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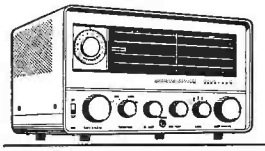
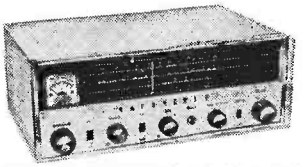
The SHORT WAVE Magazine

VOL. XXIII MAY, 1965 NUMBER 3



LAFAYETTE HA 63 COMMUNICATION RECEIVER

7 valves — Rectifier, 4 Bands 550 kc/s.—31 mc/s. 'S' Meter-BFO-ANL-Bandspread Tuning 200/250v. AC. Brand New, **24 Gns.**, carr. paid.



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A good selection available. S.A.E. for details.

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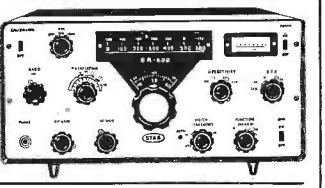

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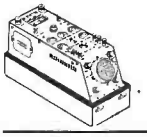

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100-0-100μA	**27/6**	50mA	**22/6**	1A DC	**22/6**	150v DC	**22/6**
500-0-500μA	**22/6**	100mA	**22/6**	5A DC	**22/6**	300v DC	**22/6**
						500v DC	**22/6**
						750v DC	**22/6**
						15v AC	**22/6**
						50v AC	**22/6**
						150v AC	**22/6**
						300v AC	**22/6**
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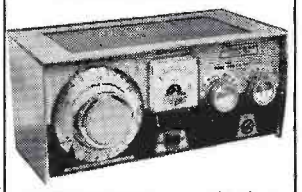

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A.T.5 Amateur TX ...	**£16**	**10**	**0**
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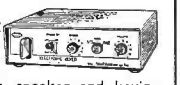
A.T.5. 12v. Transistor P.S.U.	**£11**	**5**	**0**
A.T.5. Remote control and Aerial Switching Unit	**£2**	**7**	**6**

Postage extra

MODEL DA-1 TRANSISTORISED FULLY AUTOMATIC ELECTRONIC KEYER



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400v. P.I.V. 500 mA ...	**3/6**
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Discount for quantities. Post extra.

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MODEL AR-620. 20,000 O.P.V. 0/10/50/250/500/1,000v. AC and DC 0/500μA/10/250 mA. 0/10K/100K/1 Meg. Ω. PF—.02 MFD. 0-500 Henrys, **92/6.** P.P. 2/6.

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MODEL 250J. 2,000 O.P.V. 0/10/50/500/2,500v. DC. 0/10/50/500/2,500v. AC. 0/2 Meg. Ω, 0/250 mA. —20 to + 36 dB, **49/6.** P.P. 2/6.

Green and Davis Limited announce that with effect from 1st June, 1965, the firm will be under the sole direction of Mr. C. R. Green. Another firm is being set up which will be under the direction of Mr. R. W. Davis.

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The above will not affect in any way equipment or facilities currently available.

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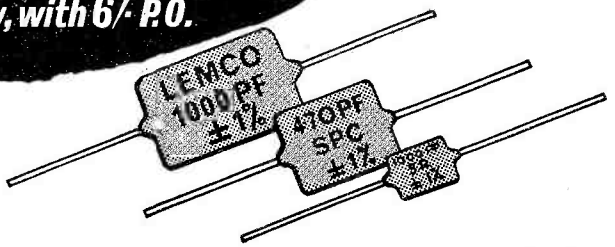

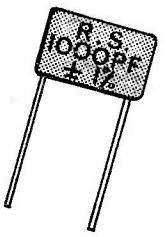

...tolerance is 1 pF or 5%

Condensers: Silver Mica (*value given in picofarads*)

Voltage 350; tolerance 1% above 50 pF (except where oth

Cat. No. C81

Value	*Price*	*Value*	*Price*	*Value*	*Price*	*Value*
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10		47		180		500
12		50		200		560
15		56		220		660
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20		68		270		800
		75		300		820
				330		1000
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INDEX TO ADVERTISERS

SHORT WAVE MAGAZINE

(GB3SWM)

Vol. XXIII MAY, 1965 No. 259

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

VHF *The active and practical interest in our frequencies above the 70-megacycle band is not only higher now in terms of numbers on the air, but these numbers represent a much higher percentage of the licensed U.K. element than, say, ten years ago.*

In the pre-1939 era, when VHF as we then knew it meant the 5-metre band, it is doubtful if there were ever more than a few hundred interested at the most prolific period—indeed, in those immediate pre-War years, the total of U.K. amateurs licensed never exceeded 3,300.

Though no very reliable estimate is possible, the probability is that the number of G/AT's now at work on our four VHF bands must be around this latter figure of 3,000-plus. It is in the field of VHF that so much that is new and exciting in Amateur Radio lies—whether you build or buy your gear, and even if you are not too well located for VHF DX the band will always open, some time!

* * * *

Admin. *The special attention of correspondents is drawn to the notice on p.148, with the reminder that the new editorial address comes into effect immediately. The sole object and intention of this slight administrative adjustment is to expedite the handling and disposal of the very large volume of mail we now have on* MAGAZINE *matters generally.*

The change affects only mail intended for the editorial side, and the one address—Editorial Dept., Short Wave Magazine, Buckingham, England—*also covers correspondence for all the regular feature articles. No other QTH is required to reach the Editor or the feature contributors. It is a full and sufficient address from anywhere in the world.*

All the rest of our business—involving circulation, advertising, subscriptions, book sales, trade orders or enquiries, and related matters—will continue to be handled through the London Office: Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

Nor does this administrative adjustment signify any change in the managerial direction or editorial control of SHORT WAVE MAGAZINE, *which remains as it always has been for the last quarter of a century.*

Austin Forsyth, G6FO.

WORLD-WIDE COMMUNICATION

MODULATED FREQUENCY MARKER UNIT

GIVING 10/100 Kc PIPS THROUGH ALL HF BANDS

A. S. CARPENTER, A.M.I.P.R.E. (G3TYJ)

Our contributor says that though he has been learning about radio and Amateur Radio for well over 30 years now, the fact that the ink is hardly dry on his licence is more because of Morse than of Marconi! Be that as it may, the piece of practical apparatus he describes here will be basic equipment for anyone taking a serious interest in accurate calibration on the amateur HF bands—whether or not there are any worries about Morse.—Editor.

ONE of the most useful items to have around the shack is a spare PSU fitted with a couple of outlets. Such a unit has been in use intermittently at this station for many years now to power odd items constructed either experimentally or for permanent use. The CRO, Signal Generator, and Variable Frequency Audio Oscillator are some of the home-brew units put together from time to time—as is also the Marker now to be described.

Simple "Markers" in General

Crystal controlled frequency markers are by no means unique and the general design pattern is already well known. The heart of a marker is of course its fundamental oscillator circuit and although this may function at various fixed frequencies, 100 kc is a very suitable one for amateur purposes. If we rig up such an oscillator and couple it to a receiver we can quite clearly tune in this "marker signal" in exactly the same way as any other and although we may hear nothing due to lack of audio modulation, visual indications will be available *via* the S-meter—or the BFO may be utilised. Retuning the Rx to 200 kc will enable us to locate the second harmonic of the original signal, whilst harmonics will also be likewise recognisable at 300, 400, 500 kc—and so on. Each time the signal is recognised we merely "mark" the scale of the Rx which, if it is a sensitive specimen, will still make detection possible up to around 30 mc.

However, climbing harmonically in this way is not always quite as easy as it sounds, for not only do the signals tail off as the Rx is tuned higher in frequency, but also odd carriers can give rise to doubt. Doubt would be eliminated if we could make the signal due to the Marker distinct from any other; it would also be beneficial if we could further sub-divide the 100 kc marker points and make them distinctive, too!

So far we have assumed that our basic oscillator is functioning dead on 100 kc; if it is not, a lot of time will have been wasted! This is of course where

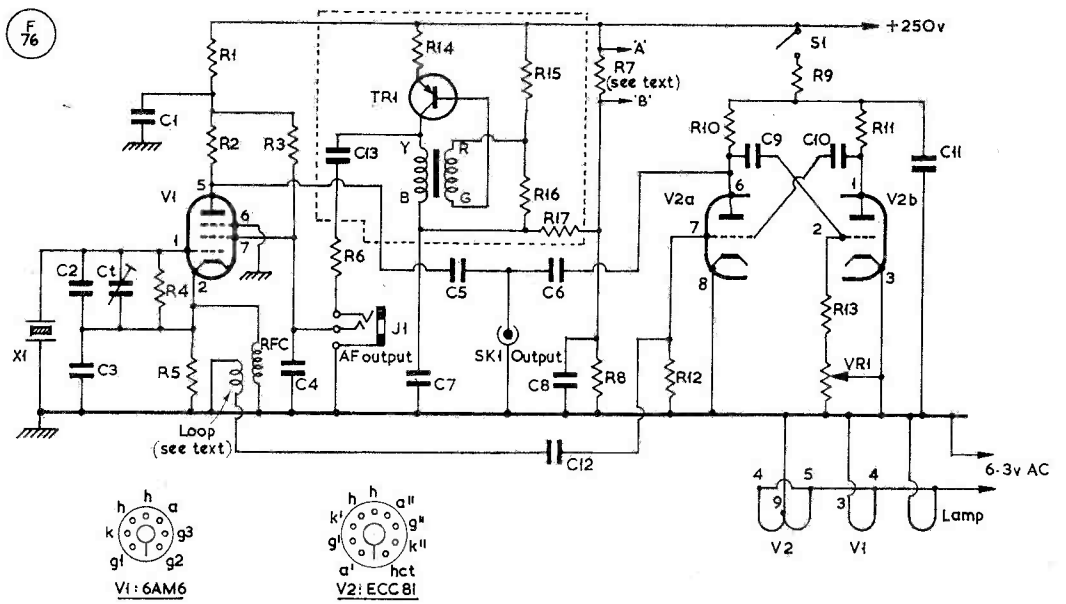


Fig. 1. Circuit complete of the 100/10 kc marker-calibrator described by G3TYJ. V1 is the 100 kc xtal oscillator and V2 a multivibrator, adjusted to 10 kc by VR1 in V2B cathode, with V2A locked on via the pick-up on the RF choke in V1 cathode (see text) — a most ingenious arrangement. This RFC also serves to maintain a good level of output at the higher frequencies. To assist in identifying the beats, and to provide an MCW signal for any other external purpose, the transistor circuit Tr1 produces a 400-cycle modulating tone, which can be switched in and out. This unit is built separately, as shown in Fig. 2, p.142.

we reach for a standard 100 kc crystal! Mixing in a little extra circuitry we obtain for our trouble a comparatively simple item of equipment capable of fulfilling all the aforementioned requirements.

Complete Marker Circuit

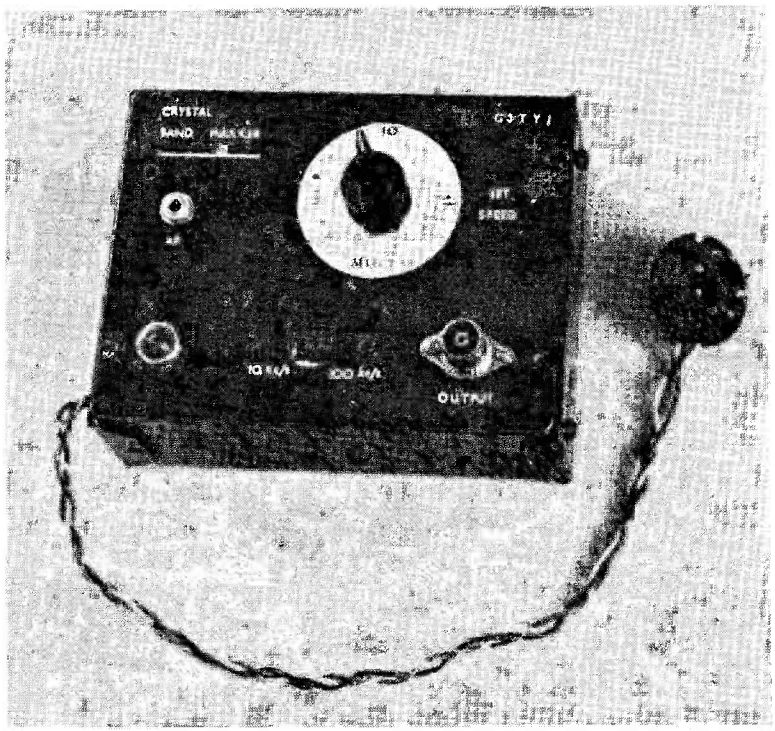
Details of a suitable unit recently built are given in Fig. 1. Here oscillation at a fundamental frequency of 100 kc is produced by V1 and associated items. Harmonics of this frequency are extracted at pin 5 of the valve and are fed *via* C5 to a panel-fitted socket Sk1, so that they can be fed out to a suitable Rx.

Closing S1 enables V2 to function as a conventional multivibrator oscillator, due to the cross-triode connection. The frequency of oscillation here depends on the time constants of the grid/cathode and anode/grid components and if either is changed the repetition frequency alters. In the absence of any form of "locking signal" a multivibrator of this kind is free-running and if one of its grid/cathode resistors is made variable a limited control of frequency is made possible. (Ideally, the values of both grid resistors should be changed but this is hardly worth while here.) Frequency control by making one or both anode/grid capacitors variable is not usually a practical method.

In this instance VR1 is made the frequency controlling element and enables the multivibrator to be adjusted precisely to 10 kc, to sub-divide evenly the previously obtained 100 kc marker points produced by V1. By its very nature, however, a simple multivibrator of this type is rather unstable unless synchronised (it actually relies on *in*stability to start it off initially!) so here a locking signal is obtained by taking a minute portion of the 100 kc output from a small loop winding added to a RFC connected in the cathode circuit of V1. This is applied *via* C12 to the grid of V2A, whereupon the multivibrator locks itself at a sub-division of the 100 kc signal when VR1 is correctly adjusted. If the operating conditions are correct "locks" can be secured at various sub-divisions other than tenths as VR1 is manipulated, and because of this it has been considered worth while making VR1 a panel-fitted item operated against a simple scale. It is found, however, that the locking signal must not be over-large, for if this happens VR1 becomes virtually ineffective. On the other hand too small a signal means no lock is obtained. Due to this it might be found beneficial to make C12 a 0-15 $\mu\mu$F beehive concentric trimmer.

The choke in the cathode circuit of V1 serves another useful purpose in that due to its inherent rising frequency characteristic it tends to counteract harmonic tail-off. Ringing is unlikely to occur, due to R5. The output at the division frequency is obtained at Sk1 *via* C6.

At this stage we have a 100 kc standard marker plus a sub-dividing section but as yet no means of



Picture of the Frequency Marker Unit as described by G3TYJ in his article. Involving a CO/Multivibrator circuit with a tone modulator, it will give modulated or unmodulated (as required) 10 kc pips throughout the range 1.8-30 mc, covering all amateur communication bands. By using a 100 kc crystal bar, adjusted on its second harmonic of 200 kc against the BBC's Long-Wave Light Programme transmitter — itself an international standard of frequency at 200 kc — this Marker Unit becomes a highly accurate and reliable calibration oscillator for general bench work.

Table of Values

Fig. 1. Circuit complete of the Marker Unit

C1, C7,		R10, R11	= 39,000 ohms
C8, C11	= .01 μF	R12	= 15,000 ohms
C2	= 23 $\mu\mu$F	R13	= 4,700 ohms
C3	= 470 $\mu\mu$F	R15	= 5,600 ohms
C4	= .001 μF	R16	= 18,000 ohms
C5	= 5 $\mu\mu$F	R17	= 2,200 ohms
C6	= 18 $\mu\mu$F	VR1	= 20,000 ohms linear pot.
C9, C10,			
C13	= .002 μF	S1	= DPDT slide switch
C12	= 10 $\mu\mu$F	V1	= 6AM6
Ct	= 100 $\mu\mu$F trimmer	V2	= ECC81
R1	= 3,900 ohms	Tr1	= OC45
R2, R8	= 100,000 ohms	X1	= 100 kc crystal, *Henry's Radio*
R3	= 150,000 ohms		
R4	= 3.9 Meg-ohms	T1	= *Ardente* type D.1001 (T.1079) transformer
R5	= 10,000 ohms		
R6	= 20,000 ohms		
R7, R14	= 1,000 ohms	RFC	= *Denco* type RFC5
R9	= 8,200 ohms		

identifying the signals aurally if needed. To resolve this problem a little transistory is introduced.

Aural Signal Recognition

All that is required is a simple audio oscillator (and the specimen used here is physically smaller than a matchbox!) capable of lightly modulating the RF output. The circuitry around TR1 deals with this, oscillation occurring due to phase reversals which take place in the transistor and in transformer T1. To ensure oscillation T1 must contribute a 180° phase shift and this is achieved by suitably connecting its two windings. As a result a modulating signal approximating to 400 c/s appears at TR1 collector and is applied to V1 *via* C13.

AF injection at the screen of the valve has been found suitable but to facilitate this the by-pass capacitor C4 is decreased in value somewhat. This prevents undue attenuation of the audio signal yet enables the screen to remain sufficiently "earthy" for the valve to function as an oscillator.

Continuous AF injection is not considered desirable since sidebands are created; all that is needed is a rapid method of checking, momentarily, whether a beat heard in the Rx is due to the marker or not. To this end J1 is fitted as an open-circuit socket and no signal at AF reaches V1 until the plug is inserted. J1 thus functions as a simple AF switch (although the AF generator is not itself switched out); furthermore, the audio signal may be extracted as required for other uses. The AF stage consumes but a few micro-amps at 2·5 volts DC and the required potential is picked off from a fixed potentiometer comprising R7-R8 connected across the supply lines. In practice point A should be some 2-3 volts (DC) positive with respect to point B.

