Ct$

Ct is the tuning capacitance.

$$\text{Therefore:—} \quad \frac{\text{Tan } 2\,\pi\,L}{\lambda} = \frac{Zo\,W\,(Cag + Ct)}{Z^2_0 W^2\,Cag\,Ct - 1)}$$

and for a tuning range from f1 to f2 the value of Ct may be found from:—

$$Ct = \frac{(Zo.\,Cag)\,Wr + \text{Tan } \emptyset}{Zo.\,Wr\,(Zo\,Wr\,Cag.\,\tan\,\emptyset - 1)}$$

THE "NEW QTH" PAGE

All interested are reminded that publication of new U.K. callsigns, or changes of address, in our monthly "New QTH" feature (*see* p.694) can only be at the direct request of the individual concerned. The first thing to do when you get your ticket, or know that you are going to change your address, is to let us know—on a separate slip, headed and addressed "New QTH Section." And do please remember (*a*) To write clearly, (*b*) To give us your full QTH, and (*c*) To include your callsign! You would be surprised to know how often (*b*) is incomplete and (*c*) omitted!

The c/s addresses we publish go, automatically, into the international *Radio Amateur Call Book*, the only directory to the radio amateur stations of the world. To keep our commitment within bounds, we accept for publication in "New QTH's," only British Isles amateur station addresses. Any others received, from Commonwealth or foreign countries, are passed on to the *Call Book*.

VHF BANDS

A. J. DEVON

THE pattern of conditions on the VHF bands since last time out has followed the pattern of the weather—mainly poor, with a few bright flashes during the early part of the period. The RSGB 4-metre contest of December 13 fell into a trough—in fact, the glass was at one of the lowest points seen for some months—and it was hard going even for those looking for CW contacts. Nothing of great interest transpired, though a few scores were advanced, as the 70 mc All-Time table shows. On two metres, it has been largely a matter of local QSO's only, with occasional short GDX openings as "targets of fleeting opportunity."

Once again, however, real two-metre EDX is reported by the exponents of meteor-scatter operation. On December 12, using the *Geminids*, G3LTF worked UP2KAB for a very nice one, putting him up to 26C in Countries and level with ON4FG, though there are still several "loose ones" between these two. During this session, Peter also heard DL3YBA /YU1EXY on their own MS test schedule. Another very interesting contact is reported by G3CCH, who worked HG2RD on November 17 by the *Leonids* shower; this QSO took from 0200 till 0430, and John remarks that it was one of the most effective MS appearances for a very long time. Necessary adjustments are being made in Countries Worked to take in these movements.

Still on the subject of meteor-scatter working, UA1DZ is anxious to arrange schedules with U.K. stations who can do it. He runs a full kilowatt on 145·000 mc exactly, with a 15-ele Yagi, and is also busy on E-M-E work. UA1DZ is located in Leningrad, and G5YV would no doubt be glad to QSP on their HF-band sked.

Next expected Meteor Showers are the *Quadrantids*, January 1-4; possible minor manifestations during February 5-10 and March 10-12; then the very predictable *Lyrids* over April 19-23; followed by the *May Aquarids*, May 1-6, and marked as "good." It is pretty certain that a number of EDX schedules are being arranged for these periods, and it can be expected that the MS boys will be accounting for more new countries.

Joining the MS party will be G3EDD (Cambridge), who now has his kilowatt-ticket for 145·280 mc. The only thing he still needs, says Brian, is a "pass signed for QSO's in the middle of the night!"

Two-Metre Gossip

G4LU (Oswestry) found conditions at an all-time low during the period, though early in the month and over a very difficult path, a 559 2m. signal from GW5BI (Cardiff) was copied by pre-arrangement on 80m. Stan offers some comments on the beacon discussion—he holds that they are mis-named because they give no indication of conditions unless one is "in the beam"; he thinks he must get a side-lobe from GB3VHF, and that this suffers from propagation variations much more than the low-angle direct beam. His suggestion is that the Wrotham aerial should be re-designed to give a broader beam in the horizontal plane, and a more "compact" vertical pattern. With him, the Cornish beacon GB3CTC is quite reliable, in that though it is not often audible, when it is there it is a certain indicator that stations in that direction can be worked.

G3PFR (Bushey Heath) reporting here for the first time, also comes in on this beam business. He says that when his QTH was Ulverston in Lancs. (where he had three years of two-metre operation

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1964

Starting Figure, 14

From Home QTH only

Worked	Station
51	G3EDD, G3SAR
42	G3HRH
38	G3CO
36	G3FNM
34	G3GWL, G3TNO
32	G2AXI, G3AHB, G3PSL
29	G2BJY, G2DCX, G3PTM, G4LU
28	G3JHM/A
27	G3KWH
26	G3FIJ
23	G3LAS
20	G3TKQ
19	G3IOE, G3THC
18	G5UM, G8VN
17	G3CKQ
14	G3KQF, GW3CBY

This annual Counties Worked Table will run till August 31, 1965. All two-metre operators who work 14 or more Counties on the band are eligible for entry. QSL cards or other proofs are not required. After the first 14 worked, simply claim from time to time with counties as they accrue, giving callsign and date for the county worked. To keep the Table up-to-date, claims should be made at frequent intervals. Operators new to VHF are particularly invited to join Annual Counties.

before moving down south into Herts.) GB3VHF *was* a consistent and reliable guide to conditions—to the extent that if there was no Wrotham signal, the GDX was not there, either. If GB3VHF could be read without the BFO on, then so could phone from the southern G's. Now, from Bushey, his experience is much the same with GB3CTC and GB3LER. G3PFR runs 110w. to a QQV06-40A, with a pair of 807's in Class-B as modulator, and the beam is 5/5 Yagi, spaced one wavelength, at a mean height of 28ft. On the Rx side, he has a 6CW4 converter into a home-built double-super, tuning 28-30 mc in four 500 kc bands, crystal controlled to 1·8-2·3 mc tunable, with 470 kc IF and a half-lattice filter, followed by detectors for all modes. In sending his list for the All-Time, G3PFR remarks that six months of operating from Bushey has brought him more counties than three years of working at the Lancs. QTH! This seems to prove the point that it is all a good deal easier for southern G's.

GW3CBY (Swansea) has got into the Annual at 14C—which is nice going from where he is, so early in the season—and has now worked 132 different stations on two metres, all-time. G2AXI (Basingstoke) has been busy on the constructional front, but nevertheless managed to add 15C for the Annual, using his NBFM.

G3KWH (Welwyn Garden City) who is a very consistent two-metre man, has pushed the urge up from 30 to 70w. and now finds himself in a bit of a tangle with the mod.; recent contacts were with G3OBD for Dorset and G3SOA for Worcester. G2BJY (Walsall), for many years a follower of this piece, and active on two and four metres, reports six more for Annual Counties.

Incited, or perhaps spurred on by the comment here last time about the hills round him, G3EDD (Cambridge) has plotted a set of contours along 45° radials for a distance of four miles out from his location at Great Wilbraham. This is always an interesting exercise—all one needs is an Ordnance Survey sheet and an understanding of how to plot relative scales against vertical radiation angles—and if it does not reveal either (*a*) An obstruction never thought to be there, or (*b*) That visible high ground should not be an obstruction at all, it will usually explain failure or success in particular directions. (Is anyone else able to follow this?—*Editor.*) Anyway, the plots appear to put G3EDD more or less into one of those "invisible saucers," so Brian is in process of pushing the beam up from 25 to 55ft. in order to get a better look over the edge. He also has a comment on the new GB3VHF keying mode—which, if you didn't know it, is FSK; it is to be hoped that it will be cleaned up before long. (G3EDD says it's a T7 note with a 400 c/s shift, and the freq. is 10 kc low—otherwise, it's jolly good.)

Four-Metre Clip

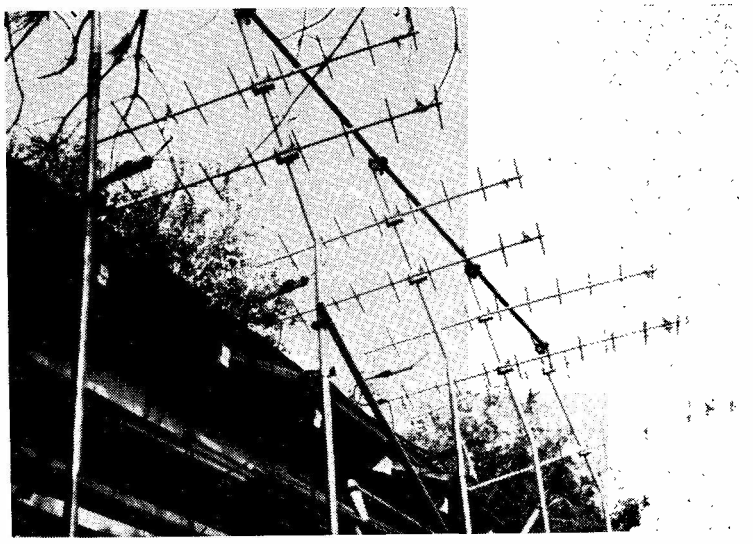
For "the first time in living memory," as you might say, we have had more reports this time for 70 mc than for two metres. It seems worth recording! G3OHH (Macclesfield) mentions a 4m. contact with G3CLW for Kent, and is now at 29C in the All-Time with the very fine total of 205 different stations worked; he may be right when he says it's much easier for those down south to score on 70 mc. He has passed his /P rig over to G3TEY (Miss Patricia Stansfield of Macclesfield) who is stirring up the activity with a nice signal.