Construction

A sectional chassis of 16-gauge aluminium consisting of four sides, a top plate and bottom plate, to form a box 5in. x 4in. x 2in. is ideal. The front panel, or top plate, has a shelf 2 inches wide bolted to it and on this assembly most of the work is done.

The 100 kc crystal used is a 3-pin R.C.A. specimen obtained from *Henry's Radio, Ltd.*, and the trimmer to adjust it precisely to the operating frequency is so fitted that access to it can be obtained through a small hole drilled in the back of the metal case. Power supplies are *via* 3-core flexible cable terminated at a tag strip.

The RFC is self-supporting but before it is soldered in fifteen turns of thin PVC wire are wound between two of the pies and secured firmly.

Constructing the AF Oscillator

This is built as a separate item using an oddment of *Veroboard* as the base element. The section of board used for the test model carries five parallel conductor strips of copper each 0·1in. wide inter-spaced by five blank strips of the same width—*see* Fig. 2A. A matrix of pre-drilled holes spaced at 0·2in. coincides with the conductor stripping. Such a section is easily cut from a larger sheet using a hacksaw. The conductor strips must then be opened

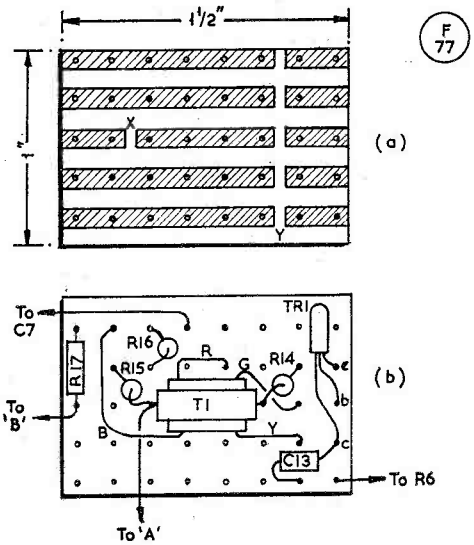


Fig. 2. The circuit of Tr1 in Fig. 1 mounted on a small section of "Veroboard," cut at "X" and "Y" as at (A) — see text. The circuit elements are then mounted as in (B), finishing as a unit, about 1in. by 1½in., for separate mounting inside the instrument case — see photograph.

along line "Y" (Fig. 2A) whilst a further cut must be made at point "X." The sub-miniature transformer T1 is supplied complete with a fixing clamp and this is located as shown. Prior to soldering, however, it should be noted that some holes are used for more than one connection and also that resistors, other than R17, are mounted vertically. Wiring out is shown in Fig. 2B.

There are various ways in which the finalised board can be mounted on the main assembly (it will go inside a matchbox, remember!), but it may be wise to note that it will be *positive* with respect to the chassis by nearly the full DC supply potential, *i.e.*, 250 volts.

Testing and Setting Up

Initially, the various oscillators are checked for functioning and if a CRO is available this is soon done. Before checking the crystal oscillator against the BBC Light Programme transmitter on 200 kc an attempt should be made to get the multivibrator working correctly. Admittedly, this may take a little time and once again the CRO will be very useful. The aim is to get V2 functioning at 10 kc when VR1 is set to about mid-travel and if a pointer knob and experimental scale are fitted this will give a clue. With S1 open two 100 kc beats can be located—at 1·7 and 1·8 mc for example. The multivibrator is then switched on and allowed to warm up, after which VR1 is adjusted. At certain settings the note heard will suddenly "purify itself," this indicating a lock; the lock may well be found to hold over several degrees of pointer-knob rotation and then the mid-point (over VR1 travel in which the lock can be held) should be selected. If the Rx is now tuned

between the two 100 kc marks, further equally spaced "division marks" should be found. There should be a total of nine of these *between* the two main ones, *e.g.*, at 1710, 1720, 1730, 1740, 1750, 1760, 1770, 1780, 1790 kc, the tenth one falling dead on 1·8 mc as already found. In actual fact this is unlikely to occur at the initial attempt and seven—or twelve—divisions might easily result. In such cases switch out the multivibrator and retune the Rx to zero beat with the 100 kc signal. Switch on the multivibrator again, reset VR1 to another lock and try again. Should too many divisions be obtained even when VR1 is completely short-circuited an increase in the values of C9-C10 is indicated and 470 $\mu\mu$F connected in parallel might effect a cure. If VR1 seems incapable of changing the division rate suspect an over-large locking signal and reduce the value of C12 accordingly.

At this point an attempt at checking the 100 kc oscillator against the BBC 200 kc transmission already referred to must be made, preferably when the carrier is unmodulated—remembering that this LW signal is maintained to a very high order of accuracy for commercial use as a frequency standard. It *is* dead on 200 kc. Some form of visual indication that the receiver is accurately tuned to 200 kc in the first place is needed, after which the Marker Unit is lightly coupled (a probe or loop connected to the output socket is usually adequate) and the trimmer Ct carefully set to enable the oscillator to run down to zero beat. You can be a bit too much out if, because you get a fat signal on 200 kc, you cannot tune your Rx accurately to zero beat. It might be better to reduce the Rx aerial input considerably in order to get a small signal.

A very accurate frequency standard should now have resulted, provided some care is used, and it then only remains to enter the division indications on the scale associated with VR1. If a CRO is available for this purpose it is merely a case of noting the various locks as they occur and although "10" will undoubtedly prove most useful, others could be of value too, *e.g.*, "8," representing 12·5 kc divisions, and so on.

Do You Know That—

—— The fibre-glass kits, sold under the *Holt* trade name and obtainable at shops and garages selling car accessories, can be used to fabricate air-ducting or a chimney for forced-air cooled valves of any type. Fibre-glass can also be moulded to form odd-shaped insulators or mounting brackets for items such as mobile aerials. The material sets glass-hard and is a nearly perfect insulator at RF. *(G3TYH.)*

—— A simple and effective way of overcoming the difficulty of making a trough for an SWR meter is by adapting air-cored coax. Most types have the air-gaps running in line all through the insulant. A length of 22g. enamelled pushed through one of these holes makes a perfect pick-up wire. The length of coax required will depend on meter sensitivity and frequency range to be covered, but generally 12 inches of coax will suit most purposes. Furthermore, since the coax with its pick-up wire can be coiled, the instrument can be fitted into quite a small box—in fact, the size of the available meter will dictate the box dimensions. As only a single wire is involved, a change-over switch will be necessary to read forward-and-reflected currents. *(G3PDL.)*

—— Sufficient power to operate small transistorised accessories—such as crystal calibrators, external BFO's and the like—can be obtained by taking a tap from the cathode of the receiver output stage. Generally speaking, the available voltage will be of the order of 12v., and the one or two milliamps of current drawn by the transistorised accessory will in no way affect the operation of the Rx output stage, except that it might be found necessary to increase the capacity of the cathode decoupling condenser, which should be 50-100 μF. *(G8AFL.)*

—— The DC input to a PA or any other power stage can be measured directly in watts by using a suitably re-scaled two-in-one type meter, as available on the surplus market; these have two 0-500 μA movements, with crossing pointers. The movements should be converted to read in terms of voltage and current; then, the point at which the needles intersect can, as the product of two individual readings, be made a measure of power. A central scale can be plotted from the intersection of the pointers, thus forming a direct-reading wattmeter, which will be independent of HT voltage variation. *(B. Gale, Solihull.)*

—— Aged or brittle aluminium sheet or ali-alloy which would crack if bending was attempted can be annealed by rubbing one metal surface with ordinary household soap, and then heated by playing a flame from a gas-ring or bunsen burner—or even by using an electric-cooker hot-plate—on the *other* side till the soapy film turns brown. Then plunge the aluminium sheet into cold water. It will be found as good and easy to work as new material. *(G3HBZ.)*

—— The items known as *Terry* clips, available from most ironmongers and the local D-I-Y stores, come in a variety of sizes and are ideal for such purposes as holding tools in a rack, clipping power transistors or rectifiers in position, or fitting beam or mobile aerial elements. *Terry* clips are made of bright spring-steel, and so should be suitably protected by doping when used outdoors.

—— A sparking-plug makes an excellent low-loss static discharger when connected between aerial and earth. And if a plug (ordinary car type, used) is wired across the secondary of a modulation transformer in a 100-watt AM rig, it will save the modulator valves if the PA should fail—the AF will simply spark away across the plug. *(G3KPO.)*

Half-a-guinea is paid for any idea we can use under the D-Y-K-T heading. It must be expressible without any sort of circuit diagram or sketch, and should be essentially practical.—*Editor.*

SERIES-GATE MODULATION

ON A VHF TRANSMITTER

B. J. P. HOWLETT (G3JAM)

SINCE installing series gate modulation in the new 50-watt 2m./4m. rig, the writer has received many favourable reports on the results. However, some of the comments have been most revealing of the general attitude towards this method of modulation, and the high spot was reached when one operator actually said, "Well, you've certainly got that mod. well adjusted—until you mentioned that it was series-gate I quite thought it was 'proper' modulation"! This gives some idea of the smell which has pervaded series-gate in the few short years since it was first introduced.

It all seems to have arisen because of the main selling feature of the system, which is that the RF output can be "talked-up" to a sort of pseudo suppressed-carrier signal. Many people find this very unpleasant, and are consequently still looking for a circuit which minimises this effect. Attempts to defeat the effect either by starving the PA of drive, or running at a higher efficiency than recommended, simply result in flat-topping and distortion.

Examination of a number of series-gate signals revealed that in most cases flat-topping is occurring while downward modulation is virtually non-existent. Since the resting value of the carrier appears to remain unmodulated, it is therefore assumed to be necessary to keep this as small as possible, with the talking-up effect just described.

In order to eliminate these effects, it is necessary to modify the original circuit very considerably, and to choose a PA valve of a suitable type. The *Mullard* QQV06-40 was found very satisfactory, in contrast with the much older 832 type which would not have series-gate at any price.

Circuit Description

Careful tests using an oscilloscope were made with several double-triode types in common use, and the conclusion was slowly reached that what was really needed was half a 12AU7 to feed the PA screen grid together with a preceding voltage amplifier having the characteristics of half a 12AX7; such a double-triode does not yet exist. However, a very close approximation to this requirement can be obtained by using a Mullard ECL83, with the pentode part strapped as a triode.

For several reasons a 30-volt negative line was chosen. It should be remembered that V1B in the circuit must be able to take the PA screen-grid slightly negative for 100 per cent modulation, and V1B grid leak R6 is returned to the bias line.

V1A is the direct-coupled voltage amplifier, and an indicator neon (*Hivac* type 8-AL, M.E.S. fitting obtainable from *Radiospares* through the usual trade channels) were used as the coupling element, in series with a 270K resistor, R5.

This allows the anode voltage of V1A always to be 70 volts higher than the grid of V1B, thus centralising its working point and improving linearity. The potentiometer R4 enables V1A current to be adjusted to set a 190-volt anode potential, which was found to be the best value. For moderate levels of AF input, V1A is in Class-A, and no change in anode current occurs until a large input is encountered, and then talking up of the PA begins to occur.

Results and Performance

The PA should have about 2 to 2½ mA drive applied, and the anode current set to give an input of about 45 watts when dipped. This bald statement has, however, to be qualified by adding that it must also be possible to obtain increment modulation, and quite substantial rises in anode current with modulation—from a static 70 mA to a fully modulated 100 mA, for example. This means that with the unmodulated 45-watt resting carrier, the loading must be adjusted tighter than optimum, so as to reduce efficiency. About a 20 per cent loss of RF voltage on the feeder must be obtained. (It is easy to read the voltage on the feeder using a normal germanium diode clipped on the end of an ordinary DC voltmeter; effective readings are given even at 145 mc.) Modulation will then cause a faithful fluctuation of the PA anode current, and on the upward excursion, besides increasing the PA power input, a material increase in efficiency will occur as required by the system.

The main difference is noticed on downward modulation, as it is quite possible to take the anode of V1A to about 20 volts only, when, after the 70 volts fall across the neon, V1B grid, cathode, and hence the PA screen grid, will assume a negative value, an indication of over-modulation! The writer certainly does not recommend doing this too often, but the ability is vital to achieving "proper" modulation.

In practice, with ordinary speech waveforms, this condition doesn't occur, and this in itself is very interesting. It appears that the neon has a "storage time," for want of a better description, and it is difficult to cut the carrier off except at very low audio frequencies, and these had already been removed in the microphone preamplifier, which gives considerable treble lift. It became necessary, therefore, to add a ·001 μF capacitor (C4) across the neon coupling assembly to push enough high-frequency audio through unmolested to achieve balanced reproduction. High frequency audio peaks may, therefore, over-modulate, as with plate and screen modulation.

Clamp Tube

Almost accidentally, it was realised that the circuit could be modified still further to develop all the attributes of a clamp tube. This comes about through the use of a bias line of lower voltage than

Table of Values

Circuit of the Series-Gate Modulator

C1	= .005 μF	R4	= 20,000-ohm potentiometer
C2, C3	= 25 μF, 35v.	R5	= 270,000 ohms
C4	= .001 μF, 500v.	R6	= 1 megohm
C5	= 100 μμF, 500v.	R7	= 2,000-ohm, 3w. w/wound
R1	= 120,000 ohms	N	= Neon 8-AL, *Hivac*
R2	= 3.3 megohms	D	= Silicon diode*
R3A	= 220,000 ohms	V	= ECL83, *Mullard*
R3B	= 470,000 ohms		

Note: *Should be rated over 50v., with back-resistance 5 megohms or more. BY101 rectifier is very suitable.

the normal PA bias, which develops from the RF grid drive.

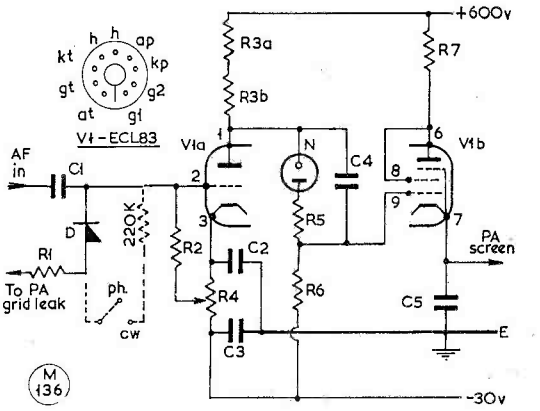
The two extra components are a 120K resistor to the top of the PA grid leak, in series with a silicon diode to V1A grid; the negative end of the diode is towards the PA.

As long as the PA has its normal bias this diode is cut off, but if the bias disappears through loss of drive (or when using CW) the diode finds itself with negative 30 volts on its positive end and zero volts (through the PA grid resistor plus the 120K) on the other. In conducting, it draws V1A grid towards the earth line, while V1A cathode remains at negative 30 volts, so V1A conducts hard, lowering its anode voltage so much that the neon extinguishes, cutting off V1B, allowing the PA screen to go negative, with total cessation of PA anode current.

This action is rapid and vastly more effective than normal clamp-tube action, and is entirely the same as that achieved in the original series-gate circuit but without any switching—and of course, is available all the time instead of only when on CW.

Conclusion

It goes without saying that the writer is now completely sold on the circuit arrangement shown here, confident in the knowledge that precious



Circuit of the series-gate type modulator arrangement devised by G3JAM from a study of the basic principles of the system. V1 is an ECL83, actually used as a double-triode — see text. With a QQV06-40 in the PA stage, and the circuit correctly adjusted, neither flat-topping nor downward modulation will be experienced. The circuitry at the grid of V1A (R1, diode D and the switch) is to give a clamp effect on the PA, as G3JAM explains in his article. He uses his telephony system on two metres, with very satisfactory results.

QQV06-40's are completely safe, and giving a good AM signal into the bargain. RF suppression has been omitted from the circuit drawing because this is seldom the same in every transmitter and may not be needed in some fortunate layouts.

The range over which the carrier resting level can be set is somewhat restricted. About 25 watts to 55 watts is possible, but this was accepted and in practice, no variation on 45-50 watts is needed, as little CW is worked from G3JAM. Naturally, a CW-only position with full input (say 80 watts) is quite easy to provide by shorting out the diode through 220K, cutting off V1A and allowing full PA screen volts to develop. The writer's present power pack will not cope with 80 watts input, so this was not fitted as standard.

R.A.E., DECEMBER '65

The business of getting your entry through in time for the R.A.E. this month will now, of course, be over. But if regrettably you should have to take it again—or if you are an aspirant still in the preliminary stages of obtaining a U.K. amateur transmitting licence (which can make the whole world your oyster)—the City & Guilds of London Institute, which sponsors the Radio Amateurs' Examination, "Subject No. 55" in their examination syllabus, asks us to give notice to the fact that their next sitting for the R.A.E. will be on December 9, 6.30-9.30 p.m., for which entries must be made through a local examination centre (your Technical College, Evening Institute or the Education Office for the county) by not later than November 8. The sitting fee is 30s., and late entries will not be accepted in any circumstances. Though December 9 sounds a long way off, what with the summer coming on and so many other things to do, remember that qualifying for an amateur licence is a serious matter—and it would be better to be able to take Subject No. 55 in December than have to leave it until next May.

To all who are taking the R.A.E. in a few days' time, our good wishes for their success and our hope that shortly they will be sending in a callsign/address for the "New QTH" page—which for nearly 20 years now has been a regular feature of SHORT WAVE MAGAZINE.

NARROW-BAND FREQUENCY MODULATION FOR A TWO-METRE TRANSMITTER

MODULATED CRYSTAL OSCILLATOR

E. W. HOLT (G3MHQ)

IT is believed that the method of frequency-modulating suggested here may have some originality about it, in that a pentode valve used in an overtone oscillator is modulated on its screen—anyway, the system does work!

The circuit is shown in Fig. 1, with modulation applied to the screen of the 6AM6 at V1. As the screen potential changes, so does the gain of the valve and hence (due to Miller effect) the capacity between anode and grid. This capacity change can pull the crystal frequency about 300 cycles (at 8 mc).

To take a few figures: If the crystal is 8 mc, then its 18th harmonic is 144 mc, and the deviation is also times-18, giving 5,400 c/s (300 x 18), or 5·4 kc, at the output frequency—more than enough for narrow-band FM telephony. The actual deviation depends, of course, on the amplitude of the modulating signal. A great advantage, apart from considerations of TVI and the elimination of large iron-cored components with expensive valves, is that only a very small modulator is needed, as shown by Fig. 1. A disadvantage may be that, on first being tuned in, the signal does not "sound right," but even on an Rx without an FM discriminator NBFM can be resolved into coherent speech by careful tuning.

In this system, some amplitude modulation will also take place due to the gain of the oscillator changing—but that in itself is no great disadvantage, because if the stages following the modulated CO are working under good Class-C conditions (as almost invariably they are) any amplitude modulation will tend to be "flattened out," due to the limiting action of grid current.

Some Circuit Points

It is essential that the crystal, with the coil assembly L1, L2 and related components in the V1 circuit, be well screened from the rest of the transmitter, or instability may occur; similarly, the modulator should be connected through a short screened lead (coax). It is as well to regard the CO/modulator section as a VFO, and construct accordingly. The voltage stabiliser can be a miniature neon and, if mounted on the front panel, will give a Tx-on indication. Condenser C, as well as being the screen decoupler, affects the audio response; a value of ·001 μF is good enough for most speech conditions, but other values can be tried.

For the x3 overtone frequency, L1, L2 are wound as one, with the excitation tap 3 or 4 turns from the grid end; L2 should have the minimum of turns to maintain stable oscillation; if too much feedback is applied, the circuit will go off on some frequency of its own, and the crystal will lose control.

The circuit of Fig. 1 shows actually a complete low-power two-metre transmitter, capable of running off a 250v. HT supply, at which voltage the load is about 100 mA total.

Though a 6AM6 is given for V1, other steep-slope pentodes such as the EF91 or Z77 are equally suitable. Stage V3 is a tripler to 72 mc, this being passed on to V4, using a 5763, as a doubler to 144 mc; a form of transformer coupling, L4-L5, is then used to drive the second 5763 as a straight two-metre PA. The input circuit L4-L5 is tuned by opening out or closing in the spacing between the turns, and the distance separating these coils, for drive control; if made as specified in the table, they will be "near enough in the band."

As it is advisable to neutralise V5, this is achieved by the use of the small trimmer C10, on the PA screen, and fixed capacity C8, connected as shown. In constructing and testing out the circuit it was found that about double the drive into V5 could be obtained merely by earthing C8 to the same chassis point as C7, decoupling the anode of the previous stage—for some unknown reason! (It mightn't work for you, but try it, as strange things happen on VHF!)

With 250v. HT, V5 will run at about 7-10 watts input, and can be used either as a QRP rig straight into an aerial or as a driver for a large PA. For CW operating, the cathode of V3 could be keyed, but

Table of Values

Fig. 1. Circuit of the NBFM Two-Metre Tx

C	= .001 μF, *see text*	R2	= 15,000 ohms
C1, C3, C4, C7, C9, C17	= .01 μF	R3, R19, R20	= 4,700 ohms
C2	= 50 $\mu\mu$F	R4, R7, R9, R13	= 1,000 ohms
C5	= 33 $\mu\mu$F	R5, R6	= 47,000 ohms
C6	= 22 $\mu\mu$F	R8, R18	= 22,000 ohms
C8	= 60 $\mu\mu$F	R10	= 100 ohms
C10	= 30 $\mu\mu$F, Philips trimmer	R12	= 47,000 ohms, 1w.
C11	= 15 $\mu\mu$F, air-spaced tuning	R14	= 250,000-ohm potentiometer, deviation control
C12	= 50 $\mu\mu$F, air-spaced trimmer	R15	= 47 ohms
C13	= 25 μF, 25v.	R16	= 470,000 ohms
C14	= .03 μF	R17	= 100,000 ohms
C15	= 8 μF, 350v.	V1, V3	= 6AM6, EF91, Z77
C16	= .02 μF	V2	= 12AT7
R1, R11	= 10,000 ohms	V4, V5	= 5763

TABLE OF COIL DATA

L1	— 19 turns 24g. enam. on $\frac{3}{8}$in. dia. slug former.
L2	— 3 or 4 turns as L1, on same former (*see text*).
L3	— 72 mc, 6½ turns 20g. enam. on $\frac{3}{8}$in. dia. slug former.
L4	— 4 spaced turns 20g. enam., $\frac{3}{8}$in. dia. self supporting.
L5	— 5½ spaced turns 20g. as L4, and mounted to couple.
L6	— 4 turns 16g., half-inch diameter, self supporting.
L7	— 2 turns as L6, and mounted to couple.
RFC1, RFC2	— 30 turns 24g. enam. on former such as a ball-point case, cut to length, with turns lightly anchored. Mount at right angles.

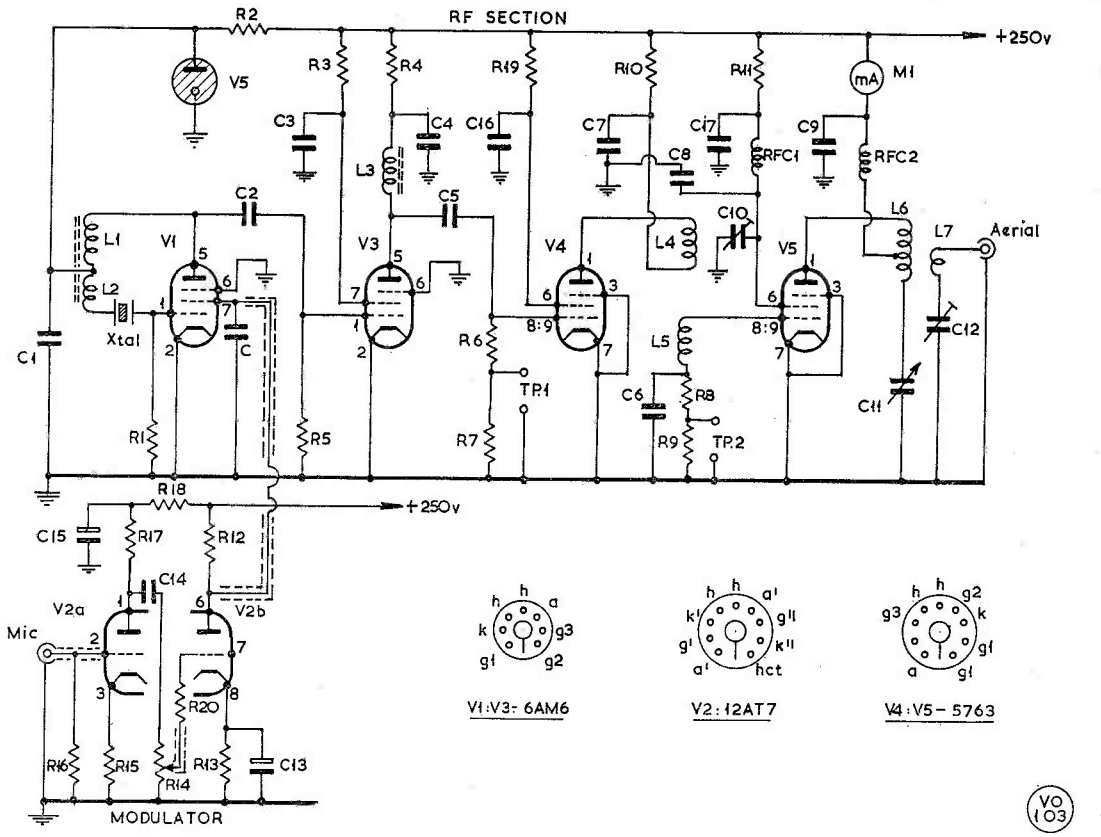


Fig. 1. Circuit of the two-metre NBFM transmitter discussed in the article. Telephony is obtained by swinging on the screen-grid of V1, the frequency relationships being such that an audio change (produced by the V2 configuration) of relatively a few cycles can control the multiplied crystal frequency (in a x18 arrangement) to give up to 5 kc of deviation at 145 mc. Though the 5763 at V5 is a straight PA running at low power, the unit as a whole could be regarded as an exciter, or driver, for an RF amplifier, such as a QQV06-40A, taking an input of 75 watts or so. Construction can be on quite a small chassis, that used for the model being about 10in. by 2½in. by 1in. deep, with a panel 11in. by 3½in.

then some hold-off bias would have to be applied to V4, V5 or full grid-block keying used on these two stages.

Setting Up—and a PSU

First, adjust the slug of L1 till the authentic xtal overtone beat is heard near 24 mc in a monitor receiver; this signal should be well locked, with no "squiggers" evident anywhere else in the Rx tuning range, and the crystal should be positive-starting immediately on switching. If these conditions are not being met, it will be a matter of adjusting the L2 tap position till they are.

Then connect an 0-5 mA meter at TP1 ("test point") and tune L3 on its slug for maximum drive at 72 mc—it should be 0·8-1 mA—and GDO L3 to make sure the frequency is 72 mc. Now transfer the meter to TP2, and juggle L4-L5 for maximum drive at 144 mc; about 2 mA should be obtainable. Next with no HT on V5, adjust C11, C12 till some flicking can be seen on the grid meter needle at TP2, and set C10 till changes of C11, C12—either separately or against one another—no longer cause the grid current to vary. It should be possible to "tune out" the slightest flick on the grid meter—and when this is achieved, the PA can be said to be reasonably well neutralised.

However, it may still show a tendency to take off when HT is applied, shown by the *plate meter* behaviour and signs of RF round L6 when the drive is removed; a slight touch on C10 should eliminate this tendency. If it does not, screening should be introduced so that L4, L5 cannot "see" L6, the chokes RFC1, RFC2 likewise being separated, and a small piece of screening material put across V5 socket to separate the anode and grid pins and their associated components.

The tank output L6 and pick-up L7 are tuned and adjusted in the usual way for maximum RF output — the dip in the PA plate meter may be quite shallow for optimum loading, and a load lamp on the aerial socket is not a very good guide, though it will do for the preliminary adjustments.

A much better form of RF output indicator is an HF diode across an 0-50 microammeter, with a quarter-wave rod aerial on one meter terminal. The device constitutes a sensitive "RF sniffer," and somewhere in the shack a position will be found for it giving a deflection *off the aerial* (which is where one wants the RF). The Tx output circuits are then

adjusted till this deflection becomes the maximum obtainable. The transmitter can then be assumed to be putting all it has got into the beam.

Talking into a microphone plugged into the grid of V2B will not produce much change in meter deflections, since the system is FM, and it would be better to monitor the signal at the fundamental, using the converter. If the station converter is anything like as good as it should be, it will be heavily overloaded by the Tx signal unless the pick-up is reduced —either by pulling out the converter aerial plug and shorting the imput, or using only a tiny pick-up, such as an inch or so of wire pushed into the coax socket. Whatever method of minimising Tx input into the converter is used, it is no use doing any speech testing till the carrier has been reduced to manageable proportions in the converter — after that, cut back the gains on the main Rx.

With careful adjustment of the deviation control R14, listen to the speech at a normal conversational level and find a tune point on the main receiver at which the speech is clear; now advance R14 till there is obviously full modulation control ("deviation"). This can be overdone! Then try the result by QSO, preferably with a local in the first instance, as he will be able to advise on further adjustment of R14. Once its setting has been found for normal speech input, it will not again need to be touched, even if a high-power PA is later added after V5.

Finally, for completeness, a suitable PSU is shown at Fig. 2, with alternative heater connections for 6·3v. and 12·6v. LT operation (where /M working is envisaged). Extensive decoupling is shown, as it has been found to be very desirable for smooth and stable modulated output. The ·01 capacities are disc ceramics, with each heater lead decoupled as close to its valve base as possible, and the decoupling condenser leads kept very short. The heater chokes

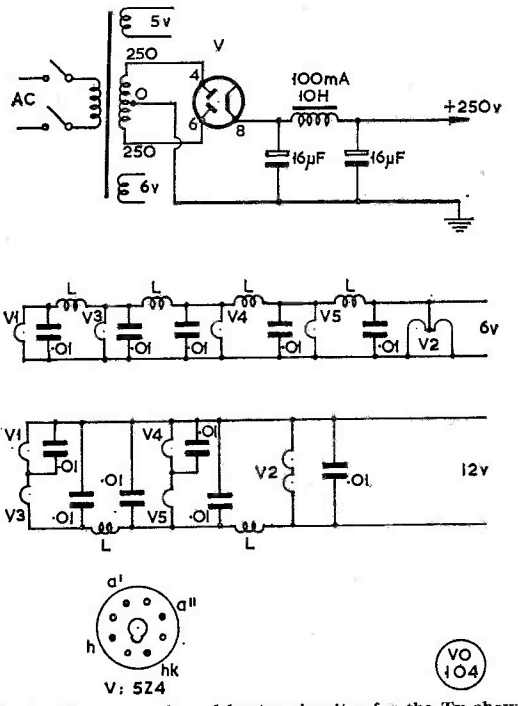


Fig. 2. Power supply and heater circuitry for the Tx shown in Fig. 1, p.147. Good heater decoupling is essential for stable operation on two metres. The .01 μF condensers should be of the disc ceramic type, and the making of the coils L is explained in the text below.

L are made up quite simply by winding 19 inches of 18g. enamelled on a pencil, with just a touch of fixative to make them firmly self-supporting when the pencil is slipped out.

SIR EDWARD APPLETON, F.R.S.

The death was reported, on April 22 at the age of 72 years, of Sir Edward Appleton, the physicist whose particular field of research, investigation and controversy was long-distance radio communication *via* the ionosphere—which, as we now all know, is what makes DX possible. In the late 1920's and early 30's, it was not at all clear how short-wave DX could happen. This was Edward Appleton's particular ploy, and he became an international authority on the mysterious workings of the reflecting layers and their diurnal and seasonal changes.

An original thinker in these spheres, it was directly from his work in the 1930's that the basic idea of radar was conceived and its practical application brought to fruition—though, indeed, as Appleton's admirers have always contended, he got very little credit for it!

Appleton became best known for his researches into the ionosphere, and the Appleton Layer (which we all use from time to time) is, of course, named after him.

He was the Nobel Prize winner for physics in the 1947 elections and, at the time of his death, was Vice-Chancellor and Principal of the University of Edinburgh, an appointment of great distinction which he had held for no less than 17 years. His own achievements, academic honours and international reputation shed lustre on a Scottish University founded nearly 400 years ago.

EDITORIAL QTH CHANGE

All correspondents are asked to note that, with immediate effect, the address for Magazine editorial matter—which includes all the regular features—becomes :

Editorial Dept.,
Short Wave Magazine,
BUCKINGHAM,
England.

This is a full and sufficient address from any part of the world. It applies only in respect of editorial material.

All matters relating to subscriptions, circulation, advertising, book sales, trade orders and similar business will continue to be handled through our London office: Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

THE PRACTICAL APPLICATIONS OF SEMICONDUCTORS

IN THE AMATEUR STATION

Part IX

IF Amplifiers

M. I. DAVIS, B.Sc.

Here, our contributor goes into the question of using transfilters—ceramic IF units of very high stability—in transistorised intermediate-frequency amplifiers. The next article will deal with some specialised transistor circuits for an RTTY receiver terminal unit.—Editor.

IT would probably be true to say that reliability and compactness, providing that they are consistent with high performance and low cost, are the principal design aims of amateur and professional equipment designers alike. Unfortunately, in the sphere of radio communication, we have several requirements which often make miniaturisation difficult—such as, as typical examples, the necessarily large size of high-power-dissipating components, and the limits set on the dimensions of coils and transformers to obtain reasonable values of Q and inductance. In some parts of this branch of electronics, however, reduction in size does not imply reductions in either performance or reliability, and IF amplifier circuitry is the example which we shall now look at.

The performance of an IF strip can be specified in terms of: Operating frequency, gain, bandwidth, and stability. Very often it is regarded as a box with input and output ends, and never mind what goes on inside it. That is as it should be—provided exactly the right thing *is* going on inside. In view of this, let's talk about ceramic transfilters.

The use of a quartz crystal as a frequency-determining network is familiar to everybody who has had a stab at the R.A.E., and in the writer's battered copy of the *ARRL Handbook* for a year in the early '30's they had started to use crystals as filters in tuned amplifiers. At about the same time, an IF transformer can would have held a week's provisions for the Brigade of Guards. Admittedly, IF cans are much smaller now, and a half-inch cube is fairly usual. But couldn't you improve your Rx with a signal generator and a bit of IF twiddling right now? Anyway, back to ceramic transfilters. Let's read what the manufacturer says about one type, intended to replace an IF transformers.

"Transfilters are ceramic filters with impedance matching characteristics. The piezo-electric disc vibrates at the first overtone of its fundamental radial mode. It forms a four-terminal network with a high impedance input and a low impedance output. With appropriate circuit design, the overtone transfilter can replace the transformer or inductive and capacitive elements used in conventional frequency-selective circuits."

Of another type, this time operating in the fundamental mode, we read: " . . . can replace an emitter by-pass capacitor. They improve selectivity and long-term reliability, and simplify circuit alignment procedure." Just how much they improve circuit alignment procedure is indicated by the next statement, that the overall frequency stability is within 0·2 per cent for ten years. A range of operating frequencies is available, centred around 470 kc. Bandwidth is about 1 per cent to 4 per cent of operating frequency, or broader if desired. The units come in an encapsulation which is, at most, 0·75in. high, 0·65in. wide, and 0·15in. thick.

Figs. 1 and 2 show IF stages using these elements and conventional components respectively.