High-scorer in the 4m. All-Time is G3IUD (Wilmslow, Ches.), now at 50C and on the look-out for G3LQR, GI3ONF and EI2A as workable possibilities for three new counties.

G5CP (Chesterfield, Derbys.) found conditions "not good" for the December 4m. contest, but worked in all 17 stations—the only ones heard; he goes to 19C in the Table. G3OJE (London, S.E.20) makes it at 16C, and G2BJY (Walsall) 29C.

GC3OBM (Guernsey), now on 10C, reports that the 4m. band has been "very dead" over there—and he would still like some schedules.

A very new station on the 4m. air is G3THH (Macclesfield), who would like to work a number of



You would hardly believe it, but this collection of VHF arrays, at the home station of W6YY, is part of his multi-channel set-up for the remote control of his real DX station at the top of Mount Wilson, twelve miles away and nearly 6,000ft. up! About 30 different control channels are available. They certainly do things in a big way out in California!

stations he can hear; he says his QTH is rather a poor one for VHF.

Shoulder - to - shoulder with G3IUD in the 4m. All-Time is EI2W who reports EI7D as a new station for Co. Dublin, and EI7A heard on from Co. Donegal.

FOUR METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8

From Home QTH Only

Worked	Station
50	EI2W, G3IUD
49	G3OHH (205)
43	G3EHY
37	G2OI, G3PJK
35	G3JHM/A (210)
33	G3OWA (213), G3SKR (158), G5JU
32	G3NUE, G5FK
30	GM3EGW
29	G2BJY, G3PMJ
26	G3LQR
25	G3AYT
24	G3LZN
23	G3BOC
21	GI3HXV
20	G2AXI
19	G3BNL
17	G5CP
16	G3BJR, G3FDW, G3HWR, G3OJE
14	G3OKJ
13	G5UM
12	G5DS
11	G3LHA, G3SNA
10	G2BDX, G3ICO. GC3OBM
9	G3EKP
8	G3NNO, G3PRQ

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

The 70 mc activity is certainly still on the up-grade, and your A.J.D. would throw out the suggestion that it will be found extremely useful and effective for general U.K. working during the coming months. The great thing in proving the effectiveness of any VHF band is to get some regular GDX schedules going—not just on a Sunday morning, but at least four or five evenings (or mornings) a week. At a frequency like 70 mc, propagation factors come into play which do not extend as high as 144 mc, and anyone wanting to take four metres seriously should not be relying on the same signs and the same Wx data as are accepted for two metres—though it is true that 70 mc, being in a sort of twilight zone, is quite likely to be good when the 144 mc band is well open. But the converse certainly does not apply, because of the propagation factors already mentioned.

It will be remembered by many people—and EI2W is probably still in a position to prove it—that the old 50 mc (6-metre) band could give real DX communication, extending to Africa and the Americas, in the days when 28 mc was an international DX band. And this cycle will, of course, come round again before long. Though we in the U.K. no longer have the 6-metre band—even by special permit (as it used to be)—the 4-metre band is not so far from it in terms of frequency as to make interesting DX impossible. It is true that the crippling factor here is that we are just about alone in the world in having 70 mc to play on—but that does not prevent the band from being of great interest from the GDX point of view.

Tabular Matter

There is neither time nor space to show it all this month, but the current tables are in. Your A.J.D. would once again ask correspondents to put claims for the *different tables* on *separate sheets*, headed by callsign and title of the table. This simple procedure can cut down by about half the time involved in preparing the tabular matter.

As this is being composed in that panic-period a few days before Christmas, there has not yet been time to work out some new form of Table for the three active VHF bands; any ideas that may occur will be offered in due course. And as nobody seems to be interested in Calls-Heard lists, we will not pursue *that* ploy any further—though A.J.D. still thinks they could help a lot on four metres, at least.

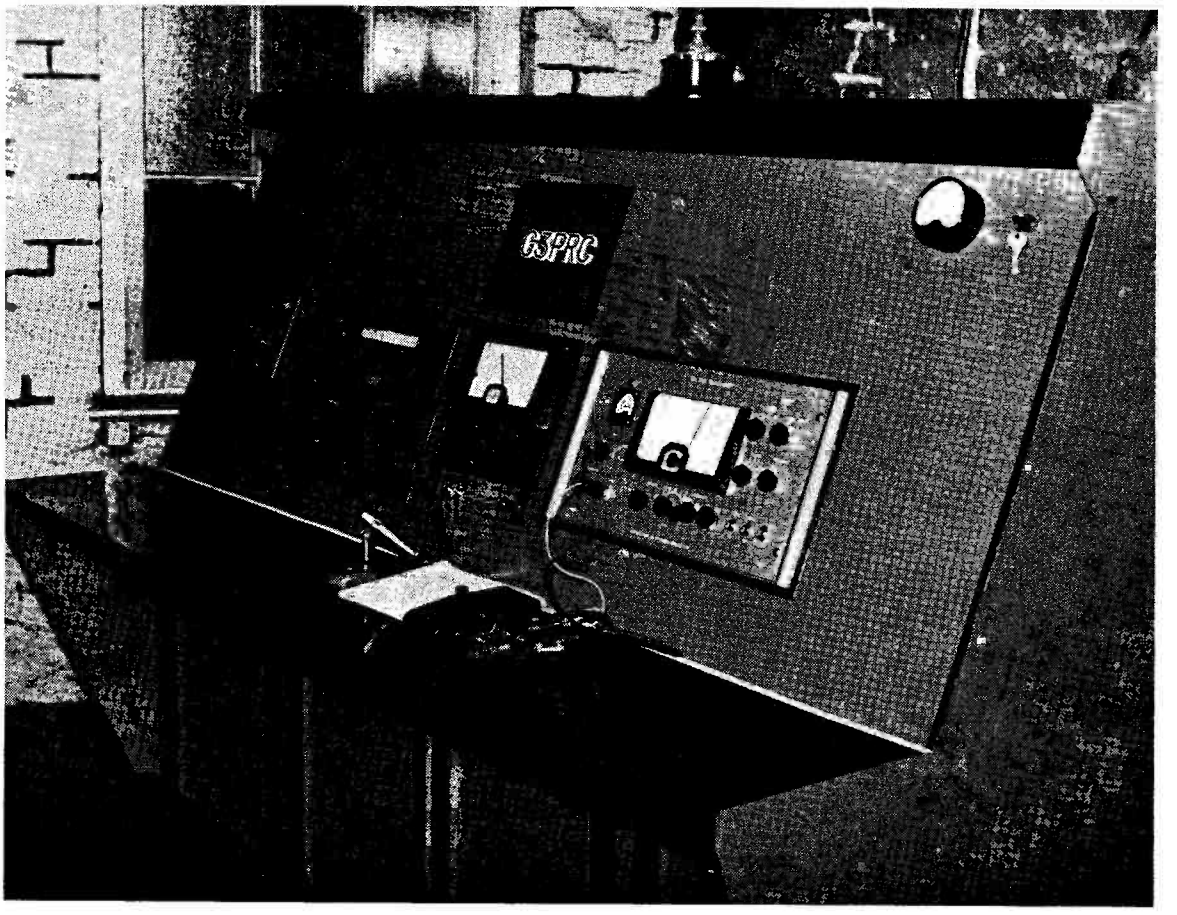
And a Very Happy New Year

If the enormous effort put forth by all connected with the production of this issue of the *Magazine* bears sweet fruit, a copy should be in your hands on New Year's Day. Whether it is or whether it isn't, this is A.J.D.'s opportunity to wish every reader of "VHF Bands"—now the oldest regular feature of its kind in print—a peaceful, prosperous and rewarding 1965; on the air and off it; in work or in business; and on the domestic front, which for most of us is so important.

There is now a little time for A.J.D. to scratch his head and think (he doesn't really think, he sleeps.—*Editor*) before the February output is due. Closing date is **Wednesday, January 20,** with everything VHF addressed to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Here's to us all for the New Year. *Urs as ever, A.J.D.*

T. A. ST.-JOHNSTON, G6UT

We very much regret to have to record the death, on December 19, of G6UT ("Uncle Tom") at his home, Bishops Stortford, after a long and active career in Amateur Radio, including two metres. The funeral was on December 23, and Amateur Radio was represented by members of the Harlow Club, of which G6UT was president. He was in his 81st year.



THE OTHER MAN'S STATION

G3PRC

THE story this time could be called "Another Club's Station"—for here we see G3PRC, owned and operated by the Plymouth Radio Club, at Virginia House Settlement, Palace Street, St. Andrew's Cross, Plymouth, with R. Hooper, G3SCW, as their honorary secretary.

Now about eight years old, serious Club operation was non-existent until the (very appropriate) callsign G3PRC was issued in 1962. Then began changes, which since then have evolved from a QRP Top Band rig with the proverbial "piece of wet string" to the rather more ambitious outfit you see here.