IF Amplifier Design

Let us choose a transistor which will be suitable

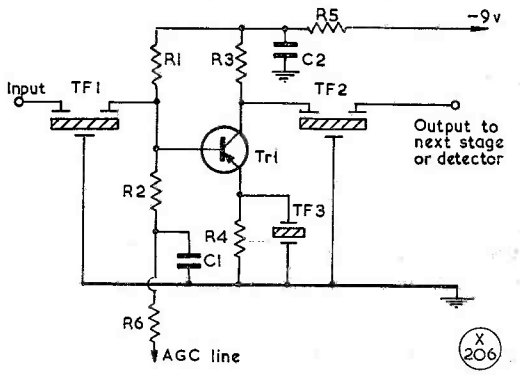


Fig. 1. An IF amplifier using Brush transfilters. Values are: C1, 8 μF; C2, 100 μF; R1, 39K; R2, R6, 3.9K; R3, 2.7K; R4, 680 ohms; R5, 470 ohms; Tr1, OC45 or similar; TF1, TF2, Brush TO-02; TF3, Brush TF-01. This circuit is discussed in the text.

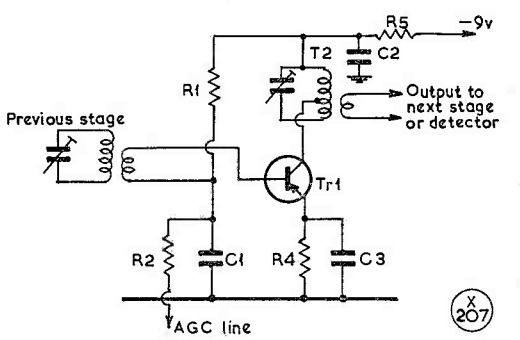


Fig. 2. An IF amplifier using conventional components, circuit values being as given for Fig. 1 above.

for Tr1 in either circuit. We know that the common-base cut-off frequency should be at least ten, and preferably twenty, times the operating frequency. Thus an OC45 (6 mc) is suitable for amplification at 470 kc. Power handling requirements are negligible, since the emitter current is not likely to exceed one milliamp. For extra high performance, it is worth selecting a transistor with a low noise figure, but since most of the noise will be brought up in the mixer, this is often considered unnecessary.

A more subtle point to be borne in mind when choosing the transistor concerns the internal feedback caused mainly by the collector-base capacitance *Cb'c*, and its associated resistance *Rb'c*. This internal feedback is extremely important at high frequencies, and causes instability in the same way that anode-grid capacity does in a triode valve. This unpleasant effect can be neutralised by the addition of an external feedback loop. This is, in general, accomplished by connecting a phase-inverting transformer across the output, and feeding back to the input through a suitable impedance. If the transformer is of a 1:1 ratio, the external feedback path impedance will be the same as the internal one, but, for interstage matching reasons, IF transformers are usually about 6:1 in turns ratio—thus the neutralising capacitor must be six times *Cb'c*, and the resistor one-sixth of *Rb'c*. The stage is then said to be "unilateralised," and changes at the output can have no effect at the input. As well as preventing oscillation, unilateralisation also greatly reduces the chance that the pass-band of the stage is asymmetrical. For the sake of clarity, these components are not shown on Fig. 2, but are connected between points A and B, and typically might consist of a 1K resistor and 56 $\mu\mu$F condenser in series.

Still on Fig. 2, we shall quickly examine the functions of the individual components. T1 and T2 are identical, and since the average value of output and input impendances for this type of amplifier are about 25-30K and 1K respectively, the ratio is likely to be, as previously stated, six to one. To avoid unnecessarily large values for C4, the primary is tapped, and the capacitance appearing at the collector is larger than C4 by a factor of the square of the turns ratio. This arrangement reduces the effect of transistor capacitance on the tuned circuit.

The secondary of T1 feeds into the base of Tr1, which is supplied with a DC bias *via* R1 and R2, to strike a balance somewhere between the supply voltage and the AGC rail voltage. Note that the direct current, as well as the signal current, flows through the secondary of T1. The function of the capacitor at C1 is to hold the mid-point of the R1-R2 chain steady as far as RF voltages are concerned, but to allow the AF variations of the AGC rail, obtained from the detector, to alter the voltage at this point, and hence affect the bias on Tr1. R4 and C3 are a standard emitter-circuit combination, but reference to Fig 3 will show that the performance of this arrangement is by no means

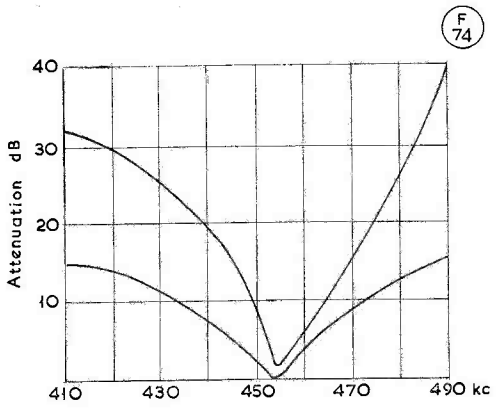


Fig. 3. Pass-band characteristics of an IF stage using a Brush TF-01 Transfilter (inner curve) and with a condenser across the emitter resistor (outer curve).

the ultimate. Nothing else remains, except the supply decoupling R5 and C2. Instability due "to common-impedance coupling" (in this case, the supply impedance) is an all-too-common fault in multistage amplifiers.

Practical Considerations

Going back to Fig 1, we observe several points of similarity. R5-C2 are unchanged, as are the resistors R1 and R2, together with C1. As is to be expected from the foregoing remarks, C3 has been replaced by TF3. The salient difference, however, lies in the collector circuit of Tr1, where the IF transformer has disappeared, and we now have R3 and the *transfilter* TF2. The method by which the stage is driven from the previous one *via* TF1 is also shown. Note that we cannot claim that the overall number of components has been reduced—nevertheless, the wiring of the circuit will be easier, because the transfilters can be soldered directly on to a piece of printed board or *Veroboard*, without the need for fixing holes, or holes for access to the tuning slugs.

It is worth mentioning, before going on to multi-stage circuits, a point about C2 in both circuits which also applies to all cases of supply decoupling. Where circuits are working at high frequencies (and this also means low-frequency square-waves) rapidly varying currents are drawn from the supply; this in turn causes fast voltage variations due to the internal impedance of the supply. Now, while one would normally feel safe about putting an electrolytic between the line and earth to counter this, examination with an oscilloscope actually across the electrolytic condenser itself may reveal that the voltage is far from stable, and it can also be found that increasing the value of the capacitor makes matters worse. The reason for this (familiar, no doubt, to many readers) is that the electrolytic capacitor is made of foil wound into a roll, and

thus it can have quite a high *inductance,* which at high frequencies makes the capacitor present a large impedance. There are some condensers, notably the solid tantalum type which, though of a very large capacitance, have virtually no inductance, and thus appear almost as a short-circuit to voltage variations of any frequency. If these are not available, the solution is to use an ordinary electrolytic to smooth out the relatively slow, large-amplitude variations, and to connect in parallel any one of the reputable types of capacitor of about ·005 μF, which will remove the high-frequency components of the noise.

A complete IF amplifier strip, from frequency-changer to detector, will not be described in detail here. Frequency-changers have already been dealt with, and the IF amplifier will be made up of two or more stages as outlined above. Those readers requiring circuits for this purpose are referred either to the *Mullard* transistor circuits manual, or to many similar publications. The designs to be found will almost certainly be for IF amplifiers working at frequencies around 470 kc, which are suitable for receivers operating on all low and medium frequency amateur bands, *i.e.* up to about 30 mc. For the VHF bands the circuits become extremely specialised and the interstage coupling transformers are far more critical in design specification. Unless readers are already fully acquainted with the problems inherent in such circuitry, they are advised to stick to circuits designed by professionals for the purpose, rather than to attempt the design themselves. It should be noted at this point that transistors with high cut-off frequencies will be required if common-emitter operation is to be used. As an alternative to this, common-base will permit the use of lower cut-off frequency devices at the expense of voltage gain, but it will be necessary to use more stages, with an increased likelihood of stray coupling and parasitics.

(To be continued)

MICROPHONE FOR MOBILE

LIGHTWEIGHT HEAD MOUNTING

W. FARRAR, B.Sc. (G3ESP/M)

ONE problem confronting a mobileer is how to maintain the microphone in a close-talking position without in any way interfering with the safe control of the car. A telephone operator's "funnel" can be used, fixed on a webbing sling, but this tends to get grubby, with adverse effects on one's shirt collar. Moreover, if the operator turns his head he no longer speaks into the funnel, and down goes the modulation. A microphone fitted to a boom attached to some part of the car also entails holding the face in one place, and the boom could also possibly interfere with vision.

The photograph shows the writer's solution to the problem. A pair of sunglasses with stout plastic frame was bought for half-a-crown from the local Boots, and the coloured lenses were carefully pushed out. A strip of hardish aluminium was cut and bent double at each end, one end clipping firmly to the side of the frame, the other receiving the spring clip on the back of the (lapel-type) microphone. A little bending, and the microphone is soon located in the best position. The driver can move as he wishes, but the relative position of the microphone to the mouth does not vary. Sharp edges and corners on the strip should, of course, be rounded off, for obvious reasons. A plastic sleeve can be fitted to improve the appearance.

The microphone and cable must be lightweight, otherwise the spectacle frames are pulled askew and become uncomfortable. The microphone shown in the photograph is of the easily obtainable Japanese lapel type, which does the job admirably.

G3ESP/M with the microphone mounting described in his note. Devised for mobile operating, it is a lightweight fitting which keeps the mike in the same position relative to his mouth whichever way the driver may be looking. About as safe as one could make it, in fact.

SWL • • • • • •

THE LOCALS—NEWCOMERS—HIGH HPX SCORES—NEWS ITEMS—GENERAL CHAT

WE all know that Amateur Radio, as a hobby, is unique, and most of us wouldn't change it for any other. A little deeper thought reveals the following facts: Amateur Radio is self-propagating, in the sense that no one is persuaded to join its ranks by high-powered advertising, but only by his own desire. There are no hoardings (or if there are we haven't seen them!) inviting you to "Talk all over the world with our new Jumbo-size Yakmaster;" no smoothy ever appears on ITV asking "What made you choose our new Global Trotter, Mrs. Natterworthy?" . . . (Oh, it's so kind to my *voice*, you see!").

Even the numerous advertisements in Amateur Radio magazines mean just about *nothing* to the uninitiated, and very few of them are directed towards the complete beginner. And no one goes round touting for "The Eezi-way R.A.E. Course," or "Our Morse Tutor will give you 35 w.p.m. in six easy lessons."

What, then, *is* the source of all new interest in Amateur Radio? The answer is simple, but surprising. It is "the locals," of whom some of our contributors write with affection, others with distaste. But the fact remains that it is by listening, sometimes quite accidentally, to the *local amateurs* that nearly all new interest in Amateur Radio is awakened. Whether on an all-wave broadcast receiver, or a transistor portable, or sometimes, regrettably, breaking through on a TV set, someone, somewhere, suddenly becomes aware of ordinary people talking to each other over the air.

At that moment an SWL is born, and, as we all know, the SWL is the compulsory first stage in the development of a radio amateur. And *that* is another unique feature of the hobby—that no one can indulge in it without being, for a longer or shorter period of time, an SWL. Thus, from the broad point of view of Amateur Radio as a worldwide pursuit, the SWL is a key figure and no less important than members of any other category of radio amateur.

These "Locals"

The very people we have been talking about come in for some comment from various quarters. *Brian Walker (Tamworth)* sums it up by saying "If our transmitting friends *didn't* spend a little time 'yakking,' then there wouldn't be much point in our listening friends listening." Fair enough—and *M. Wood (Ringwood)* adds "If all 'locals' packed up, who would there be to listen to? And the W's and ZL's are someone else's locals—so our readers' locals are someone else's DX." And so on, and so on, with short comments all the way through the pile of mail.

Incidentally, this month's correspondence is by far the heaviest ever received for this feature. As it is not printed on elastic paper, nor do we have rubber type, that unfortunately means still greater brevity in dealing with letters. So we will stop yakking like a local and get on with it.

Newcomers

All the following are new readers of these columns. *M. Reilly (Birmingham)* runs an S.940 and indoor Joystick, has logged 30 Zones and prefers 21 mc . . . *Douglas Watts (Staines)* has an S.640 with a PR30X, a trap dipole and a long wire. He would like more technical gen. on aerials, favours 21 mc and also enjoys BC listening and demands "what's wrong with *that?*" . . . *Robin Hooper (London, N.16)* covers mostly 14 mc SSB on his HRO and 68ft. indoor wire, and joins the HPX Ladder with the high starting score of 282.

Barry Smith (Hexham) also likes 14 mc SSB and runs a National 121 with preselector. He is putting up a 14 mc ground-plane and wants a good 21 mc aerial as well . . . *P. Crust (Loughborough)* has an RG42-C with "a massive long wire about 30ft. up;" he says he has logged 270 different G-stations on 160 and 80 metres and hopes to join the Ladder soon . . . *Robert Cockcroft (Huddersfield)* likes reading about other SWL equipment; all his listening is done on a Philips BC receiver, and he now finds far more interest in 160 and 80 metres than the other bands; he wants to correspond with another reader whose main interests are the LF bands and CW (and he learnt Morse by listening to G3SED on Top Band!) QTH—66 Longley Road, Almondbury, Huddersfield.

The first report from *Colin McKie (Worcester)* arrives just as he has become G8AGK (his listening career started with a single-transistor receiver!). Now, on the "home-brew" question, he says that the modern receiver is so complex that the average SWL takes one look, then goes and buys a ready-made job. Even the receiver he now has on the *drawing-board* would cost more than his resources would run to!

Many other newcomers sent brief notes—welcome to them all, and to those already mentioned.

More Quotes

Some of the older hands now come in. *Iain Mackay (Dingwall)* says he prefers the present style of reporting, and will we please stick to it! . . . *John Fitzgerald (Great Missenden)* says much the same, but is glad to read other people's points of view—but he does *not* want more ladders. And he, along with many others, has a new outlook on SSB after reading the note by B. Dale in "Do You Know That . . ." on p.17 of the March issue of SHORT WAVE MAGAZINE. And he now comments "What a bad-mannered lot they are on Twenty SSB."

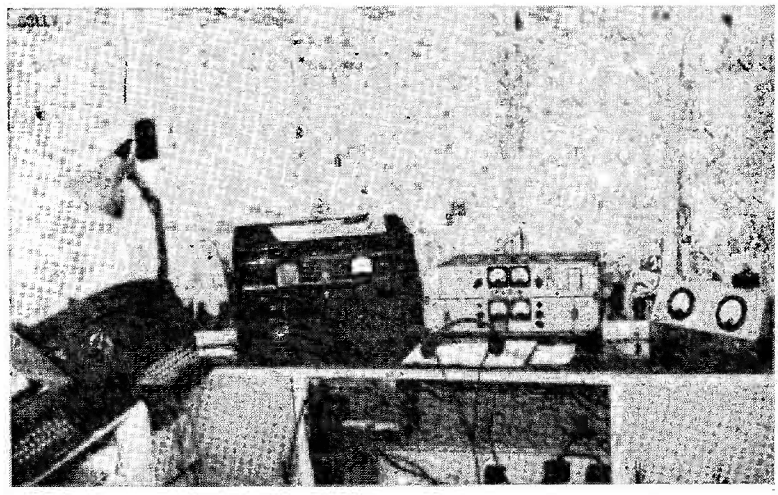
Alan Dailey (Leeds) asks whether ZD5 is the new prefix for Malta. No—it has replaced ZS7 for Swaziland, and Malta is using ZB1 . . .

B. Pack (Frome) would like us to conduct a kind

of census of all readers of this feature, to find out what they really want. There are all sorts of snags here . . . the major one is to get a good response to such a project. Without that, one is merely doing what 10 per cent of the customers want. However, it will be borne in mind.

R. de Buis (Felixstowe), with his CR-66 and PR-30 preselector, has found most interest in Fifteen, Eighty and Top Band. He is working up his CW speed, and remarks that when one can read Morse reasonably well, there's always something of interest on the bands, however poor the conditions may be.

R. Hunter (Kenton) says goodbye to us, having become G3TXV —and congratulations to him; he hopes to be active on all bands soon, but insists that he will continue reading this feature.



SWL Colin Jones of Plymouth is a listener with a special interest in radio teleprinter reception. His gear includes, left to right, a Creed Type 3 machine, a Creed 7B, an AR88 as main receiver and, at mid-centre, right, a Type FSR.1.1X Terminal Unit. He has printed some extremely interesting amateur-band signals.

W. H. Gundill (Dewsbury) hits out in favour of "freedom of choice" among SWL's. Why should they be looked down on if they prefer BC listening? Why should they be subnormal if they have no ambition to transmit? Why can't they all potter along in the way that amuses them most? (One's reaction to this is: "No one is trying to stop them—and good luck to them.")

Top Scorers

Terry Popham (Exeter), who has already given some idea of how the HPX bug has bitten him, now heads the table with the astonishing score of 806. And his friend *Pete Cayless,* also of Exeter, follows him into second place with 708. We have been a long time reaching the 700 mark, but the 800-plus score is quite something, and a high percentage of 15-metre listening accounts for it, maybe. Good going . . . and how long before the thousand comes up, if it's possible?

A. W. Nielson (Glasgow) was amazed at SWL Popham's progress with new prefixes from last November onwards. What he will have to say now, we can only imagine. The problem up in Glasgow is QRM from the overhead wires of British Rail—a continuous heavy crackle, day and night, all bands. SWL Nielson would like to know if anyone has overcome this type of QRM, and if so, how?

C. Pedder (Ashford), together with many others, would welcome a listeners' contest of some sort, and thinks it should coincide with one of the big World-wide Contests, which he finds very useful for collecting new ones. This we really are working on, and one of these days you will be seeing the details for a real SWL Contest. Maybe the top scorers on the ladder will also scoop a contest—or maybe not?

Next appearance of this feature—July, 1965. All correspondence and photographs (of SWL stations and equipment) by May 28, addressed Editorial Dept., Short Wave Magazine, Buckingham, England. Head the letter "SWL."

VHF Interest

Martyn Vincent (Cheltenham) had an interesting time with *Oscar III,* and heard K2GUG on Two Metres by that means—nice work. He feels that possibly the SWL's made more use of it than the transmitting boys, and would be pleased to hear from any others who had anything to do with the *Oscar* exercise.

J. Layton (Prestwich) is also getting very keen on VHF and is about to put up a six-element beam for two metres. He has been building up several transistor units on *Veroboard,* including a Morse oscillator, signal tracer, Q-multiplier and Top-Band converter. His source of parts is mainly the surplus printed-circuit boards from computers, which contain loads of transistors and diodes. (He has 100 of the latter and can't think what to do with them at present!)

D. A. Poulter (Morden) is also operational on two metres with a Green & Davis Mk. III converter and an 8-element beam, tuning from 4 to 6 mc on his S.504 for coverage.

H. M. Graham (Harefield), and quite a few others say they are in favour of the occasional contest, but *please*—no more ladders, tables or lists. They not only tend to make the whole business a rat-race but they take up space which might be filled with more interesting gen. (Well, that's what they say!)

J. F. Cooper (Ipswich), an R.N.-trained radio operator, despairs of the "all-call, no-listen" brigade. He passed on some useful information (*see* p.108,

April issue) concerning Morse practice transmissions, for which he is responsible.

James Brown (Llandaff), particularly interested in 80-metre SSB DX, complains that BST has wrecked his late-night listening! So he is planning a preselector/converter for Twenty, to make the best of the summer.

Angus Graham (Bruton) says he has been a keen reader of "SWL" for many years. Now that he writes for the first time it is to say he has become G3TXL! He senses quite a bit of friction betwen those who spend all their waking hours logging new prefixes and those who "potter" and mix it in with other hobbies. Also between the CW-fanciers and the phone-only boys. And he wonders whether there is such a thing as "operating procedure" today. (To judge from what's heard on the bands, the answer is in the negative). Finally, he strongly advises those who are still at school to join the Signals Section of their C.C.F.—"the C.C.F. Net is worth its weight in gold!"

P. Church (Nottingham) doesn't think that it is the complication of SSB that has reduced the interest in home construction; he blames it on the Affluent Society, and points out that you can buy a receiver at little more expense than it takes to build a really good one—and then the secondhand value is enormously greater.

HPX LADDER

(Starting January 1, 1960)

Qualifying Score—150

SWL	PREFIXES
PHONE ONLY	
T. R. Popham (Exeter)	806
P. A. Cayless (Exeter)	708
A. W. Nielson (Glasgow)	677
D. Douglas (Dundee)	650
L. Margolis (Ilford)	643
R. Hunter (Kenton)	614
S. Foster (Lincoln)	584
B. Curnow (Plymouth)	519
P. Etheridge (Hull)	507
R. G. Preston (Norwich)	484
D. Dewar (Morden)	477
K. C. Staddon (Stroud)	465
D. Poulter (Morden)	458
M. Vincent (Cheltenham)	457
M. Woollin (Leeds)	446
P. Baxter (Winchester)	439
P. J. Lennard (Wartling)	420
C. Pedder (Ashford, Mdx.)	378
B. Dale (Congleton)	374
I. A. Mackay (Dingwall)	369
J. E. Hart (Leeds)	364
A. Dailey (Leeds)	354
A. Stone (Kidderminster)	352
M. J. Summers (Market Harborough)	339
M. G. Allen (Heston)	327
J. P. Fitzgerald (Great Missenden)	315
R. Turlington (Braunstone)	304
D. C. Parker (Redditch)	303
M. Shaw (Bromley)	292
H. M. Graham (Harefield)	286
N. Perry (Farnham)	286
D. H. Foster (Rainham)	280
A. Parker (Chesham)	271
G. Christie (Gainsborough)	270
A. Papworth (Over)	263
B. J. Turner (Westcliff)	261
R. V. Bruce (Norwich)	259
A. D. Jones (Chertsey)	258
J. Butler (Bargoed)	250
M. Reilly (Birmingham)	244
D. E. Fitzgerald (Dublin)	244
C. Sparrow (London, N.W.7)	232
W. J. Angerson (Leeds)	229
H. Wolton-Carr (Cambridge)	228
B. Smith (Hexham)	223
R. S. Finley (Harrow)	215
G. Cowling (Goole)	203
M. Silverstein (London, N.W.7)	198
A. J. Hayter (Portsmouth)	196
C. A. McKie (Worcester)	188
C. Dillon (Bath)	187
C. Freeman (Nuthall)	184
D. Griffiths (Ilford)	180
R. C. Booth (Stanmore)	177
D. Rogers (Wrexham)	176
A. T. Morton (Millport)	163
D. M. Wilson (Roxburgh)	162
R. Woodward (Yeovil)	158
P. F. Elgar (Woking)	156
CW ONLY	
B. Curnow (Plymouth)	567
R. Hunter (Kenton)	545
V. Lindgren (Hull)	489
P. J. Lennard (Wartling)	489
M. Vincent (Cheltenham)	354
L. Margolis (Ilford)	323
R. de Buis (Felixstowe)	311
M. Woollin (Leeds)	283
P. Etheridge (Hull)	225
D. Douglas (Dundee)	214
D. H. Foster (Rainham)	185

(NOTE: *Listings include only recent claims. Failure to report for two consecutive issues of "SWL" will entail removal from the table. Next list, July, 1965 issue—deadline, May 28.*)

D. M. Wilson (St. Boswells) is surprised that so many SWL's only seem interested in a callsign or a prefix, rather than following a whole QSO, which can be much more absorbing . . . and he would like to see more information on BC listening. (*Sorry*, but that's not really our province . . . look at the heading on the Editorial page.)

Once More

Now to answer, once again, all those correspondents who ask "How do I join the HPX Ladder? And do I need confirmations?" To gain a place on the ladder, simply send (initially) a full list of the *prefixes* heard. Confirmations are *not* needed. Thereafter, keep your list "topped up" every two months with supplementary lists of new prefixes heard. And, for the real newcomer, we must get straight, once again, what a prefix is: If you hear, say, WA2GBF, the prefix is *WA2;* that is different from W2, or WB2, or K2, or KN2, though they may all live in the same street.

In the case of calls like 4X4CJ, the prefix is *4X4*, not just *4X*. And where there are suffixes, they count as if they were prefixes—*e.g.* ZS6BBB/ZS9 counts as a *ZS9;* W4BPD/XW8 counts as an *XW8*. And that's enough to start you on your way.

Conditions Improving

We now know that the new sunspot cycle is on its way; it seems possible that the last one reached its minimum at some time between July and December last year, but accurate assessment will not be complete until more figures are available. From the SWL's point of view the important thing is that conditions on all bands are steadily improving, and that the Twenty and Fifteen-metre bands are open much later these days—Twenty until midnight or even later, Fifteen until quite late in the evening.

L. Margolis (Ilford) sticks mostly to Fifteen and Ten these days; says Fifteen is open to VK, KR6 and the Far East in the mornings, and to Africa all day, with Central and South America also there after midday. Ten, he has found, seems to open for a couple of hours, at least, every Sunday morning. Since June 1964 he has heard 47 countries and 33 U.K. countries on Ten.

Barry Curnow (Plymouth) wants to congratulate his old friend Roger Western ((now G3SXW) on his enthusiasm. From his temporary QTH in Kingston, Surrey, he made the return journey to Devon twice in one month—for the annual dinners of the Plymouth and Torbay clubs. And SWL Curnow adds that it is obvious, when some of our keen SWL operators eventually become licensed, that they have a great advantage over some of the other novices—he quotes G3SXW, G3PHO and G3RFS as outstanding examples.

TV Interference

Concerning TV sets that cause QRM on the amateur bands (referred to in the March instalment), *G2FYT (Bristol)* says he is a fellow-sufferer, with a set that gives trouble every 10 kc. It is dreadful on Twenty, not too bad on Fifteen and fairish on Forty.

S W L • • • • • •

continued

There's not much to be done about this pest except for efficient screening of the TV receiver. The noise is not (usually) mains-borne, but due to direct radiation, and it is caused by the line time-base (10,125 cycles and easily audible to youngish people!) In some circuits this generates a fearsome collection of harmonics, and it is these, spaced out at roughly every 10 kc, which cause the trouble. Some TV's are far worse than others; *none* of them are efficiently screened. If the boot were on the other foot (amateur-band receivers causing QRM on TV) there would be some swift action; as it is, we are the sufferers. (Yes we know about the HRO—but that seems to be the *only* one whose oscillator penetrates into TV!)

Incidentally the DX/TV boys are getting ready for the new season with some interest; already there has been one good burst of Tropospheric to whet their appetites.

General Comment

"I find the DX by a method already recommended—by letting the Europeans call CQ DX and listening for what comes back" *(David Fitzgerald, Dublin)* . . . "Just acquired 30 fixed condensers of a type popular in about 1930, still in original wrappings. Very useful around the shack and not bad for 1s. the lot!" *(W. H. Gundill, Dewsbury)* . . . "Ten has been in fine form—I heard LU4DM, OD5BU and CR4AE, all on the same day. And it's such a change from all the clatter of Twenty" *(D. H. Foster, Rainham)* . . . "A listeners' contest would be a good idea, but make it a date common to all school holidays—say a six- or twelve-hour contest?" *(S. Shaw, Stockport).*

"Over the last two weeks, with above-average effort, I have heard more than 120 new prefixes. I shall eventually start the difficult task of HPX-ing on AM only, not SSB" *(Pete Cayless, Exeter)* . . . "Stations heard here on *One-Sixty* this season include JA6AK, 6Y5XG, VP7NY, 9L1HX and 1TL. And on Eighty my best catch was KB6ON (Baker Is.) working three OK's at 2200 on March 18" *(Vic Lindgren, Hull).*

General Answers

Stewart Foster (Lincoln) and *A. D. Jones (Chertsey)* both suggest that it would be interesting if the HPX Ladder were divided up into bands—prefixes heard on each separate band, and then the total. We doubt whether most of the people on it could separate out those prefixes already heard, and the paper-work would be terrific . . . but it might be a good idea for a future SWL Contest.

That queer callsign "UB5ARTEK" once more brings in a batch of queries. He is genuine—just a UB5—but situated at the Black Sea resort of Artek. Must be "special status" in some way or other.

Other letters are acknowledged from *John Butler (Bargoed); Bill Felton (Burton-on-Trent); John Hart (Leeds); Dennis Boniface (Ripon); B. F. Hughes (Worcester); M. Woollin (Leeds)* and *Brian Fowler (Wirral).*

A very large number of new entries for the HPX Ladder were received this month; so many that we shall seriously have to consider the raising of the starting figure to 200 in order to fit into the space available. This would be an unpopular move—but also an incentive to do a little more listening!

The deadline for the next instalment of "SWL" will be **Friday, May 28.** We look forward to hearing from all our SWL readers, old or new—and we are very pleased to note the number of newcomers this month. More, please! Good Hunting to you all, and good luck if you are in for the R.A.E.

STRATTON's TO BECOME MARCONI SUBSIDIARY

As time marches on in the modern world of radio communication and manufacture, commercial situations change. We are now informed that the old-established Eddystone Radio business—manufacturers and purveyors of amateur-band equipment for the best part of 40 years, with A. C. Edwards, G6XJ, as the guiding influence—has been sold out to English Electric, which also owns the Marconi Company.

The official notice says that "It is the intention of the Marconi Company to give Eddystone its full backing in all respects." What this actually means is anybody's guess—for one thing, Stratton's have for years been manufacturing general-coverage receivers for the rather specialised marine market, and for another they are also doing a large business with Service and commercial users of communications equipment, as well as in the amateur field.

92nd SIGNAL REGIMENT, A.E.R.

Allocated callsign G3SIG for amateur-band operation, the Regiment has vacancies for wireless operators and radio mechanics, within the age limits 17½-40 years. With gratuity and pay, each member of the Regt. receives a minimum of £90 a year and does a fortnight's training in the summer under what might be called "mobile and field day" conditions, using Army frequencies and equipment (mainly QRO/CW, on point-to-point working).

During these training camps, off-duty activities include amateur-band operation using modern equipment. For instance, during March last, a party signing GM3SIG was working some exotic DX—such as YA, 4S7 and DU, to say nothing of W6—on 14 mc Sideband, running a KWM-2 without a linear. Early in July, GM3SIG will be on again, this time using AM/CW/SSB on all bands from 160m. to two metres, offering QSO's from the rare counties of Angus and Kincardine. The schedule details for this operation will be announced later. Those interested in knowing more about 92nd Signal Regt. and its Army commitment can obtain full details by writing either to G2CAV, G3GVV or G8PG—all *QTHR.*

MODIFYING THE ORIGINAL "VANGUARD"

FOR 100 WATTS AM PHONE ON THE HF BANDS

From Notes by G3SZC

The Vanguard was one of the earliest transmitter kits put on the U.K. market, originated by the now very well-known firm of K.W. Electronics, and first offered to the British radio amateur in 1957. The original Vanguard —as a 50-watt AM/CW transmitter for the 10-160m. bands—was reviewed, as a home-constructor kit, in "Short Wave Magazine" for March 1958. Since then, a great many Vanguards have taken the air and a large number are still in service. This article discusses some interesting practical modifications to give the Vanguard a much bigger carrier output on the HF bands. Whether or not you possess a K.W. Vanguard (or decide to acquire one through our small advertisement columns) these ideas will be useful, because they reflect basic thinking in the AM phone context—in which mode there is still a great deal of amateur activity, in spite of the advent of Sideband.—Editor.

HAVING come into possession of a rather decrepit original Vanguard, and requiring something to give more than the 35 watts then being used at G3SZC, it was decided that something better could be done with the Vanguard. Its Geloso exciter was the sort that would provide ample RF excitation to drive "two of something"—such as a pair of 807's in a new PA stage. Accordingly, the Tx was stripped of everything except for the Geloso VFO unit and the loading and tuning condensers in the PA section.

Looking first at the circuitry of Fig. 1, this is the re-built speech-amplifier/modulator, with everything following normal audio practice, with two 807's (V4, V5) in Class-B zero-bias. The driver transformer T1 for V4 V5 is actually the original Vanguard modulation transformer reversed, and it works very well, as this particular component is of good make. A new modulation transformer is required, T2 in Fig. 1, and this should be of the type having two secondary windings (one for the PA plates and the other for their screens) as found in the Collins ART-13 transmitter available as surplus. Any usual modulation transformer capable

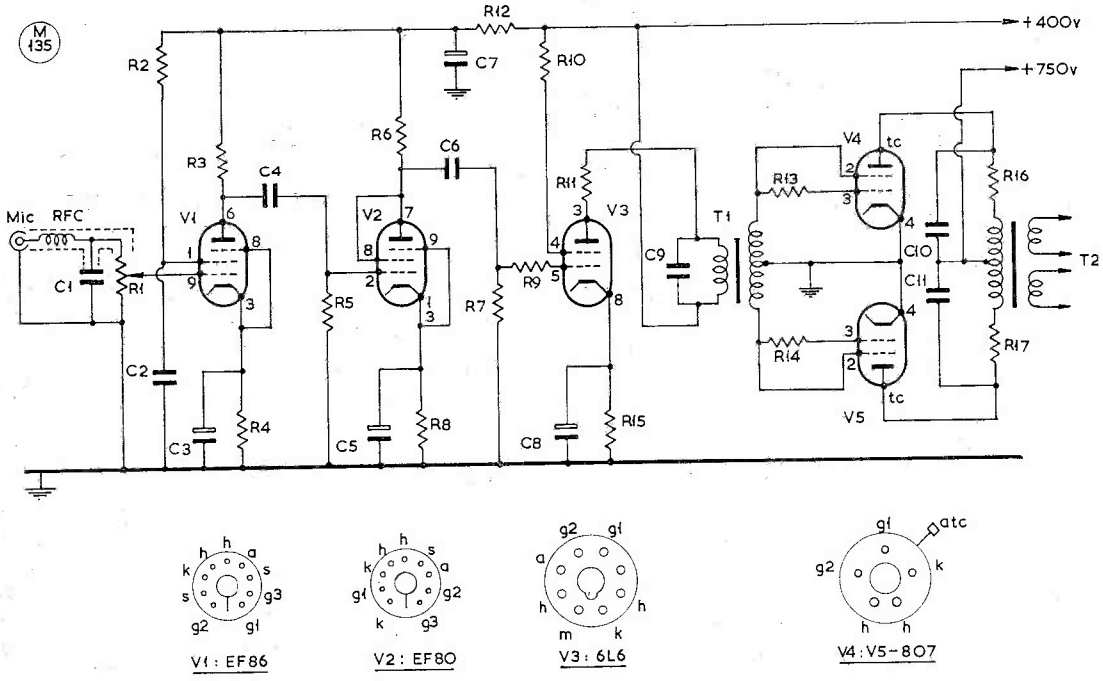


Fig. 1. The speech-amplifier/modulator as built by G3SZC for his modified Vanguard transmitter. Two 807's are used in the Class-B zero-bias connection, to give ample power for modulating a pair of paralleled 807's in the rebuilt PA (see Fig. 2). Since full plate-and-screen modulation is used, T2 should be of the type having split secondaries — see text. The transformer at T1 is the original Vanguard mod. xformer reversed, to function as the driver for the output 807's. Good quality audio with plenty of power is given by this speech layout. Values are in the Fig. 1 table opposite.