The main Tx is a K.W. "Vanguard," running 50w. on 10-80m. and ten watts on 160m. On the Rx side, a K.W. Geloso converter feeds into a hotted-up CR-100, and the aerial is a multi-band doublet about 40ft. high. The console, built entirely by Club members, was designed for maximum comfort and ease of operation over long periods. The whole station can be controlled from the finger-tip switches at the central position, with isolating cut-outs both inside and outside the station for any emergency. Single-control change-over is effected by *Londex* relays, with full BK available for CW operation.

On the maintenance side, the gear is under the control of G3SVZ, with a special three-man committee to arrange about operating matters.

While CW is the preferred mode, with the accent on DX, Phone is also possible on all bands. For the discriminating CW operator, there is a choice of straight or bug keys. Most contests are tackled, the WAC and WBE awards are on the wall, and DXCC is not very far off.

Keen operators are not lacking, and include G3BRJ, G3HSP, G3PGJ, G3SCW, G3SGV, G3SVZ, G3TSE, G3WL and G5TZ, with others. That the station really does work is shown by their DX cards. Club night is Tuesday, when G3PRC is QRV (also at week-ends), and always glad to work any other Club station.

LIST OF COUNTRIES BY PREFIXES

(Corrected to January 1965)

CURRENT PREFIXES ONLY

AC3	Sikkim
AC4	Tibet
AC5, 7, 8, 9	Bhutan
AP	East Pakistan
AP	West Pakistan
BV	Formosa
BY	China
CE	Chile
CE9	*see* Antarctica
CEØA	Easter Island
CEØX	St. Felix
CEØZ	Juan Fernandez
CM/CO	Cuba
CN	Morocco
CP	Bolivia
CR4	Cape Verde Is.
CR5	Portuguese Guinea
CR5	Sao Tomé and Principe Is.
CR6	Angola
CR7	Mozambique
CR8	Timor
CR9	Macao
CT1	Portugal
CT2	Azores
CT3	Madeira
CX	Uruguay
DJ, DL, DM	Germany
DU	Philippines
EA	Spain
EA6	Balearic Is.
EA8	Canary Is.
EA9	Spanish Morocco
EA9	Ifni
EA9	Rio de Oro
EAØ	Spanish Guinea
EI	Eire
EL	Liberia
EP	Iran
ET3	Ethiopia
F	France
FB8	New Amsterdam and St. Paul Is.
FB8	Kerguelen Is.
FB8	Crozet Is.
FB8	Adelie Land (*see* Antarctica)
FC	Corsica
FG7	Guadeloupe
FH8	Comoro Is.
FK8	New Caledonia
FL8	French Somaliland
FM7	Martinique
FO8	French Oceania
FO8	Clipperton Is.
FP8	St. Pierre and Miquelon
FR7	Reunion
FR7	Glorieuses Is.
FR7	Juan de Nova and Europa
FR7	Tromelin
FS7	St. Martin
FU8	New Hebrides
FW8	Wallis and Futuna Is.
FY7	French Guiana
G	England
GC	Jersey
GC	Channel Is. (*excluding Jersey*)
GD	Isle of Man
GI	N. Ireland
GM	Scotland
GW	Wales
HA	Hungary
HB	Switzerland
HBØ	Liechtenstein
HC	Ecuador
HC8	Galapagos Is.
HG	*see* HA
HH	Haiti
HI	Dominican Republic
HK	Colombia
HKØ	San Andres Is.
HKØ	Malpelo Is.
HKØ	Bajo Nuevo Is.
HL, HM	Korea
HP	Panama
HR	Honduras
HS	Thailand (Siam)
HV	Vatican City
HZ	Saudi Arabia
I	Italy
IL	Pelagian Is.
IP	Pantellaria
IS	Sardinia
IT	Sicily
JA, JB	Japan
JT	Mongolia
JY	Jordan
K	*see* W
KA	*see* JA
KB6	Baker, Canton, Howland and American Phoenix Is.
KC4	*see* Antarctica
KC4	Navassa Is.
KC6	Eastern Caroline Is.
KC6	Western Caroline Is.
KG1	Greenland
KG4	Guantanamo Bay
KG6	Guam Island
KG6	Marcus Island
KG6I	Bonin Is. and Parece Vela
KG6R, S, T	Marianas (Rota, Saipan, Tinian)
KH6	Hawaii
KH6	Kure Is.
KJ6	Johnston Is.
KL7	Alaska
KM6	Midway Is.
KP4	Puerto Rico
KP6	Jarvis and Palmyra Is.
KR6	Ryukya Is. (Okinawa)
KS4	Swan Is.
KS4B	Serrana Bank and Roncador Cay
KS6	American Samoa
KV4	Virgin Is. (U.S.)
KW6	Wake Is.
KX6	Marshall Is.
KZ5	Canal Zone
LA	Norway
LA-/P	Jan Mayen
LA-/P	Svalbard (Spitzbergen)
LA--/G	*see* Antarctica
LA, LH	Bouvet Island
LU	Argentina
LU-Z	Argentine bases in Antarctica, South Orkneys, South Shetlands and South Sandwich Is.
LX	Luxembourg
LZ	Bulgaria
M1	*see* 9A1
MP4B	Bahrein
MP4D	*see* MP4T
MP4Q	Qatar
MP4M	Muscat and Oman
MP4T	Trucial Oman
OA	Peru
OD	Lebanon
OE	Austria
OH	Finland
OHØ	Aland Is.
OK, OL	Czechoslovakia
ON	Belgium
OR4	*see* Antarctica
OX	*see* KG1
OY	Faeroe Is.
OZ	Denmark
PA, PI	Netherlands
PJ	Dutch West Indies
PJ--M	Sint Maarten
PX	Andorra
PY	Brazil
PY	Fernando do Noronha
PYØ	Trinidade Is.
PZ	Dutch Guiana
SM, SL	Sweden
SP	Poland
ST	Sudan
SU	Egypt
SV	Greece
SV	Crete
SV	Dodecanese Is.
TA, TC	Turkey
TF	Iceland
TG	Guatemala
TI	Costa Rica
TI9	Cocos Island
TJ8	Republic of Cameroon
TL8	Central African Republic
TN8	Congo Republic
TR8	Gabon
TT8	Tchad Republic
TU2	Ivory Coast
TY2	Dahomey
TZ	Mali Republic
UA1-6	USSR (Europe)
UA1	Franz Josef Land
UA1	*see* Antarctica
UA2	Kaliningradsk
UA9, Ø	USSR in Asia
UB5	Ukraine
UC2	White Russia
UD6	Azerbaijan
UF6	Georgia

UG6	Armenia
UH8	Turkoman
UI8	Uzbek
UJ8	Tadzhik
UL7	Kazakh
UM8	Kirghiz
UN1	Karelo-Finnish Republic
UO5	Moldavia
UP2	Lithuania
UQ2	Latvia
UR2	Estonia
UT5	*see* UB5
UV, UW	*see* UA
VE	Canada
VO	Newfoundland and Labrador
VK	Australia and Tasmania
VK	Willis Is.
VK	Lord Howe Is.
VK9	Christmas Is.
VK9	Cocos-Keeling
VK9	Nauru
VK9	Norfolk Is.
VK9	Papua Territory
VK9	New Guinea
VKØ	*see* Antarctica
VKØ	Heard Is.
VKØ	Macquarie Is.
VP1	British Honduras
VP2	Anguilla
VP2A	Antigua and Barbuda
VP2D	Dominica
VP2G	Grenada
VP2L	St. Lucia
VP2M	Montserrat
VP2K	St. Kitts and Nevis
VP2S	St. Vincent
VP2V	British Virgin Is.
VP3	British Guiana
VP4	Trinidad and Tobago
VP5	Cayman Is.
VP5	Turks and Caicos Is.
VP6	Barbados
VP7	Bahamas
VP8	Falkland Is.
VP8	South Georgia
VP8	South Orkneys
VP8	South Shetlands
VP8	South Sandwich Is.
VP8	*see* Antarctica
VP9	Bermuda
VQ1	Zanzibar
VQ8	Mauritius
VQ8	Chagos Is.
VQ8	Cargados Carajos
VQ8	Rodriguez Is.
VQ9	Seychelles
VQ9	Aldabra Is.
VR1	British Phoenix Is.
VR1	Gilbert and Ellice Is.
VR2	Fiji Is.
VR3	Fanning and Christmas Is.
VR4	Solomon Is.
VR5	Tonga
VR6	Pitcairn
VS5	Brunei
VS6	Hong Kong
VS9	Aden
VS9O	*see* MP4M
VS9M	Maldive Is.
VS9H	Kuria Muria Is.
VS9K	Kamaran Is.
VS9P	Perim Is.
VS9S	Socotra Is.
VU	India
VU	Andaman and Nicobar Is.
VU	Laccadive Is.
W, WA, WB, WN	U.S.A.
XE, XF	Mexico
XE4	Revilla Gigedo Is.
XT2	Upper Volta
XU	Cambodia
XW8	Laos
XZ	Burma
YA	Afghanistan
YI	Iraq
YJ	*see* FU8
YK	Syria
YN	Nicaragua
YO	Roumania
YS	Salvador
YU	Yugoslavia
YV	Venezuela
YVØ	Aves Is.
ZA	Albania
ZB1	Malta
ZB2	Gibraltar
ZC4	Cyprus
ZC6	Palestine
ZD3	Gambia
ZD7	St. Helena
ZD8	Ascension Is.
ZD9	Tristan da Cunha, Gough Is.
ZE	Southern Rhodesia
ZK1	Cook Is.
ZK1	Manihiki (Danger Is.)
ZK2	Niue
ZL	New Zealand
ZL	Chatham Is.
ZL	Campbell Is.
ZL	Kermadec Is.
ZL5	*see* Antarctica
ZM7	Tokelau Is.
ZP	Paraguay
ZS1, 2, 4, 5, 6	Republic of South Africa
ZS2	Prince Edward and Marion Is.
ZS3	South West Africa
ZS7	Swaziland
ZS8	Basutoland
ZS9	Bechuanaland
3A2	Monaco
3V8	Tunisia
3W8	Vietnam
4S7	Ceylon
4U1	United Nations
4W1	Yemen
4X	Israel
5A	Libya
5B4	Cyprus
5H3	Tanganyika
5N2	Nigeria
5R8	Malagasy Republic
5T5	Mauritania
5U7	Republic of Niger
5V4	Togoland
5W1	Western Samoa
5X5	Uganda
5Z4	Kenya
6O	Somali Republic
6W8	Senegal
6Y5	Jamaica
7G1	Republic of Guinea
7Q7	Malawi
7X2	Algeria
7X3	French Sahara
7Z	*see* HZ
8J1	*see* Antarctica
8Z4	Iraq/Saudi Neutral Zone
8Z5	Kuwait/Saudi Neutral Zone
9A1	San Marino
9G1	Ghana
9J2	Zambia
9K2	Kuwait
9K3	*see* 8Z5
9L1	Sierra Leone
9M2	Malaya } West
9M4	Singapore } Malaysia
9M6	Sarawak } East
9M8	North Borneo } Malaysia
9N1	Nepal
9Q5	Republic of the Congo
9U5	Burundi
9X5	Rwanda