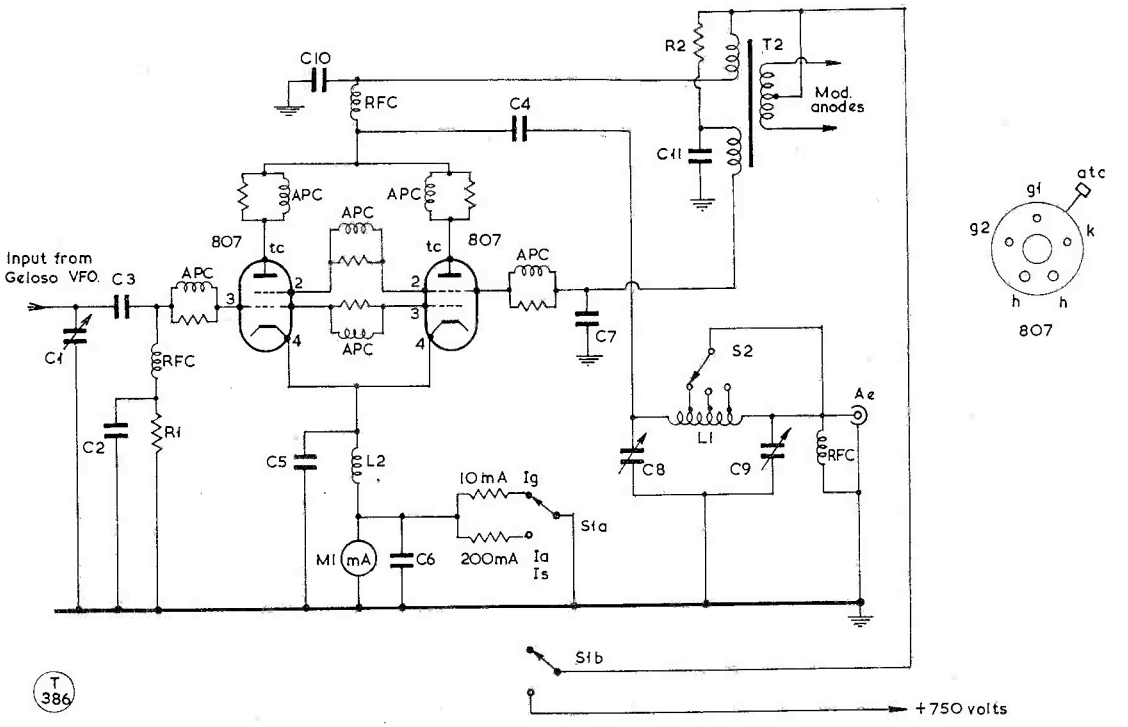


Fig. 2. The Vanguard PA stage, as rebuilt for 100-watt working. Driven by the existing Geloso VFO — which gives sufficient output for the paralleled 807's, run at 750v.— the frequency coverage of the Tx as modified is 10-15-20m. only, though 40-80m. could be included by making L1 plug-in, as suggested in the text. (There is insufficient room in the PA compartment for a suitable all-band tank coil for the much higher-powered PA, though condensers C8, C9 are as original, and are quite satisfactory at the higher HT voltage.) Note the liberal use of APC's and the meter switching arrangement, S1A-S1B ; the meter is as in the Vanguard original.

of handling 100 watts of audio may be too big to fit into the chassis space, so that some sort of double-secondary mod. xformer rated at 100w. and 750v. should be obtained—the point here is that it will permit very full modulation, and full use can be made of the G3SZC speech compressor described in the February '65 issue of SHORT WAVE MAGAZINE.

Table of Values

Fig. 1. The SA/Modr. section for the Modified Vanguard

C1	= 470 $\mu\mu$F	R9	= 4,700 ohms
C2	= 1 μF	R10, R11	= 100 ohms, 2w.
C3, C5	= 25 μF, 25v.	R12	= 3,900 ohms, 5w.
C4, C6	= .005 μF	R13, R14	= 22,000 ohms
C7	= 16 μF, 450v.	R15	= 260 ohms, 2w.
C8	= 25 μF, 50v.	R16, R17	= 47 ohms, 2w.
C9	= .001 μF, 1000v.	RFC	= 2.5 mH RF choke
C10, C11	= .001 μF, 2.5 kV	T1	= Original xformer reversed (*see text*)
R1	= 500,000-ohm potentiometer, AF gain	T2	= Mod. xformer with double-wound sec. (*see text*)
R2	= 1 megohm		
R3, R5, R7	= 220,000 ohms	V1	= EF86
R4	= 1,200 ohms	V2	= EF80
R6	= 82,000 ohms	V3	= 6L6
R8	= 1,000 ohms	V4, V5	= 807

NOTE: The input side RFC, C1, R1 should be fully screened up to the grid of V1, to eliminate RF pick-up. It would be desirable to regard V1, V2, V3 as one unit, with T1, V4, V5 on a separate deck. T2 can be incorporated with V4, V5 or go in on the same chassis as the PA in any other sort of 150w. AM layout.

Table of Values

Fig. 2. Rebuilt Vanguard PA stage for 150 Watts

C1	= 25 $\mu\mu$F, grid tune	R1	= 18,000 ohms, 2w.
C2, C5,		R2	= 65,000 ohms, 5w.
C6, C7	= .001 μF, disc ceramic	RFC's	= 2.5 mH, rated 250 mA in plate
C3	= ex-Geloso VFO (*see text*)	S1A-S1B	= Ganged ceramic
C4	= .001 μF, 2.5 kV	S2	= RF type, ceramic, ex-TU, or similar
C8, C9	= As *Vanguard* original	T2	= As T2 in Fig. 1 (*see text*)
C10	= .001 μF, 2.5 kV	Valves	= 807
C11	= 2 μF, 1000v.		

COIL DATA

L1 — Eight turns of $\frac{1}{8}$in. dia. soft drawn copper tube, wound to 2$\frac{1}{4}$in. dia. by 2$\frac{1}{4}$in. long, tapped at 3t. for 10m. and 5t. for 15m., full coil for 20m., connected to S2.

L2 — To form RF choke: 20 turns 18g. enamelled, wound to be self-supporting.

APC's — In each screen, plate and control grid: 16 turns 20g. enamelled wound on any available 1-watt resistor body.

The RF Side

This is shown in Fig. 2, noting that T2 is as in Fig 1 and C3 is the DC blocking condenser out of the Geloso VFO unit—for some inexplicable reason, moving this capacitor from inside the VFO section to the grid side of C1 reduces, if it does not elimi-

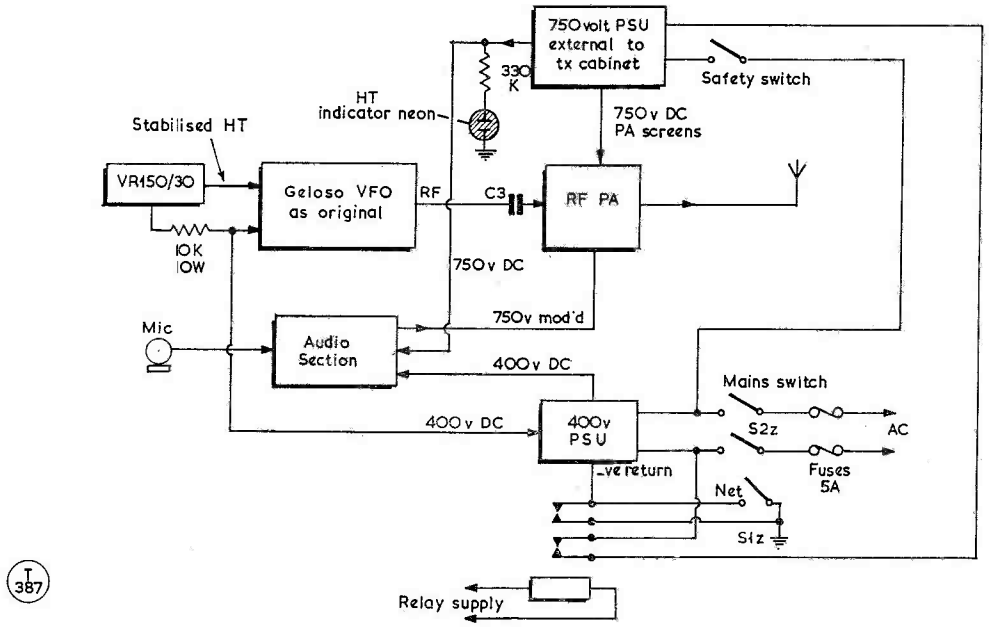


Fig. 3. Block diagram covering the final Vanguard layout, as modified. The Tx now gives 100 watts-plus AM phone, with a new speech-amplifier/modulator section (shown in Fig. 1) and a PA running a pair of 807's in parallel (Fig. 2). The original internal 400v. PSU is retained to run the VFO and low-level audio side, with an external 750v. 500 mA HT pack for modulator and PA supply. The work involves a complete strip-down of the original Vanguard, except for the Geloso VFO, the PA tank tuning assembly, and the 400-volt power supply unit.

nate, TVI! (For G3SZC, BBC-1 is on Ch. 5, and he has no trouble with TVI using the Tx as described here.)

It will be seen from Fig. 2 that APC's are used liberally in the plates, screens and grids of the 807's, with RF chokes and an inductor L2 in the cathode. These serve to keep the paralleled 807's under complete control on the 10-15-20m. bands on which the transmitter operates. A point to note here is that the RF choke in the PA plate is a standard 2·5 mH item, rated for 250 mA—it works better than the pi-section choke originally fitted.

To make room for the new and larger PA coil L1, the harmonic trap was stripped out of the PA compartment. The new coil L1, for the 10-15-20m. bands, is wound with 1/8th-in. copper tube, as shown in the coil table. This is to cope with the much greater RF output, for which the original meter switching has also been modified. As shown in Fig 2, the meter is now in the PA stage cathode line, with suitable shunts switched by S1A to read grid drive and full cathode current; S1A is linked with S1B in such a way that HT is off the PA when the meter is connected to read grid current only.

The new PA band-change switch S2 is a ceramic type, ex-T.U. unit, and will be found to fit into the original front panel orifice for this switch of the hole is reamered out slightly. The output socket for the aerial is fitted where the harmonic trap (now removed) was adjusted—but could just as well come out at the back of the Tx, as in the original.

As regards chassis work, a certain amount of re-drilling and holing will be necessary. Broadly, a suitable layout is, with the Geloso VFO in its original position, the parallel 807 PA worked into the RF output compartment, with the 807 modulators between the smoothing choke and modulation transformer. The speech-amplifier section can go in to the left of the VFO unit (looking down on the chassis), with the 400v. mains transformer at upper left.

PSU Points

In the original, the Vanguard incorporated a 400v. power supply unit, giving all the necessary LT and HT current outputs for 50-watt operation on CW or AM phone. This PSU is retained and used as shown in the block diagram Fig. 3, which indicates the final modification arrangement as worked out by G3SZC. The existing 400v. supply is used for the VFO and audio driver stages, it not having been found necessary to provide separate HT for the Geloso unit—under full modulation the 400v. HT line varies only about 5 volts between full audio output and resting carrier.

To run the modulator itself and the parallel 807's in the PA, an external 750v. supply is provided, obtained from a 375-0-375v. 500 mA transformer and 12 silicon diodes in a bridge arrangement, with switching for half or full secondary to give QRP or full-power conditions. The only other power supply is an external 12 volts for the change-over relays,

obtained from a *Woolworth's* 12v. 4 amp. battery charger (as suggested by one of the *D-Y-K-T* items not long ago).

Some General Comments

Vanguard owners who may be worried about whether the original tuning and load condensers—C8 and C9 in Fig. 2—will stand the gaff need not have any qualms. It has been found that they are quite capable of handling up to 150 watts input when the PA is driven full out.

The tank coil here specified for the PA is suitable only for the 10-15-20m. bands. If 40-80m. should be wanted, L1 in Fig. 2 could be made plug-in—for proper operating efficiency at 150 watts carrier input, there is not enough room in the PA compartment to accommodate a switched "all-band" tank coil.

Circuits for the PSU's are not shown, because anyone undertaking a modification of this sort will know what to do, since any PSU capable of giving 400v. at 100 mA and 750v. at 500 mA will meet the power requirements. The switching should be arranged to enable netting to be carried out using only low power on the Geloso VFO, and the relay change-over arrangement will depend on the station switching layout—but whatever that is, if the mains supply for the external HV pack is taken from the dead side of the main on-off switch within the transmitter, there should be no accidents. In other words, arrange it that the speech-amplifier/VFO drive must be on before the modulator/PA sides can be switched in, with the 750v. supply.

GOONHILLY AND EARLY BIRD

NOTES ON PERMANENT SHF COMMUNICATION LINK OPERATING BETWEEN U.S.A. AND EUROPE

Information by courtesy G.P.O.

This is another in our series of occasional general-interest articles, by which we seek to keep readers informed of the more important happenings in the world of radio communication outside the amateur bands. The material on which this article is based was supplied by the Post Office.—Editor.

AS is pretty well-known, we now have what is virtually a fixed-position satellite, Type HS-303 (called "Early Bird") at a distance of about 22,300 miles above our equator; it moves within a very small orbit of its own, but is always within range of Europe and the U.S.A. simultaneously.

Thus, it provides direct super-high frequency (SHF) linking between a U.S. earth station at Andover, Maine, and three European stations—at Goonhilly in Cornwall, Pleumeur Bodou in Brittany, and Raisting in West Germany.

The system capacity is 240 high-grade (meaning noise-free broad-band) telephone circuits across the Atlantic, available 24 hours a day, and also usable for two-way TV when required. An interesting point is that the path distance of about 45,000 miles means that there is a distinct speech lag on any telephone circuit routed *via* Early Bird, so that fast talkers may find themselves at some slight disadvantage.

Since at the European end the satellite can only work one station at a time (for a week each, in turn, is the arrangement) a considerable land-line and microwave relay tie-up has had to be installed between the three stations and their outlets into their own national telecommunications systems. Though expensive and complicated, the advantages of this plan on the European side are considerable—in that while giving a 24-hour service, one station is on stand-by, one out for maintenance, and the third in full traffic operation.

So far as the U.K. is concerned, broad-band microwave links have been (or are being) installed on the routes Goonhilly-London G.P.O. Tower *via* London-Bristol, then Bristol-Plymouth, and Plymouth-Goonhilly. This internal system will operate line-of-sight on frequencies of 5922-6425 mc and 6425-7110 mc (called the 6 Gc band), capable of carrying 960 telephone circuits, or TV in colour or monochrome. The contractors for the U.K. communications network are the G.E.C. and S.T.C.—and some extremely interesting and highly sophisticated equipment, much of it of entirely new design, is being provided to meet the G.P.O. specifications.

The notes following give some details about what is probably the most interesting part of the whole project—the G.P.O. Satellite Terminal at Goonhilly Downs Radio near the Lizard, Cornwall, this station having been entirely designed by the Engineering Dept. of the Post Office.

Meeting the Requirement at Goonhilly

The new satellite Early Bird differs from Telstar and Relay in many respects, and all the earth stations which took part in the earlier experiments have required considerable modification. Goonhilly, the G.P.O. earth station, has been out of service for several months, but is now in action again. The most obvious feature at Goonhilly is a high-gain, narrow-beam steerable aerial capable af tracking moving satellites with great accuracy. The optimum frequency range for broad-band radio transmission between satellites and the earth is in the 1,000-10,000 mc area, and it is internationally agreed that the frequency for transmission between the earth and the satellite should be in the 6,000 mc region, and that for satellite-to-ground working, frequencies near 4,000 mc should be used. Consequently, a high-powered

6,000 mc transmitter is required, preceded by a frequency modulator which raises the input baseband signals (multi-channel telephony or television) to an intermediate frequency; between the modulator and the transmitter is a transmitter drive unit which converts from the intermediate frequency to SHF.

In the satellite-to-ground direction an extremely sensitive low-noise receiver, such as a maser or parametric amplifier, is necessary to amplify the very low signal levels from the satellite. This is followed by a further SHF amplifier and then a down-converter from SHF to IF; finally a frequency demodulator extracts the baseband information. These transmit-and-receive sequences must be in operation *simultaneously* for telephony transmission.

So that waveguide losses can be reduced to a minimum, the transmitter and low-noise receivers must be fitted as close to the aerial feed as possible. At Goonhilly the transmitters are carried in a cabin that turns, but does not tilt, with the aerial; the low-noise amplifiers are in very small cabins high up in the aerial backing structure.

For tracking, the aerial must either be programmed in its movements, which pre-supposes an accurate foreknowledge of the satellite orbit, or there can be an auto-follow system. At Goonhilly the system is basically a programmed tracking scheme to which is added an auto-correction unit to take out the effects of wind gusts or any very small errors in the original computation.

Aerial Modifications

The aerial at Goonhilly uses an 85ft. diameter paraboloidal reflector with centre feed, *i.e.*, the feed is located at the focus of the paraboloid. As a result of the experienced gained over the past two years the design has been modified to give improved performance. The reflector has been rebuilt and now consists of 24 adjustable stainless steel petals surrounding a 25ft. diameter paraboloid. These petals are very accurately fabricated and fitted and the alignment of one panel relative to another is such that the loss in gain due to surface imperfections is estimated to be only 0·3 dB at 6,000 mc and 0·1 dB at 4,000 mc. The angular aperture of the reflector has been reduced from 180° to 140°; this eased the design of the primary feed so that more efficient illumination of the reflector could be obtained.

Careful consideration has been given to the design of the feed-support structure to minimise its deleterious electrical effects. "Aperture blocking," produced by the structure intercepting the main beam, is kept small by making the legs of the structure as transparent as possible. The structure may also shade the dish from the feed illumination so that transmitted energy is scattered; this energy appears as increased side radiation with consequent reduction of power in the wanted direction. When used for reception, noise from the hot earth is scattered by the support structure into the feed and the system noise temperature is increased. Shadowing is minimised by having the legs of the structure as near to the rim of the dish as possible. Loss in gain due to aperture blocking and feed shadowing should not exceed 0·26 dB. The increase in system noise temperature due to these effects should be less than one °K.

Because of these modifications, the additional weight on the front of the aerial is 120 tons and to balance this a lead counterbalance has been added. The total gross weight of the rotating part of the modified aerial is about 1,100 tons.