Antarctica: CE9, KC4, LA--/G, LU--/Z, OR4, UA1, VKØ, VP8, ZS--/Ant, FB8, ZL5, 8J1—*all apply.*

(NOTE: This list of countries is not to be regarded as a key list for claiming the DXCC or any other award. Countries have been included which do not count for DXCC—*e.g.* IT, Sicily; VS9, Perim—but it was felt that they should be included in a complete list.

There is some ambiguity, at the time of going to press, about the prefixes in use in Zanzibar and Saudi Arabia.)

Our "DX Zone Map" will help to locate many of these prefixes and prefix areas. Another useful guide is the "Amateur Radio Map of the World." Both are available as advertised on p.648 of this issue.

ALPHABETICAL LIST OF COUNTRIES

(Showing Prefixes — Corrected to January 1965)

Adelie Land	**FB8**
Aden	**VS9**
Afghanistan	**YA**
Aland Is.	**OHØ**
Alaska	**KL7**
Aldabra Is.	**VQ9**
Albania	**ZA**
Algeria	**7X2**
Andaman Is.	**VU**
Andorra	**PX**
Angola	**CR6**
Anguilla	**VP2**
Antarctica	**CE9, KC4, VP8, FB8, etc.**
Antigua	**VP2A**
Argentina	**LU**
Armenia	**UG6**
Ascension Is.	**ZD8**
Asiatic R.S.F.R.	**UA9, UAØ**
Australia	**VK**
Austria	**OE**
Aves Is.	**YVØ**
Azerbaijan	**UD6**
Azores	**CT2**
Bahamas	**VP7**
Bahrein	**MP4B**
Bajo Nuevo	**HKØ**
Baker Is.	**KB6**
Balearic Is.	**EA6**
Barbuda	**VP2A**
Barbados	**VP6**
Basutoland	**ZS8**
Bechuanaland	**ZS9**
Belgium	**ON**
Bermuda	**VP9**
Bhutan	**AC5, 7, 8, 9**
Bolivia	**CP**
Bonin Is.	**KG6I**
Bouvet Is.	**LA, LH**
Brazil	**PY**
Brunei	**VS5**
Bulgaria	**LZ**
Burma	**XZ**
Burundi	**9U5**
Caicos Is.	**VP5**
Campbell Is.	**ZL**
Cameroons	**TJ**
Canada	**VE, VO**
Canal Zone	**KZ5**
Canary Is.	**EA8**
Canton Is.	**KB6**
Cargados Carajos	**VQ8**
Cayman Is.	**VP5**
Central African Rep.	**TL8**
Ceylon	**4S7**
Chagos Is.	**VQ8**
Channel Is.	**GC**
Chatham Is.	**ZL**
Chile	**CE**
China	**BY**
Christmas Is.	**VK9**
Christmas and Fanning Is.	**VR3**
Clipperton Is.	**FO8**
Cocos Is.	**TI9**
Cocos-Keeling Is.	**VK9**
Colombia	**HK**
Comoro Is.	**FH8**
Congo Rep.	**TN8**
Cook Is.	**ZK1**
Corsica	**FC**
Costa Rica	**TI**
Crete	**SV**
Crozet Is.	**FB8**
Cuba	**CM, CO**
Cyprus	**ZC4, 5B4**
Czechoslovakia	**OK, OL**
Dahomey Rep.	**TY**
Denmark	**OZ**
Dodecanese	**SV**
Dominica	**VP2D**
Dominican Rep.	**HI**
East Pakistan	**AP**
Easter Is.	**CEØA**
Eastern Caroline Is.	**KC6**
Ecuador	**HC**
Egypt	**SU**
Eire	**EI**
England	**G**
Estonia	**UR2**
Ethiopia	**ET3**
European R.S.F.S.R.	**UA1, 3, 4, 6**
Faeroe Is.	**OY**
Falkland Is.	**VP8**
Fernando de Noronha	**PY**
Fiji Is.	**VR2**
Finland	**OH**
Formosa	**BV**
Franz Josef Land	**UA1**
France	**F**
French Oceania	**FO8**
Galapagos Is.	**HC8**
Gabon Rep.	**TR8**
Gambia	**ZD3**
Georgia	**UF6**
Germany	**DJ, DL, DM**
Ghana	**9G1**
Gibraltar	**ZB2**
Gilbert Is.	**VR1**
Glorieuses Is.	**FR7--/G**
Gough Is.	**ZD9**
Greece	**SV**
Greenland	**OX, KG1**
Grenada	**VP2G**
Guadeloupe	**FG7**
Guam Is.	**KG6**
Guantanamo Bay	**KG4**
Guatemala	**TG**
Guiana, British	**VP3**
Guiana, French	**FY7**
Guiana, Netherlands	**PZ1**
Guinea, Portuguese	**CR5**
Guinea, Spanish	**EAØ**
Haiti	**HH**
Hawaii	**KH6**
Heard Is.	**VKØ**
Honduras	**HR**
Honduras, British	**VP1**
Hong Kong	**VS6**
Howland Is.	**KB6**
Hungary	**HA, HG**
Iceland	**TF**
Ifni	**EA9**
India	**VU**
Iran	**EP**
Iraq	**YI**
Iraq/Saudi Neutral Zone	**8Z4**
Ireland, Northern	**GI**
Isle of Man	**GD**
Israel	**4X4**
Italy	**I1**
Ivory Coast	**TU2**
Jamaica	**6Y5**
Jan Mayen	**LA**
Japan	**JA, KA**
Jarvis Is.	**KP6**
Jersey	**GC**
Johnston Is.	**KJ6**
Jordan	**JY**
Juan Fernandez	**CEØZ**
Juan de Nova	**FR7--/J**
Kaliningradsk	**UA2**
Kamaran Is.	**VS9K**
Kazakh	**UL7**
Kenya	**5Z4**
Kerguelen Is.	**FB8**
Kermadec Is.	**ZL**
Kirghiz	**UM8**
Korea	**HL, HM**
Kure Is.	**KH6**
Kuria Muria Is.	**VS9H**
Kuwait/Saudi Neutral Zone	**8Z5**
Kuwait	**9K2**
Laccadive Is.	**VU**
Laos	**XW8**
Latvia	**UQ2**
Lebanon	**OD5**
Liberia	**EL**
Libya	**5A**
Liechtenstein	**HBØ**
Lithuania	**UP2**
Lord Howe Is.	**VK**
Luxembourg	**LX**
Macao	**CR9**
Macquarie Is.	**VKØ**
Madeira	**CT3**
Malagasy Rep.	**5R8**
Malawi	**7Q7**
Malaya	**9M2**
Maldive Is.	**VS9M**
Mali Rep.	**TZ**
Manihiki Is.	**ZK1**
Marcus Is.	**KG6**
Marion Is.	**ZS2**
Marshall Is.	**KX6**
Martinique	**FM7**
Mauritania	**5T**
Mauritius	**VQ8**
Mexico	**XE, XF**
Midway Is.	**KM6**
Miquelon Is.	**FP8**
Moldavia	**UO5**
Monaco	**3A**
Mongolia	**JT**
Montserrat	**VP2M**
Morocco, French	**CN8**
Morocco, Spanish	**EA9**
Mozambique	**CR7**
Nauru	**VK9**
Navassa Is.	**KC4**
Nepal	**9N1**
Netherlands	**PA, PI**