Preliminary measurements indicate that the net gain of the aerial is comparable to that of the giant horn aerials used in the American and French earth stations, but because the Goonhilly aerial does not require a radome (which would increase the system noise temperature in rain) a consistent performance can be expected in all weather conditions.

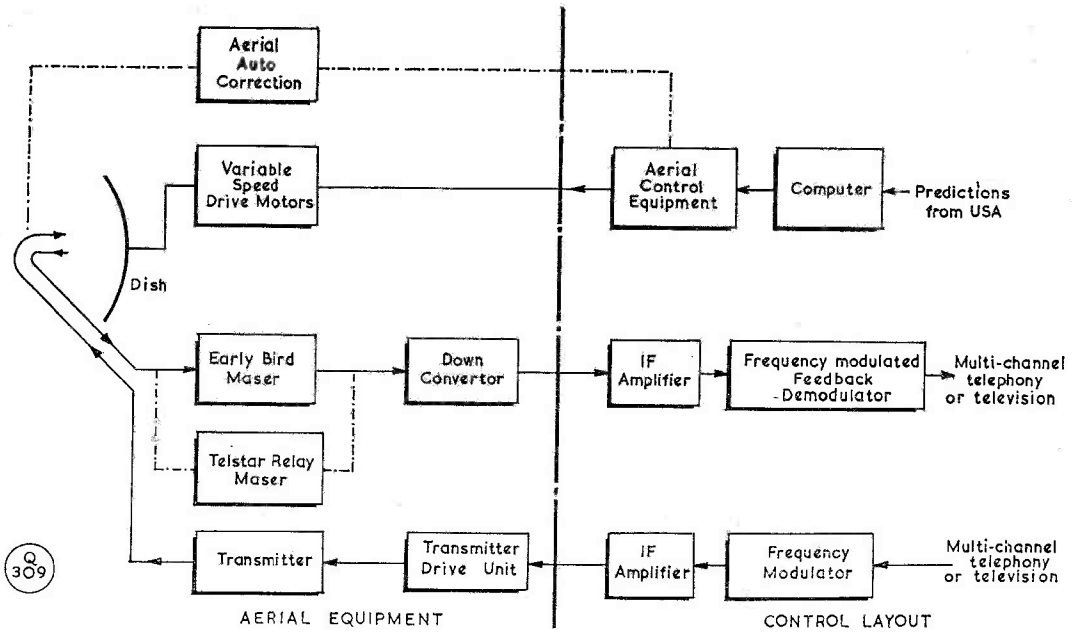
Primary Feed

The primary feed at the focus of the reflector is required to transmit up to 10 kW of RF at 6,000 mc and to receive simultaneously signals at 4,000 mc having the very low level of about a micromicro-watt! The dual requirement of simultaneous transmitting and receiving at different frequencies is met by making the feed an open-ended coaxial waveguide having a hollow inner conductor. The lower-frequency signals, used for reception, are carried in the outer coaxial waveguide and the high-frequency signals are transmitted through the inner tube.

In normal terrestrial microwave systems the losses of the waveguide feeders between the aerial and the transmitters and receivers are not normally of very great importance. In long-range satellite systems, however, such as that we are considering, the losses in the waveguides must be kept to a minimum both to conserve the energy collected by the aerial during reception and to avoid wasting power during transmission. Losses have been more than halved by re-engineering the waveguide transmission lines on the aerial and special waveguide components were developed to preserve mode purity and to absorb any unwanted modes.

Aerial Control System

The basic control system at Goonhilly uses predictions, prepared in the U.S.A., of the satellite position—in the case of Telstar or Relay—throughout the usable parts of its orbit. The Goonhilly computer then checks for feasibility, makes allowance for the refraction of radio waves at low angles of elevation, converts to elevation and azimuth angle positions for the aerial, and interpolates down to one second intervals in time. This is punched on to a paper control tape which can be stored until required, and about 1,500 feet is necessary to control the aerial for one hour (when tracking Telstar). The control system can operate at aerial speeds of up to 120° per minute in azimuth and 30° per minute in elevation. For Early Bird, however, the required tracking speeds are very much lower than those for Telstar or Relay—in fact less than one or two degrees per *hour* for most of the time. The control system has therefore been modified so that, when required, steering data can be read from the



Diagrammatic layout of the Satellite Terminal at the G.P.O. Goonhilly Downs Radio Station, as outlined in the accompanying article. In working the satellite, one of the engineering complications is that transmission and reception are instantaneous, with an 8 kW RF output which must not affect the received signal arriving in terms of $\mu\mu$Watt — though of course with a good frequency separation (see text). The dish itself, 25ft. in diameter, is a very refined piece of mechanical engineering and though the all-up weight of the structure is some 1,100 tons it can be moved both in azimuth and elevation with great precision. An interesting feature of the design is that auto-following of any satellite is possible by locking on to its beacon signal, which controls mechanism to keep the eye of the dish right on the target. The frequencies involved are in the gigacycle range, and the receiving maser, of a new design, is cooled by liquid helium. The whole problem with the receiving circuits centres on low-noise reception of an extremely weak signal.

control tape once per minute instead of once per second.

Small steering errors due to wind gusts or imperfect predictions are corrected by swinging the aerial beam independently of the motion imparted to it by the aerial mount. A beam-swing mechanism, controlled automatically by error signals derived from the beacon signal of the satellite itself, moves the aerial feed about the true focus of the paraboloid, setting the beam accurately on the satellite. This part of the system is thus an auto-follow arrangement which continuously minimises small steering errors.

Monitoring and control facilities are brought together at a console in the main equipment building one-quarter mile from the aerial. Provision is made for manual as well as for automatic control of the mechanism. Standby plant, where provided, is switched manually or automatically.

Transmitting Equipment

Standard frequency modulating equipment, of the type used in normal line-of-sight microwave radio links, accepts the input multi-channel telephony or television signals, and produces a frequency-modulated 70 mc output. The deviation employed is several times greater than the standard adopted in normal terrestrial circuits. Further amplification at IF occurs before the modulated signal is transmitted over coaxial cable between the control building and the aerial site.

Because of the greater orbital height of Early Bird, as compared with Telstar or Relay, some increase in the power of the signals transmitted from earth stations became desirable. A new water-cooled travelling wave tube has been specially developed and can supply 8 kW of RF at the Early Bird frequency for transmission around 6,000 mc.

Receiving Equipment

Reception of very weak signals from satellites depends upon the use of a pre-amplifier having an extremely low level of internal noise. The principal type of amplifier in use in the various earth stations is the travelling-wave ruby maser. The maser requires an operating temperature only a few degrees above absolute zero, and this is achieved by immersing it in a bath of liquid helium.

The original installation at Goonhilly incorporated the first fully operational travelling-wave maser made in Britain, and this was used in all the experiments with Telstar and Relay. However, operating frequencies for the Early Bird satellite are sufficiently different from those of Telstar to require considerable modification to the maser, and an entirely new maser has been installed, incorporating developments since 1962.

This new design has better gain and more band-

width, but the greatest improvement lies in the reduction of the internal noise level to less than half its previous value, and an improvement in stability achieved by using a lightweight superconducting magnet (immersed in the liquid helium bath) instead of a heavy external permanent magnet. Monitoring and control circuits have been built into the new equipment to overcome possible interruptions caused by the failure of auxiliary apparatus.

The maser is followed by a low-noise travelling wave tube which provides further amplification at microwave frequencies and is then down-converted in frequency to 70 mc. An all-solid-state pre-amplifier follows this and then conventional IF amplifiers for transmission back to the control building.

Because the carrier/noise ratio over the satellite link is so low, conventional discriminator-type frequency demodulators would not be satisfactory, so an FM negative-feedback demodulator is used instead. In this type of receiver the instantaneous frequency of the incoming signal is continuously followed and the noise bandwidth is limited by a filter of narrower passband than that occupied by the whole deviation range of the RF carrier.

Test Facilities

An improved design of power measuring equipment has been developed to enable a sample of the transmitted power launched into space to be measured at the vertex of the aerial. The device is not affected by temperature changes, and is sufficiently sensitive and compact to be used as a hand-held radiation monitor. In addition, a miniature transmitter has been installed at the vertex that operates on the same frequency as the transmitter in Early Bird. Thus, the aerial has a satellite simulator built into it, and the whole of the earth station equipment can be checked under realistic conditions without having to aim the aerial to an earth-bound distant checking station.

Shortly, it is expected that the system will be in full commercial operation, though at first only for the periods noon to midnight on Mondays to Fridays, to relieve the peak of the Trans-Atlantic telephone traffic.

SPECIALLY ON THE AIR

Arising from the note, under this heading, on p.108 of the April issue of SHORT WAVE MAGAZINE, we have the following to which to draw attention :

GB3SAD, May 15 : For the opening of the new Youth Centre at Stevenage, Herts., the Stevenage & District Amateur Radio Club will be providing a station to operate on the 10-20-80-160m. bands, from 10 a.m. to 10 p.m., using AM/CW/SSB, with spot-frequency AM on 28·57 mc. A special card is being minted, and QSL will be 100 per cent. The QTH is : P. J. Burgess, hon. secretary, Stevenage & D.A.R.C., 51 Fawcett Road, Mobbsbury, Stevenage, Herts.

G3SBF/A, G3TTK/A, May 15 : In connection with the Toc H Golden Jubilee, the Coalville Radio Club will put on stations at the Staunton Harold Cheshire Home, signing G3TTK/A on Top Band and G3SBF/A on other bands, operating all day. Contacts are specially hoped for with stations on the air for Toc H or from other Cheshire Homes. All QSO's will be confirmed by a special QSL card. The address is : B. V. Eames, G3SBF, hon. secretary, Coalville Road Club, 46 Ratby Lane, Markfield, Leicester.

GB3GP, May 15-16 : Operating SSB on all amateur bands from the Scout Camp Site at Gilwell Park, Chingford, Essex. Station will be provided and manned by members of the Baden-Powell House (London) Scout Amateur Radio Club, and will be using the new equipment obtained for their own Club station G3TGS. During the week-end it is expected that 1,200 Scout fathers-and-sons will be in camp. The QSL address is : Scout Amateur Radio Club, G3TGS, Baden-Powell House, Queen's Gate, South Kensington, London, S.W.7.

G3RHF/A, May 29 : Members of the Echelford Amateur Radio Society will be operating an exhibition station at the Meadhurst Club, British-Petroleum Research Centre, Sunbury, Middlesex, on the occasion of the B.P. Sports Day and Fête. Contacts will be acknowledged by special card, and the QSL address is : A. G. Wheeler, G3RHF, 88 Village Way, Ashford, Middlesex.

G2SU, May 29 : This will be a demonstration station run by the Northern Heights Amateur Radio Society for the Warley Charity Gala ; the callsign is that of the late G2SU, an old member of the society, and re-issued to N.H.A.R.S. by special arrangement with the G.P.O. A member's /M station will take part in the gala procession and keep in touch with the base station G2SU. QSL address : A. Robinson, G3MDW, hon. secretary, Northern Heights A.R.S., Candy Cabin, Ogden, Halifax, Yorkshire.

GB3SAL, June 7 : Operating in connection with the Mobile Rally being held by the Saltash & District Amateur Radio Club at Calstock, Cornwall, and working on all bands. QSL address : H. Griffiths, G2DFH, 4 Westbourne Terrace, Saltash, Cornwall.

In connection with some of these events, it will be noted that an " appropriate callsign " is being used —this is because the G.P.O. will issue special calls for short-period operation, where the request can be justified.

For the next list, details (set out in the form shown here), must reach us by *May 19* latest for appearance in the June issue of SHORT WAVE MAGAZINE, and by *June 14* for July publication.

COMMUNICATION and DX NEWS

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

AS conditions continue to improve, it becomes obvious that certain problems will arise. Broadly speaking, the better the signals, the heavier the QRM. And with each succeeding sunspot cycle there is bound to be more QRM, just because of the rapid increase in the number of stations on the air.

All those who use the HF bands are by now well aware of the effect of a huge number of stations between 600 and 1,000 miles away, where they get full benefit from the first skip . . . in fact, you can hardly escape them on Twenty at any time of day or night.

This phenomenon is hardly what we used to class as "short-skip"; it is exactly what one would expect from a normal first skip, quite apart from any unusual sporadic-E effects that may arise from time to time. Therefore we shall all have to condition ourselves to working DX (if we are keen enough on doing it) through a constant foreground — you can't call it a background — of strong and rather poor-quality signals.

We've got to live with it, so we must make the most of it; and certainly stable, selective receivers are the first necessity. Some of these interfering signals, of late, have been so raucous in tone and so prone to drift that with a really good receiver one could almost ignore them. Certainly one would not even know if one was being called by one of them, while listening to a stable, clean signal on the frequency.

That, of course, refers to CW, but on Phone the problem is not so simple. A super-selective receiver will keep these transmissions at an unintelligible level, certainly, but won't eliminate or even much reduce the sheer noise that they make.

Even beams are not the universal remedy that many seem to think, since some of them have an excellent front-to-back ratio at the low angles for which they are designed, but the unwanted signals come spraying down from high angles and sometimes seem to be the same strength, whichever way the beam is looking.

No doubt about it, QRM will be the real challenge in the coming years. Since the last sunspot peak the world's amateur population has increased by over 60 per cent, powers have gone up, the amount of SSB has multiplied ten- or twenty-fold (it was quite scarce in 1954!) and we only have the same bands to contain it all. That's our problem—will anyone come up with a solution?

What—Again?

Though not intending to keep up this CW-*versus*-Phone business any longer, G3SIL, who started it all, tries to make it clear that he has no objections to CW as a means of communication . . . he just doesn't like the superior attitude adopted by some of its practitioners.

Further comments come from GM3KLA who says the controversy would never have arisen, had the old probationary CW period been retained; from G3SZC, who thinks the original letter was a deliberate act of "wooden-spoonism" (riot-rousing or civil-commotion-starting!); and from SWL P. Cayless, who asks plaintively "Is it really necessary that everyone should spend their time in trying to convert everyone else to *their* form of communication?"

What we have not yet seen is a reasoned letter which puts aside the whole of the emotional aspect and sets forth the advantages of each mode in different circumstances. For instance, there are occasions on which *conditions* alone make a Phone contact impossible, but one might just about get something intelligible through with a very weak CW signal.

There are days when a long CW ragchew would be a sheer waste of time, if both stations had modulators (and if a vacant space were to be found anywhere!). On

FIVE-BAND DX TABLE

Station	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries Worked
G2DC	111	165	305	279	169	319
G3DO	83	86	316	223	183	322
GI3IVJ	83	101	306	259	175	316
G3PEK	75	119	142	88	18	175
G3IGW	67	113	150	128	123	189
G6QB	56	116	284	195	143	308
G3KMQ	53	95	201	83	3	226
G3NOF	39	32	252	190	132	275
GW3AHN	21	71	322	294	151	332
G3TJD	18	47	44	36	0	94
G3IDG	17	27	53	66	55	94
G3MDW	6	7	46	41	43	81
G3RJB	1	46	105	19	0	112

the other hand, a Brazilian might find it difficult to talk to, say, a Scandinavian on Phone but might manage quite a good QSO on CW. There's plenty to be said for both modes, in the right place, and happy is the operator who can turn to one or the other with equal dexterity.

News from Overseas

Activity from St. Helena, ZD7, should soon increase smartly, judging by reports received. GW3LXI (son of old-timer GW2OP) will be there for three months with a KW-2000, looking for U.K. contacts on Twenty (QSL arrangements *via* GW3TSH, 33 Treowen Road, Pembroke Dock). ZC4IP is also expecting to be there, signing, if possible, ZD7IP. And on the nearest neighbour, Ascension Island, there are now about fourteen ZD8's in various stages of activity.

5X5AU (Kampala) writes that the "gentlemen" signing 5X5AM, 5X5RV and a few other calls are not genuine—the only legal ones there are 5X5AU, 5FS, 5IH, 5IU, 5JK and 5KD. The Radio Club at Kampala handles cards for all genuine 5X5 and 5Z4 stations—others are "consigned to the ash can."

VE3FJQ (Willowdale, Ont.) says he sympathises with us in our European QRM problem (especially from the "Klubs"), but out there in VE3, if he listens on Forty he can hear dozens of creepy-crawlies, nothing better than T6, from CM, CO, PY, ZP, YV and the like! He hands the prize for clean operating to G's and DL's, and he likes the G's because they manage to find his 40-watt signal. (Many other stations grab the loudest W they can find, and ignore his 559!) Incidentally we like VE3FJQ's thumbnail sketch of himself, which (apart from the age bit) would almost fit your Conductor: "Age 17, dyed-in-the-wool CW man, indifferent about QSL's, do lots of 80-metre ragchewing, frustrated but aspiring DX'er." Good luck!

OY7ML writes to say that there are eight newly-licensed stations in the Faeroes, signing OY2J, 3B, 3S, 7M, 7X (all in Torshavn), OY3M (Suderoy) and OY3SL, 4KL and 4M (Klakksvik). All QSL's *via* Box 184, Torshavn, where the new radio club is seeking I.A.R.U. membership.

From 9J2W (Kitwe) we hear that the callsign allocation to Zambia consists of two blocks, 9IA-9IZ and 9JA-9JZ. At present all amateur callsigns are in the 9J2 series, but from time to time certain special stations are liable to crop up with other numerals, 9J1-9JØ. For instance, 9J6AA/P will be on during June 12-13, and all contacts with them will count double points for the new Worked Zambia Award, to be announced shortly.

The Ex-G Club ask us to announce that their Sunday nets on 14345 kc will not take place, in future, when an international contest is in progress. This will not only release an extra 3 kc for the giant pile-up, but will save members the struggle of trying to get through the QRM.