Netherlands West Indies	**PJ**
Nevis	**VP2K**
New Amsterdam	**FB8**
New Caledonia	**FK8**
New Guinea	**VK9**
New Hebrides	**FU8, YJ1**
New Zealand	**ZL**
Nicaragua	**YN**
Nicobar Is.	**VU**
Niger Rep.	**5U7**
Nigeria	**5N2**
Niue	**ZK2**
Norfolk Is.	**VK9**
North Borneo	**9M8**
Norway	**LA**
Ocean Is.	**VR1**
Okinawa	**KR6**
Oman (Muscat and)	**MP4M**
Oman, Trucial	**MP4T**
Palestine	**ZC6**
Palmyra Is.	**KP6**
Panama	**HP**
Pantellaria	**IP**
Papua Territory	**VK9**
Paraguay	**ZP**
Pelagian Is.	**IL**
Perim Is.	**VS9P**
Peru	**OA**
Philippine Is.	**DU**
Phoenix Is., American	**KB6**
Phoenix Is., British	**VR1**
Pitcairn Is.	**VR6**
Poland	**SP**
Portugal	**CT1**
Prince Edward Is.	**ZS2**
Principe Is.	**CR5**
Puerto Rico	**KP4**
Qatar	**MP4Q**
Rep. of Guinea	**7G1**
Rep. of the Congo	**9Q5**
Reunion Is.	**FR7**
Revilla Gigedo	**XE4**
Rhodes	**SV**
Rhodesia, Southern	**ZE**
Rio de Oro	**EA9**
Rodriguez Is.	**VQ8**
Roumania	**YO**
Rwanda	**9X5**
Ryukyu Is.	**KR6**
St. Helena	**ZD7**
St. Kitts	**VP2K**
St. Lucia	**VP2L**
St. Martin	**FS7**
St. Paul Is.	**FB8**
St. Pierre Is.	**FP8**
St. Vincent	**VP2S**
Sahara, French	**7X3**
Samoa, American	**KS6**
Samoa, Western	**5W1**
San Andres Is.	**HKØ**
San Felix	**CEØX**
San Marino	**M1, 9A1**
Sao Thome	**CR5**
Sarawak	**9M6**
Sardinia	**IS**
Saudi Arabia	**7Z, HZ**
Scotland	**GM**
Senegal Rep.	**6W8**
Serrana Bank and Roncador Cay	**KS4**
Seychelles	**VQ9**
Sicily	**IT1**
Sierra Leone	**9L1**
Sikkim	**AC3**
Singapore	**9M4**
Sint Maarten	**PJ2M**
Socotra	**VS9S**
Solomon Is.	**VR4**
Somali Rep.	**6O2**
Somaliland, French	**FL8**
South Africa, Rep. of	**ZS1, 2, 4, 5, 6**
South Georgia	**VP8, LU-Z**
South Orkney Is.	**VP8, LU-Z**
South Sandwich Is.	**VP8, LU-Z**
South Shetland Is.	**VP8, LU-Z**
South West Africa	**ZS3**
Spain	**EA**
Spitzbergen	**LA**
Sudan	**ST**
Swan Is.	**KS4**
Swaziland	**ZS7**
Sweden	**SL, SM**
Switzerland	**HB**
Syria	**YK**
Tadzhik	**UJ8**
Tahiti	**FO8**
Tanganyika	**5H3**
Tasmania	**VK7**
Tchad Rep.	**TT8**
Tibet	**AC4**
Timor, Portuguese	**CR8**
Togo	**5V**
Tokelau Is.	**ZM7**
Tonga	**VR5**
Trinidade Is.	**PYØ**
Trinidad and Tobago	**VP4**
Tristan da Cunha	**ZD9**
Tromelin Is.	**FR7--/T**
Trucial Oman	**MP4**
Tunisia	**3V8**
Turkey	**TA, TC**
Turkoman	**UH8**
Turks Is.	**VP5**
Uganda	**5X5**
Ukraine	**UB5**
Union Is.	**ZM7**
U.S.A.	**K, W, etc.**
U.S.S.R. in Europe	**UA1, 2, 3, 4, 6**
U.S.S.R. in Asia	**UA9, Ø**
Uruguay	**CX**
Uzbek	**UI8**
Vatican City	**HV**
Venezuela	**YV**
Virgin Is., American	**KV4**
Virgin Is., British	**VP2V**
Volta, Upper	**XT2**
Wake Is.	**KW6**
Wales	**GW**
Wallis & Futuna Is.	**FW8**
West Pakistan	**AP**
White Russia	**UC2**
Willis Is.	**VK4**
Yemen	**4W1**
Yugoslavia	**YU**
Zambia	**9J2**
Zanzibar	**VQ1**

A List by Prefixes Alphabetically appears on pp.690-691. All four pages may be extracted for desk use if desired. Useful Maps to go with these Lists include the "Radio Amateur Map of the U.S.A." and the "Radio Amateur's World Atlas" (available as advertised on p.648).

NEW QTH's

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

EI8H, P. J. Fagan *(ex-EI7AU)*, Main Street, Granard, Co. Longford.

G3TLX, R. Goodman, 179 Edgwarebury Lane, Edgware, Middlesex.

G3TMN, Dr. T. M. Newland, The Meads, Tollerton, York. *(Tel. Tollerton 231.)*

G3TOK, J. L. Hall, 54 South Eden Park Road, Beckenham, Kent.

GW3TOW, A. D. Hirst, Four Winds, Kelsterton Road, Connah's Quay, Chester.

G3TPN, W. Knox, 34 Waldridge Road, Chester-le-Street, Co. Durham.

G3TSC, Amateur Radio Society, Trinity School of John Whitgift, North End, Croydon, Surrey.

G3TSO, M. J. Grierson, 5 St. Mary's Close, Peterborough, Northants.

G3TSS, C. A. Waters, 1 Chantry Estate, Corbridge-on-Tyne, Northumberland.

G3TSV, T. H. Clay, 25 Hollies Drive, Bayston Hill, Shrewsbury, Shropshire.

GM3TSZ, A. R. McWalter, 107 Muir Wood Road, Currie, Midlothian. *(Tel. Pentland 2971.)*

G3TTC, K. M. Orchard, 25 Kenmore Drive, Yeovil, Somerset.

G3TTE, A. J. Walker, 23 Tilehurst Road, Earlsfield, London, S.W.18.

G3TTF, J. A. Fegan, 50 The Roman Way, Glastonbury, Somerset.

G3TTH, T. S. Coltman, 22 Willow Poole Lane, Sutton Bonington, Loughborough, Leics. *(Tel. Kegworth 402.)*

G3TTI, L. F. Meikle, 2 Hawthorn Terrace, Gunnerton, Hexham, Northumberland.

G3TTJ, J. G. Barber, Leafield, The Ridgeway, Heswall, Wirral, Cheshire.

G3TTN, G. H. Haselden, 64 Morton Road, Blacon, Chester. *(Tel. Chester 23921.)*

GW3TUD, J. M. Allen, Cole's Corner Café, High Street, Saundersfoot, Pembs. *(Tel. Saundersfoot 2179.)*

G3TUH, B. W. Harrison, 24 Barrow Point Avenue, Pinner, Middlesex.

G3TUM, J. M. Stuart, 10 Stewards Close, Epping, Essex.

CHANGE OF ADDRESS

EI8AD, F. O'Byrne, 69 Willow Park Grove, Ballymurn, Dublin, 11.

GW2DPD, R. H. B. West *(ex-G2DPD)*, 6 Robinswood Crescent, Penarth, Glam.

G2FMR, F. W. Broomfield, 23 The Greswoldes, Radford Semele, Leamington Spa, Warks.

G2KI, G. A. Spencer, 7 Rivey Close, West Byfleet, Surrey. *(Tel. Byfleet 46722.)*

G2NP, F. A. Pride, Granfers, Jordans Village, Beaconsfield, Bucks.

GM3BGW, T. W. Homewood, 32 Sandylands Road, Cupar, Fife.

G3CHM, G. Buckland, 1 Drayton Drive, Heald Green, Cheadle, Cheshire.

GM3COV, G. B. Woffinden, 5 Rockwell Crescent, Thurso, Caithness.

G3FGT, L. F. Crosby, 11 Loxley Avenue, Shirley, Solihull, Warks.

GM3GHF, W. A. Gorman, 51 Drumby Crescent, Clarkston, Glasgow.

G3JFY, M. J. I. Lillington, Whitenap Cottage, Whitenap Lane, Romsey, Hants. *(Tel. Romsey 2497.)*

G3LEJ, M. G. Hudson, 7 Larch Road, R.A.F. Station, Topcliffe, Thirsk, Yorkshire.

G3LEX, R. Reed, 24 Atria Road, R.A.F. Station, Northwood, Middlesex.

G3LOJ, A. A. Blythe *(ex-ZC4AB/5B4AB/9G1FB)*, 34 Orchard Grove, Thorpe Edge, Greengates, Bradford, Yorkshire.

G3LXS, J. H. Scott, 6 Summerfield Road, Bridlington, E. Yorkshire.

G3MCF, J. Wilson, 4 St. Augustines Grove, Bridlington, E. Yorkshire.

G3MGC, R. M. Russell, Windsoredge Cottage, Windsoredge, Nailsworth, Stroud, Glos.

G3NFT, P. M. E. Pavey, 52 Springfield Road, Pennsylvania, Exeter, Devon.

G3NHG, C. D. Gammon, Tyrone, Belmont Drive, Failand, Bristol.

GM3OTG, G. H. Gilmour, Schoolhouse, Blackford, Perthshire. *(Tel. Blackford 218.)*

G3OV, A. H. Parker, 92 Panfield Road, Abbey Wood, London, S.E.2.

G3PFD, R. F. Vowles, 14 Railway Terrace, Fishponds, Bristol.

G3PFJ, J. D. Harris *(ex-ZE6JT/ZD4BN/ZD2JDH)*, No. 4 Flat, 7 Hatter Street, Bury St. Edmunds, Suffolk. *(Tel. Bury St. Edmunds 3182.)*

G3PJL, J. H. Hampson, 31 New Forest Road, Brooklands, Manchester, 23.

GM3PMT, J. S. Russell, c/o Sgts' Mess, R.A.F. Station, Buchan, Peterhead, Aberdeenshire.

G3PPE, M. J. Eccles, 185 Mosslands Drive, Wallasey, Cheshire.

G3RHF, A. Wheeler, 88 Village Way, Ashford, Middlesex. *(Tel. Ashford Mdx 55265.)*

G3RNX, W. I. B. Walker, 105 Coupe Lane, Old Tupton, Chesterfield, Derbyshire.

G3RRZ, C.o.H. Kingston, J. E., W/O and C.o.H. Mess, Royal Horse Guards, B.F.P.O. 15.

G3RYZ, M. G. Byrne, Chief Petty Officers' Mess, H.M.S. Terror, c/o G.P.O., London.

G6ZH, T. Winchcombe, 28 Broadleas Crescent, Devizes, Wilts.

G6ZH/A, T. Winchcombe, c/o Sgts' Mess, R.A.F. Station, North Luffenham, Oakham, Rutland.

G8HV, J. R. D. Sainsbury, c/o 9 Wayside Mews, Cookham Road, Maidenhead, Berks.

AMENDMENTS

G3OIZ, W. H. Ingle, Raworth, Queens Road, Littlestone, New Romney, Kent. *(Tel. New Romney 3333.)*

GM3ORX, A. G. Rumbold, Valhalla, Tullichewan Road, Balloch, Alexandria, Dunbartonshire. *(November issue.)*

SMALL ADVERTISEMENTS

(" SITUATIONS " AND " TRADE ")

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

SITUATIONS VACANT

ELECTRONIC TESTERS: Several vacancies exist for Testers familiar with Television circuitry for work on Industrial Television Cameras, TV Monitors, etc. Good salary, Station Transport. — Apply Personnel Officer, Peto-Scott Electrical Instruments Ltd., Addlestone Road, Weybridge. *(Tel. WEY 45511.)*

ASSISTANT EDITOR required for RSGB Publications. Good command of English and experience in journalism essential. Amateur licence an advantage. Salary offered will be in accordance with qualifications and experience but is expected to be not less than £1,200 p.a. Applications to—General Manager, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1.

DEVELOPMENT ENGINEERS required experienced in development and design of transistorised HF, VHF and UHF receivers and low power transmitters for commercial communication systems. Excellent prospects with small but expanding concern in ideal West Country locality.—Please write giving fullest possible details to Staff Officer, Radio Communications Co., 16 Abbey Street, Crewkerne, Somerset.

TRADE

QSL CARDS: Buff, blue, pink, green, 100, 15s.; 250, 25s.; 500, 40s.; 1.000, 75s.—Samples (s.a.e.); Reilly, Panxworth, Norwich, 56.Z.

WEBB'S LOG BOOK for recording signals heard and worked; 112 pages 9¼in. x 8in. approved format, semi-stiff covers. Excellent value; 7s. 6d. post free, or callers, 6s. 5d.—Webb's Radio, 14 Soho Street, London, W.1.

QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST, PROMPT DELIVERY, SAMPLES.—ATKINSON BROS. PRINTERS, LOOE, CORNWALL.

GREEN & DAVIS LTD. offer the following second-hand equipment for sale. HP and Part Exchanges arranged. AR88D in mint condition complete with original speaker in separate case, manual and built-in crystal calib., £59. GEC BRT-400 with product detector and fast-slow AVC for SSB, £89. Sonar SSB Transceiver, 14·0-14·40 mc, with AC and DC +ve earth PSU's; 200 watts p.e.p. Collins, 2·1 kc mech-filter, 0·2 μV Rx sens., complete with microphone and instruction manuals, etc., £139. K.W. Viceroy Mk. IIIA, £139 (price inc. separate power supply). KW-77, a choice of two, £70-£80. Eddystone 750, £45. Panda PR-120V, enquiries invited. By publication date we will have acquired numerous S/H equipments including an NC-190X and KW-2000.—Green & Davis Ltd., 104 Hornsey Road, London, N.7. *(Tel. NORth 6871.)*

I've been calling CQ-20, all through the night,
All I got were G's in plenty, pity me my plight,
What I have's a tiny tetrode, puny p.e.p.,
Then I got a lovely linear, made by G. & D.,
So when I now call CQ-20, the world comes back to me.

(Tune of: " All through the Night ")

NORTH-WESTERN agents for all Green & Davis, Codar, Lafayette and Partridge Electronics equipment. Eddystone 888A, speaker, S-meter, £70; AR88LF, £40.—James Stephens, 70 Priory Road, Liverpool. *(Anfield 3602.)*

READERS' ADVERTISEMENTS

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

SALE: ZC-1 Tx/Rx, 80-160 metres, *pi*-output, good condition, provision for external PSU, handbook, £8.—Simpson, 17 The Dene, Wylam, Northumberland.

MINIMITTER unit, bandswitched Tx, £10. Hammarlund Comet Rx, £5. K.W. Geloso converter, self-powered, £12, Delivered London.—Aitken, 19 The Headway, Ewell, Surrey. *(Tel. 7804.)*

S.36, some spares, £25. CR-100 coil unit, IF's, BFO, etc., £6. R.209 front-end, IF's, disc-valved, £4. AVO Sig. Gen., 50 kc-80 mc, £15. Xtal Cal. No. 10, £2. Stab. power, 250v. Pos., 80v. Neg., 6·3v. AC, £3.—B. A. Kind, 113 The Ridgeway, Chingford, London, E.4.

52 Set, as new, with mains/battery PSU, spare valves, and official Canadian manual, £13 10s. Also G.E.C. BRT-400 manual, £1.—Fenwick, 115 Church Hill Road, East Barnet.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Teleprinter, Creed 3X, perfect, £8; C.F.S. Terminal unit and circuits, £3 10s.; 840A Receiver, late model, immaculate, £30; Spy Rx, 50s.; B2 Rx, 30s.; R.107, £9; Carriage extra.—30 Abbey Crescent, Sheffield. *(Phone 363155.)*

TIGER TR-60B, TT21 PA, excellent condition, £45; Tiger 150w. Z-match, 75s.; Eddystone S.640 with speaker, £17 10s.; Minimitter Top 2-7, £18 10s.; Woden DTM-17, 750v. 250 mA, 50s.; A.M. Morse keys, 10s. (2s. 6d.); brand new Kokusai mechanical filter, £8 10s.; SSB Exciter, 2250 kc, 50s.; Jackson C.804 variables 15 $\mu\mu$F and 30 $\mu\mu$F, 2s. 6d. each (new). All items o.n.o.? Carriage extra.—G3MOE, Westbury Road, Cheltenham, Glos. *(24217.)*

SALE: K.W. Vanguard, 160-10 metres, factory-built, very good condition, £38; BC-221AF, mains PSU, amateur bands charts, £13. Buyer collects or carriage extra.—V. Burman, 1 Burnaby Road, Portsmouth, Hants.

FOR SALE: Brand new AR88D Receiver in maker's carton. Complete with service manual, spare valves, aerial, headphones and tools, £75, carriage 30s.—Sales, 87 Wickenden Road, Sevenoaks, Kent. *(Sevenoaks 55628 after 6 p.m.)*

EDDYSTONE 750 0·45 to 32 mc double superhet, speaker and manual, condition as new, performs to maker's specification. Offers?—*(Phone Gipsy Hill 4068.)*

FOR SALE: B-44 Mk. II, complete with crystals for 70·26 mc. Offers?—H. Bates, 16 Northfield Road, Ruskington, Sleaford, Lincs.

SALE: Transmitter DX-40U, VFO and xtals. New condition. With handbooks. Carriage paid, £27 10s. Exchanges.—G2DFH, 4 Westbourne Terrace, Saltash, Cornwall.

FOR SALE: Minimitter Mercury Tx 80-10 metres, perfect condition, £70. Minimitter ATU, £6. Avometer Mod. 7 with leather case, £10. Blaupunkt Frankfurt Car Radio 6/12v. L/M/VHF bands, automatic station selection, new, £25.—Willoughby, 29 Mackenzie Drive, Shorncliffe, Kent.

TCS Rx/Tx, control unit, cables, modified xtal mike, less PSU. 130A VHF Sig. Gen., field strength meter. SCR-522 Tx modified. SCR-522 Tx modified 4m. Offers?—G8DT, 18 Newcourt Park, Cheltenham, Glos.

SPECIAL QUALITY Versions of the following types of valves: ECC81, ECC82, ECC83, ECC91, all at 5s. each post free. Also many ordinary types, including EF86, EBR7, EL90 at 3s. each; s.a.e. for list.—G3RHF, 88 Village Way, Ashford, Middx.

SALE: Eddystone 640 Receiver, £14 10s. Also components, units, valves, HRO coils, etc.; send s.a.e. for list.—Box No. 4043, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: KW-160 transmitter, as brand new, £17 10s.; 2-metre Converter (Withers), IF 26-28 mc, £5, as new.—Box No. 4044, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SPHYNX Tx, 160-80-20 metres, mint, £45; Eddystone EC-10 Receiver, mint, £30; Unigor 3 meter, new, £10; quantity QQV03-10's, £1; QQV06-40's, 30s. —James Hogg, 104 Hill Street, Glasgow, C.3, Scotland.

R.216 VHF Receiver, 19-157 mc AM/FM/CW, good condition, complete with power supply and connecting cable, £36, including carriage.—Box No. 4045, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Double Beam oscilloscope, Hartley type 13A, etc.—G3PUV/T, 51 Lyndale Drive, Wednesfield, Staffs.

PANDA Cub, good condition (worked over 150 countries), plus new CR-100/8 mod., £50 plus carriage.—Wade, 28 Belvedere Street, Ryde, I.o.W.

HRO, 9 coils and PSU, for Sale in Wolverhampton. Good condition, £15. Buyer collects.—Telephone Bevan, *Dudley 54527*, 10 a.m.-5 p.m.

MINIMITTER MR.37 Communications Receiver, 5 bands, Q-multiplier, BFO, S-meter, cost £52, sell £22, carriage paid.—Pirie, 33 Pitt Street, Southport, Lancs.

FOR SALE: Heathkit RA-1 with matching speaker; also Minimitter Top to 7 mc Tx, both used only three times since purchased six months ago; £55 the lot, carriage paid.—G3CIF, St. George's Hotel, Truro, Cornwall.

G2DAF SSB Tx, 160-10m., complete with P/P and T/R switch, £60. HRO, mod. with two sections half-lattice and Q-Multiplier, with P/P, £18. 1475 Rx with own P/P for AC or 12v. DC, £12. Top Band Command Rx, £5. UM-3, £3. *Electroniques* Hamband coilpack, £12. *Labgear* W/B multiplier, 50s. Various other items.—G3HQX, Sutton, Surrey. *(FAI 1094.)*

SALE: AR77E, 31 mc to 540 kc, £15 o.n.o.? Also R.109, 1·8 to 3·9 mc and 3·9 to 8·5 mc, £5; 6-volt car battery operation with vibrator, battery available, £2. Also *Telecomm.* 2-metre crystal converter, 4 to 6 mc output, with two EF91 and two EF95's, includes PSU, £10. All in working order; immediate reception on 2-metre band with Converter and any of the above Receivers. Buyer collects.—J. Fraser, 20 Huxley Street, London, W.10.

FOR SALE: AR88D, in excellent condition, recently aligned, tested, cascode RF stage, S-meter, manual and photostats of modifications, £35 o.n.o.?—Hellier, 149 Guinness Flats, London, N.16. *(Phone Stamford Hill 7730 after 7 p.m.)*

NCX-3, surplus to requirements, mint condition, with NCX-D mobile power unit. Delivered 150 miles, £150.—G3FKO, 90 Oxstalls Drive, Longford, Gloucester.

EXCHANGE: Stereo Hi-Fi system, Leak amplifier and pre-amp., Garrard 4HF turntable, two speakers, cabinet, cost new £130 approximately. WANTED: High class Receiver. Cash adjustment if necessary.—Box No. 4042, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SSB Tx phasing type, 20 and 80 metres, complete with PSU, Vox, 6146 PA, etc., in neat table-top cabinet, £30; Linear Amplifier, 2 x TT21, self-contained with PSU, silicon rectifiers, £22. Marconi Marine Receiver, LW, MW and 1·4-30 mc, push-pull output, £25. B-44 Mk. II 4-metre Transceiver, £4. R.216 VHF Rx, 19-157 mc with PSU, £35. Pair Pye mains Intercom. units, the pair, £8. All items carriage extra.—Wilson, 13 Lumley Avenue, Skegness, Lincs. *(Tel. 1623.)*

SHACK CLEARANCE: Creed 3X, cover, spare tapes, etc., perfect, £7; G2UK T.U., brand new, £8; HRO Senior, 9 coils, P/P, matching speaker, like new, £17. One TBY walkie-talkie, 27-100 mc tunable, c/w P/P, carrying case, whip, phones, key, handbook, mint, £7; one TBY c/w whip, phones, etc., less P/P, mint, £5.—GI3HCP, 7 Prospect Road, Bangor, Co. Down, N.I. *(Phone Bangor 60251.)*

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Dow-key coaxial relays, brand new, boxed, DK60, £4; DK60-2C, £5; DK60G, £5; DK60G-2C, £5 10s. 220v. AC coils. Other Dow-key relays available, various voltages; s.a.e. with your requirements.—Box No. 4046, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

G3MAO fab. offer 93 copies *Short Wave Magazine*, 1955 to 1963, £4 13s. 38 *Bulletins* plus 67 *Radio Constructors*, £2 12s. E.C.G. Scope unit, £1 10s.—Ring *Gulliver 4261*, Pronto.

FOR SALE: Modern House, 5 years old, three Bedrooms, Lounge, Kitchen/Diner, kitchen fully equipped, large Garage, large Garden, Shack and contents, plus 55ft. Tower, complete with Mosley TA-33 and 4m.-2m.-70 cm. Beams. Local shops, schools; London 40 minutes, Dartford Tunnel 10 minutes. Price £4,650.—Williams, G3MHD, 51 Paley Road, Stanford-le-Hope, Essex.

GELOSO VFO type 4/102, 5-band for 2/807 or 6146, brand new with circuit, £6. Denco coil pack, RF and FC, 1·4 mc to 30 mc, new, £2. Selmer Truvoice guitar amp. about 10 watts *tremolo*, £8. Enlarger F4·5 lens, takes negatives to 3¼in. x 2¼in. (cost £40), £13. All including postage. List of valves, spares, etc.—Box No. 4047, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TELEPRINTER 3X, commutator skimmed, rewired; spare paper, ink rollers, perfect working order, cover; £16 including carriage U.K.—D. A. Hogg, Royston, Warwick Drive, Hale, Cheshire. *(Phone 061 Altrincham 4083 after 1830.)*

HENPECKED: Requires smaller set. Your Eddystone EC-10 (0-3 months old) and £15 in exchange for my rare unmodified Siemens Rx, built to NATO spec. 9 years ago, it cost £400! Definitely not a "tin and chrome" effort; 1·5-30 mc in seven bands, 160:1/5:1 drive with 10in. dial, diecast turret; nickel-plated 14g. construction, 90lbs.; four-section Mixer/IF filter, bandpass continuously variable, crystal to 100 c/s; ECH81 BFO/Det. mixer; 1 mc marker crystal; works manual; S-valve metering; bonny case.—Call evenings, bring EC-10, Rowbottom, 2 Newthorpe, South Milford, nr. Leeds.

FOR SALE: Marconi CR-100, unused since overhaul, with service manual, £20. Also HMV 55 gns. Tape Recorder, hardly used, £25 o.n.o.? Can be seen Kensington.—Box No. 4048, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1, or *Tel. Frobisher 2600 after 6 p.m.*

WANTED: Converter. Minimitter, Geloso or similar.—Zeiby, Corran House, Wingate Road, Highlands, Salisbury, Rhodesia.

FOR SALE: Minimitter MR-44 Receiver, excellent condition, £35.—R. D. Josephy, 8 Meetwood Park Drive, Leeds 16, Yorks.

HRO, modified with B7G-valved front-end, PSU, nine GC coils, handbook, good condition, £18 o.n.o.?—G3PTS, 21 Manor Road, Eastwood, Nottingham.

AR88LF, professionally overhauled and aligned, performs like new. Delivered 30 miles, £32 10s. o.n.o.? Cabinet extra, guaranteed. — *Blackburn 58594* evening, not Sundays please.

FOR SALE: R.107 Rx, mint condition, £11 o.n.o.? —S. Warner, 3 Marlowe Grove, Peterborough, Northants. *(Tel. 71092 after 6.30 p.m.)*

MINIMITTER MR-44/11 Receiver, nice condition, £34.—Wilson, Orchard House, Sutton Green, Guildford. *(Guildford 5783.)*

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: HRO modified for B7G valves, with PSU, GC coils, 50 kc-30 mc. Offers?—Box No. 4049, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Mint condition Marconi No. 52 Set incl. PSU, £15 o.n.o.? No. 19 Set with PSU, in good working order, £3. Buyer collects.—A. Zalsberg, 7 Darien House, Ocean Estate, London, E.1. *(STE 5617 after 8.30 p.m.)*

SALE: TW Twomobile Rx, £20.—Rowlands, Post Office, Meifod, Mont.

SSB Transmitter, 20 and 80 metres, 2-5B/257 1000v. PA, Vox and anti-Vox, PSU, worked WAC Round Table, described January 1959 *Short Wave Magazine*, £35.—G3HRO, 2 Cedar Road, Bromley, Kent.

R.107, FB condition, S-meter, handbook, spare IF chassis, £10 o.n.o.?—G3HGR, Knight, Asmara, 21A South Norwood Hill, London, S.E.25. *(Livingstone 5389.)*

SALE: Eddystone 840, a first-class Receiver in first-class condition, £30. Buyer collects.—Ridgeway, 13 Sunnyside Gardens, Upminster, Essex.

SALE: DST-100 double conversion Rx, power meter, S-meter, NL, etc., 50 kc-30 mc in 7 bands, good working order, 10 gns.; BC-312 Communication Rx, 1·5-18 mc, 6 bands, vernier tuning, etc., £11, FB condition, BC-221, good condition, calibration book, mains working, £10. Box about 20 relays, various, £1. Several Motors in box, 10s. About 250 valves, miniatures, octals, etc., including two 6CW4's, all or none, £5 the lot. Boxes of various components, meters, resistors, etc., 10s. each. AF Meter, £1. German valves, Two Wire Recorders, working, £5 the two.—Melhuish, 31 Shepherds Bush Green, London, W.12, mornings only.

R.390 Collins Rx. Service successor to 51J series. 5 to 32 mc, direct reading to nearest 200 c/s; 31 valves; xtal oscillators incorporate ovens for extra stability. Superiative specification.—Berry, 12 Warwick Crescent, Harrogate, Yorkshire. *(Tel. 3807.)*

AR88LF in new condition with matching speaker, S-meter and manual, £32 10s. Buyer collects.—G2AON, 333 Seaside, Eastbourne, Sussex. *(Phone 7039.)*

SAVE £40. Eddystone 940 (current model), slightly marked case, otherwise as new, £85 for quick sale (genuine reason). Buyer inspects and collects before January 17, or carriage, insurance extra.—Adkins, 72 Courtenay Avenue, Headstone, Harrow, Middx.

SALE: AR88D communications receiver, recently resprayed, revalved, fitted set new knobs, realigned by professional radio engineer; good condition, manual, £40, carriage 30s. Power unit Z.B. 10235, input 250 volt AC, output 24 volts at 15A; OK drive any type beam rotator; manual, good condition, £15 plus carriage. Power unit S.441B, input 230 AC, output 250 volts 200 mA, 12v. 3A, £1 10s. WANTED: Good R.109A, unmodified.—Box No. 4050, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: All-Band, mainly for CW, Tx about 50w. (DX-40U, K.W., similar type or home built) no TVI.—Details and price: Box No. 4051, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

KW/Geloso converter, good condition, £15. Can be seen working.—G3INZ, 13 Greenlands, Flackwell Heath, High Wycombe, Bucks.

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: All-Band or Few-Band CW/SSB exciter, home or factory built, to drive 6146.—Box No. 4051, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Transistor power pack 350v. 300 mA, £10. WANTED: QQV06-40.—G3OHC, 24 Wood Green Road, Winson Green, Birmingham, 18.

840A, less valves, £14 (buyer collects, Essex). New CR-100 manual, 30s.—Box No. 4056, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: DX-40U, little used, £21; Marconi TF-390G Sig. Generator 16-150 mc with some parts, £3 5s.—Write G3OXS, 64 Border Gardens, Shirley, Surrey.

KW-2000, few hours' use only. As-new condition (less power supply), £140 (H.P. available).—G3AME, Grange House, Reigate Hill, Reigate, Surrey. *(Tel. Reigate 46007 after 7 p.m.)*

BARGAINS: W.1191 Wavemeter as advertised December, now £4 10s.; DX-40U with VFO, manuals, FB condition, £20.—Akehurst, Stevens Cottage, Ipplepen, Devon.

EDDYSTONE 840C, mint condition, £45.—C. Vanderneut, 20 Lampton Park Road, Hounslow, Middx. *(Phone Hounslow 6110 after 7 p.m.)*

HARVEY WELLS (U.S.A.) Miniature 90 watt AM/CW Transmitter, 80-10 metres. Fixed or mobile use. Matching R9A receiver and AC power supplies. **£5 down and £1 per week for a year buys complete station (original cost over £150).**—G3AME, Grange House, Reigate Hill, Reigate, Surrey *(Tel. Reigate 46007 after 7 p.m.)*

SALE: Eddystone 680X in very good condition electrically and mechanically, £70 or best offer?—Hunter, EI9V, 30 Coolgariff Road, Beaumont, Dublin, 9. *(Tel. 374261.)*

HEATHKIT Mohican Receiver GC-1U for Sale, £17. Also Codar Preselector PR.30, £4.—G3SYZ, 143 Phillipers, Garston, Watford, Herts. *(Tel. Garston 4577.)*

EXCHANGE: Factory-built Heathkit Mohican, perfect condition, for new condition Tape Recorder of equal value.—E. Bartlett, Odd Spot Café, Fowey, Cornwall. *(Tel. 2235.)*

TABLE Top Tx, modified Tiger, 100w. CW/phone, TT21 PA, sequence keying, FB at £45. Also lots components including 100 kc, 500 kc and 1 mc marker xtals, 7s. 6d. each. Miniature LMS Superhet coilpack, 10s.; new Muirhead vernier dial as RF units, 7s. 6d. Manuals for R.1392, 10s.; W.1191A, 10s.; CR-100, 25s. 2v. Hi-Fi preamp. to Mullard spec., £2. LPF No. 12, Admiralty, £1. Plus ceramic formers ex-TU, chokes and valves 1T4 to 813; sa.e. with enquiries. Prefer Tx to be seen and tested to satisfaction. Delivered 75 miles Leicester.—Box No. 4052, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EXCHANGE: Minimitter Mobile 3-band Transmitter, K.W. transistorised Power Pack, Minimitter mobile Antenna base with 160-metre top section, Perdio 5 Wave-band Portable Transistor Receiver. WANTED: Two-metre equipment suitable for mobile or fixed use.—Details, offers to Box No. 4053, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: Panda Cub transmitter and HE-30 Receiver, £50 the lot. Will split.—B. Heape, 3e Melita Road, St. Andrew's Park, Bristol, 6.

SALE: AR88D, S-meter, £22 10s.; Top-Band SSB/CW Tx, 807 final, £10.—Spencer, Paladyn, Lyons Hall Road, Bocking, Braintree, Essex.

SALE: K.W. Valiant 160-10 metres, KW-76 mobile Receiver 160-10 metres; S-meter, Dependapac transistorised PSU and control box for above; all factory-built in good working condition, £60. Webster Bandspanner 80-10 metre mobile aerial, £9. Above gear has worked all Continents. Geloso G.209R Receiver 160-10 metres, small fault, £30. K.W. Vanguard transmitter, 160-10 metres, factory-built, perfect, £30. Minimitter mobile whip with 160-80 metre coils, £4. Buyer collects Bristol/Bath area.—Box No. 4054, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MANUALS, circuits of all British *ex*-W.D. 1939-45 Wireless equipment and instruments, from original R.E.M.E. instructions. S.a.e. for list: over 70 types.—W. H. Bailey, 167a Moffat Road, Thornton Heath, Surrey.

TX/Rx ZC-1, 160 and 80 AM/CW, 12 volt, modified for xtal mic., £8 10s. Tx TA-12C Bendix table-top, new, unmodified, £5.—G3THH, *QTHR, Macclesfield 2276.*

SALE: Mint Eddystone 840A with matching feet, £40 o.n.o.? WANTED: QP166, Eddystone 898 dial, V4-6 Antenna.—Details to: G3SCU, *QTHR.*

WANTED: Base and chimney for 4X150A.—A. H. Jubb, GW3PMR, U.C.N.W., Dean Street, Bangor, Caerns.

FOR SALE: Hammarlund HQ-170A, good condition, £75 o.n.o.? Buyer collects please.—H. G. Cavill, G3SBH, Quarry Farm House, Cam, Dursley, Glos.

EDDYSTONE 940, latest general-coverage SSB receiver, v.g. condition, £100 o.n.o.?—Box No. 4055, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SSB all band prototype transmitter, 400-watt approx. p.e.p. c/w power supplies, real Dx'er, £35. BC-342, usual mods c/w power supplies, £12 10s. Top Band mobile SSB Tx, transistor power supply, Command Rx, £15. 5-Band SSB Tx using Jap filter, Eddystone 398 dial, power supply, only PA and Vox needs completing, in cabinet, £40. T.1540 2-metre Tx, £5. B44 Mk. II modified, £7 10s. Top Band Minimitter whip, £3 10s. Heathkit OS1 'Scope, mint, £15. AVO R/C Bridge, £7 10s. WEE Megger, £7 10s. Mint Perdio all-band Transistor Rx, £15. Small tower, rotating pole, pitch prop motor, power supply, control and indicator unit, £10. Hundreds transformers, xtals, meters, state requirements. All carriage extra. Large items to be collected; s.a.e. replies.—G3IDW, Orchard Cottage, Hook, Swindon.

RE-EQUIPPING shack. Eddystone 640, many mods. all information, £15. Pye Radiogram chassis, VHF/BC/G, £7. Collaro 4-speed autochanger, £6. Precision Apparatus 4in. 20,000 o.p.v. Multimeter, overhauled, wooden case, £10. Crystal activity test-set, with stabiliser, less meter, £5. 19 Set 25 watt, plate modulation, less PSU, has been used as main station equipment, £9. 46 Transceiver less switch, crystals, £2. Throat mic., headset, 15s. B44 Mk. II, £4. 60 watt modulation transformer CT1:1.2CT, 30s. Valves, crystals; s.a.e. list.—Davidson, 25 Doonholm Road, Alloway, Ayr.

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