I.T.U. Activity

Celebrations on May 16-17: For two whole days the I.A.R.C. station in Geneva will operate on all bands, to celebrate the 100th birthday of the International Telecommunications Union. Six stations will be in action, using the calls 4U1ITU, 2ITU, 3ITU, 4ITU, 5ITU and 6ITU. The more contacts the merrier—starting on 160 metres, right down to two metres.

Interesting to note that the mutual overloading problem, with several stations going simultaneously at 4U1ITU, has been solved with front-end crystal filters on the receivers. These have a pass-band 30 kc wide, with 120 dB attenuation outside that band, and at present several are in use. Frequencies covered in this way are 14113, 14292, 7045, 3800 and 3536 kc.

Top Band Doings

The real Top-Band DX is now in short supply, but the winter season was a long time tailing off. Was it better than the previous one? Opinions vary, but W1BB, up to March 31, had worked 164 different stations in 28 countries, compared with his figures of 136 and 25 for last season. Stew says that the official test weekends and the *CQ* Contest failed to synchronise with really good conditions this year, whereas we were very lucky that way in 1963-64.

Many strange happenings were recorded during the season, including that outstanding opening between the American East and West coasts on February 14, when reception from Europe was almost *nil*. Many nice DX stations popped up at various times on the other side and were very well received in Europe (such as HP1IE, HI8XAL, VP3CZ, VP2VL). The general report on them from this side is "lovely signals, but not workable." Real frustration, to hear a beautiful signal with an exotic prefix, calling CQ Europe . . . and to be quite unable to raise him with 10 watts.

Then there were the outstanding contacts between G3PU/ZL3RB on *Phone* (March 22) briefly reported last month, and that between G3FPQ/VK3BM on CW. (We have since heard rumours of Phone for that one, also, but no confirmation.)

It has been suggested to W1BB

TOP BAND LADDER

(G3S-- and G3T-- stations only)

(Starting Date, January 1st, 1965)

Station	Counties	Countries
G3SED	69	20
G3TBJ	64	12
G3SYS	61	12
G3SWH	56	11
G3SJJ	54	8
G3SVL	50	10
G3SHY	47	8
G3TIK	45	12
G3SGC	45	12
G3TTK	45	9
G3SZA	41	8
G3TSS	40	7
G3TON	37	8
G3TZM	28	6
G3SQX	24	6
G3TUX	15	5
G3SVW	6	3

by G8PG that we have now awakened *too much* Top-Band interest. A few years back there was only a handful of stations getting out really well, and after they had worked a W or a VE, the boys with poorer aerials got a chance. Now there are at least two dozen stations with superb aerials, and the smaller fry simply don't get a look in at all. G8PG suggests that there might be a couple of "First Time Across" mornings next season, when the big guns would be requested to stay in bed.

It's good to note that the high-powered DHJ station which was testing for a while on 1818 kc seems to have disappeared; maybe that was not intended to be his final frequency after all. DHJ59 on 1830 kc is always with us, of course, and the W/VE stations use him as an indicator of conditions.

Apparently the JA's on the band have not yet heard Europe, but they have logged the W6 and W7 stations as well as 9M4LP and 9L1HX. It would be nice to find one European getting through to them on 1880 kc CW—just to say it could be done!

To the welter of commercial stuff on Top Band, G3TBJ (Ringwood) now adds the harmonics of Barcelona and Brussels, which land on 1870 and 1852 kc and reach S5-6 with him in the late evenings. Anyone else bothered by them?

County-chasers who still need the *Scilly Isles* are invited to look out for G3RCW/P, July 4-16. This will be a joint expedition to the islands by GW3PMR and G3NHE, and most of their operation will be on Top Band.

G3PPE says he has been trying a form of capacity-loading for a Top Band aerial by running the far end very near to the ground. It seems that with only 84 feet—the last 20 feet being only two feet off the ground—he can make the thing behave like a quarter-wave, and thinks this might be handy for people with small gardens.

G3SHY describes his aerial as "peculiar"—one of these bent affairs that works in a different mode on every band—but no DX has been raised as yet.

G3SDE, commenting on the analysis of Top-Band occupancy, says "engineers proved that according to the theory of aerodynamics the construction of the bumble-bee is such that it can't possibly fly, but, not knowing this, it just keeps on flying." Likewise, we have surely proved that no amateur communication on Top Band could be possible . . . but fortunately the amateurs don't know it and keep on working DX.

Reporting the HF Bands

G3PLQ sends more logs from his short trip to West Africa, with a note that the strongest G stations heard between last August and the present time have been G3GRL, 3SED, 3RFS, 3RPB, 3FYT, 3IGW, 3TLY and 6VC. Most powerful Europeans, PAØPN, DL1FF and a few OK's. Strongest DX, W1BB/1, VO1FB, VE3KR and WØGDH. But he hasn't yet heard that beacon in ZE1-land.

Support for the G3S--/G3T-- table is still increasing, and we shall have to close that one to new entries before long, as it only runs until the end of the year. The changing of positions on the Counties Worked Table is also very brisk, and it is intended to keep that going, too, until the end of this year, after which something fresh will have to be devised. The feeling is, at present, to settle for the suggestion of a combined Phone-and-CW total, giving a possible maximum of 196, but if a better idea comes up, we'll use it.

Noise Generators

We are always receiving an increasing number of complaints about interference from overhead mains, but any local 11 kV lines come in for more criticism than the EHV types. A typical remark is from G3SDE, who writes "Tragic to think that signals can travel thousands of miles, and then be lost in the last mile home under S9 hash from these motionless zombies, spreading over the countryside like an unchecked weed in a garden." He has recently been troubled by a faulty 11 kV line at a distance of 1¼ miles.

While on this one, we should like to know the greatest range at which serious noise, definitely attributable to power lines, has been experienced. Is the range of the 275-kV monsters twice that of the more common 132-kV lines? And what of the newer lines as compared with the old ones—have the insulators *really* been improved?

If you suffer from this kind of interference, please let us know, and, in particular, which bands are worst affected. Generally speaking, it seems that 160 and 80 metres are the chief sufferers, but there *have* been cases in which one HF band has been blotted out, the others hardly being affected at all.

Around the DX Bands

Sundry good openings of the 21-mc band have awakened hopes among the DX-chasers, usually short-lived because the band has almost immediately folded up again. There was one weekend (April 10-12) when the whole band was as full of JA stations as it sometimes is of W's; for three days it seemed that JA contacts were going to be ten a penny for evermore. Then — they just disappeared.

It's much too early in the new sunspot cycle to expect reliable and long-lived openings even on 21 mc, let alone 28 mc . . . but in the long-term view they should be improving all the time. And just as well, too, if the present short-skip on 14 mc is going to stay with us.

GI3IVJ, speaking of 21 mc, reports many Far East contacts on CW, including AC8H (Gus, of course); CT3AQ, HK5DE, TN8BK and 9X5AV on AM Phone; and "Many JA's," KC4USP, VS9MB, XE1RRW, YA4A, ZD8HL and 5X5IU on SSB. Is the SSB usage of that band on the increase at last?

G3SML, with 110 watts and a

2-el. beam on 21 mc, worked Phone (AM?) with a load of JA's, KP4, KZ5, LU's, OD5's, PY's, PZ's, VP2LS, VS9AWR, VU2JM, YA1AW, ZS8C and the usual bunch of Africans.

SWL Pete Cayless and others comment on the excellence of 21 mc between 1700 and 1900 most evenings—mostly AM Phone but with the welcome appearance of ZD8HL and ZD8JC on SSB.

G6YL drops a line to confirm that the OD5's *are* back (she heard OD5LX several times on 21 mc

TOP BAND COUNTIES LADDER

Station	Confirmed	Worked
Phone and CW		
G2NJ	98	98
G3NPB	98	98
G3REA	98	98
GM3KLA	98	98
GM3IKD	97	98
G3PLQ	92	95
G3SED	81	91
G3NOW	76	82
G3RTU	67	67
G3PPE	63	77
G3SGC	55	76
G3SVL	54	62
G3IDG	53	57
G3SWH	52	72
G3LZZ	50	64
GW3TLW	47	59
G3SHY	46	62
G3SJJ	42	81
GW3PMR	39	69
G3TMZ	37	43
G3RJB	34	37
G3SQX	23	58
G3ING	16	41
Phone only		
G3NPB	88	88
G3REA	56	67
G3PLQ	55	58
G2NJ	54	54
G3MDW	43	62

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

CW) and also that the 9H1 prefix for Malta isn't yet in use, judging by the number of ZB1's around.

Passing on to 14 mc, where most of the DX is still to be found, stronger and stronger complaints about European operation continue to come through. G2DC remarks that SP5AFL's letter (last month) is all very well, but at least if an SP station calls CQ DX he is not likely to be pestered by gangs of G stations with T7 notes calling *him*—and continually calling even when he is actually working his bit of DX. That is what we all have to put up with, and Jack says "It's time that all and sundry had it drummed into them that a CQ DX call from a European station, especially on 14 mc, is not an open invitation for replies from other Europeans."

He also remarks that it still takes a major contest to bring those rarer DX stations out of hibernation—the number of really rare ones that could be heard calling the W's during the ARRL Contest, especially on 7 and 3·5 mc., was "really mouth-watering, even to a hard-bitten DX'er such as myself." He worked all the ten U.S. districts on all bands, 3·5-21 mc, with the exception of W7 on the last-named. Otherwise, nothing unusual to report except some ZS's and ZD8's on 28 mc, with openings of very short duration.

GI3IVJ amassed a good list of DX on 14 mc SSB, including Pacific pieces like KB6EPN, KH6's, KW6EJ, KX6BQ, VR1B, VR2EK and others. The Far East was also good—DU9FB, KR6KS, HS3RP, 9M2SR, 9M4ML and 9M6LX. He missed KH6EDY (Kure) and KS6BO, but makes it obvious that the path over the North Pole has been pretty good.

GM3JDR, who always seems to collect a different lot of DX from the boys down south, reports working 38 UAØ or UWØ stations on 14 mc CW—many of them in Vladivostok or Sakhalin Is. (Do we hear all those in Southern England?) Also, on CW, AC8H, AP5HQ, HL9KA, JA's, JT1's, PJ2CZ and ZL1NG/P. And on SSB (150 watts to a dipole)—DU1AA and 9FB, KC4USN, UAØ, UH8, VE8, VK5JT, VP3HAG, VS9MB, three XE's, ZD5R, ZL's, and many Africans and 9M4's.

Incidentally, GM3JDR says he's quite proud of his 6146's when he compares results with some of these pairs of 813's or 4X150's or 4-400's, and feels that it's a bit silly to run 100 watts to heat up for another 50 watts (after all, 150 watts DC input is still all that we're allowed!)

1965 Conditions

SWL Dave Whitaker (Halifax) has been working out some figures for the first quarter of 1965, showing the number of Zones and Countries worked, or heard, by British amateurs and SWL's. As this covers the period of sunspot minimum he suggests that it would make interesting reading in 11 years' time, when we should be under similar conditions.

The 14 mc band tops all the others (naturally) with 243 countries and 40 Zones worked (all modes), though his figures indicate that Phone dominates CW as regards DX worked on this band. On the LF bands CW comes into its own (115 countries on 7 mc, compared with only 68 on phone). But as it is our experience that the stations who work the best DX are those who keep quietest about it, these figures are not really very much to go by, we feel. On 28 mc, for instance, his figure is 24 countries worked on Phone, but we know a modest chap who has worked over 60 countries on the band during this period, and has said nothing about it except privately.

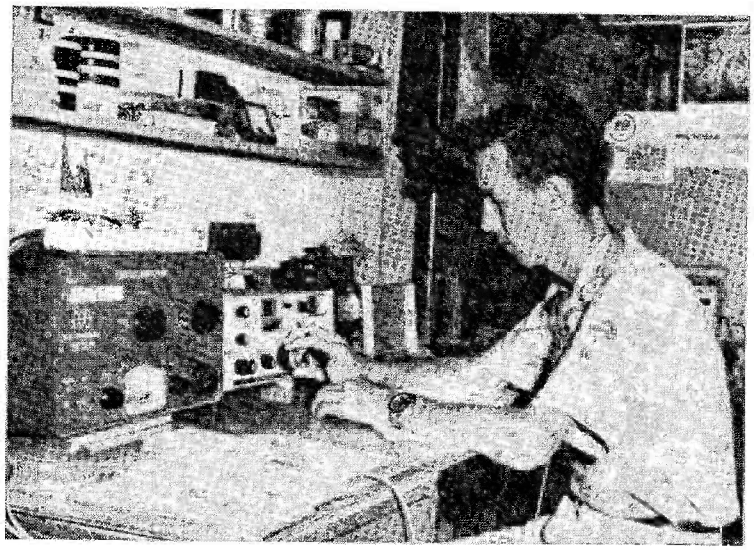
Four-Band Working

Just a note about G3PEK, who rejoins us after a long absence and still reports good CW DX on all bands from 3·5 to 21 mc (on the first-mentioned he worked VP2AV and ZL4GA, the latter using a "Joystick"). G3PEK has a long wire with loading coil for 1·8, 3·5 and 7 mc; a 7 mc dipole for 7 and 21 mc; and a ground-plane for 14 mc. Plus lots of enthusiasm, as he says "other

activities during the month include going out to change aerials at 2 a.m., and rewinding burnt-out HRO front-end (caused by loading Tx straight into it!) at 4 a.m."

Other consistent four-banders include, of course, G2DC, who, despite noting openings on 28 mc, never fails to snag an odd bit of DX that shows up on 3·5 or 7 mc.

G6QB tries his best to keep *six* bands going (1·8-28 mc, of course), all on the same two "bits of wire," but some of the visits have to be pretty short and snappy and we should say that the ideal state of affairs is to settle for three or four and work them over really carefully. (Think of all that lovely Pacific DX you can be missing on 14 mc while trying to work a VE1 on Top Band!)



Station of Nigel Dunn, MP4TBM, P.O. Box 8, Sharjah, Trucial States, Arabian Gulf, who is out there with International Aeradio, Ltd. Running a National NCX-3 tri-band SSB transceiver, with a Lafayette 600w. linear amplifier, he has dipoles for 20-40-80m., a GP for 20m., with a beam under construction. MP4TBM is on the air with SSB practically every evening during 1300-1700 GMT, and has worked 65 countries since starting up last December — Nigel says the only drawback about all this is the temperature, which can rise to 140°F. in the summer! But they do have air-conditioning.

Big Moves

G3DO, who adds to his Five-Band score with 9U5BB, ZL4JF, VQ8AMR and VU2NRA, all on 14 mc SSB, shifted his QTH on April 7 and is now off the air for several weeks before erecting his tower and beams. And the distance of the move? Just into the house next door!

G3NWT was summarily evicted from his old QTH (the M1 extension now runs roughly through what used to be his shack!) but is now in possession of a much better one, with a TH4 beam at a height of 57 feet and erected (like all his beams over the past five years) single-handed. A real triumph of mind over matter!

Segregation?

Last month G3NWT queried the wisdom of trying to confine SSB to 50 kc sections of the bands, and asked why one should have to shift frequency because one had adopted a mode of transmission that uses less space and causes less QRM. This month G2DC says "I read with horror the comments relating to the SSB gang being fenced off. I am all for it, for the present, anyway. It is better to have these high-powered commercially-built transmitters and their owners segregated where they will only be inflicted on the ears of those who wish to listen to them. To let them roam at will would be too bad, especially on 21 mc, where 75 per cent of all the voice transmissions are from stations using moderate power and, usually, home-constructed AM transmitters."

By and large, it is possibly true that most SSB stations use commercial gear and high power. But there *are* exceptions, and there are also AM stations using very high power. Taking a careful look over the Phone bands just before writing these paragraphs, it seemed to us that the most unpleasant and QRM-causing transmissions heard emanated from "home-brew using single 807" and rigs of similar type. *Bad* rigs, admittedly, whose owners would not be capable of building an SSB outfit or of operating it properly.

We are back on the old controversy about power—which causes more QRM, a clean kilowatt or a dirty 50 watts? An unfair question—almost as unfair as the reverse choice between a dirty kilowatt and a clean 50 watts! But the fact remains that most of the high-powered, commercially built rigs *do* put out clean signals, and the home-built brigade includes far too many who should not, by our own standards, ever have been licensed, because they simply don't know what they're up to. All honour to *good* home-brew rigs; if a man knows what he's doing sufficiently to build a first-class rig himself, it's pretty certain he will know how to operate it sensibly.

DX News in Brief

G5MD reports one of those queer QSO's that sometimes happen; on Twenty, at 1850 GMT, he worked VK2AZI, who had as strong and steady a signal (57/89) as any of the Europeans on the band. He was the only VK heard and his appearance was very brief. What *is* the real explanation of these occasional freak contacts?

HZ1AT is the call currently used by our old friend Ken Ellis in Saudi Arabia. He has hopes of Neutral Zone operation (in fact he may have done it before this reaches you), but isn't sure of the callsign—something with "KW" in it, if possible, so look out for him.

G3FYR reports CW DX on 3·5 mc continuing well into April, with a longish list of W's and VE's

worked, as well as HI8XAL (589) and SVØTR.

All QSL's for the HZ3TYQ/8Z4 operation have now been despatched by W1RAN, and give the information that he made 1,340 QSO's (four days' work) from an unheated tent in temperatures below freezing. Single-handed, too, from a spot accessible only by 150 miles of camel-track, but he managed to get a KWM-2 and a 2-el. beam along in a small truck. (When the whole world is going mad over one of these DX-peditions, you might occasionally spare a thought for the chap or chaps at the other end . . . they're not always quite as comfortable as you are!)

G3IDG remarks that when he reads a note, like G2DC's, to the effect that "a CQ will sometimes bring back a host of JA's but not much else" he is quietly amused. To one like himself, for whom just *one* JA QSO would be a matter for celebration, it proves that DX is rather a comparative term.

Working the Islands

The new "IOTA" (Islands on the Air) Awards are in full swing, and the Directory of Islands, which serves also as a rule-book, is available from Geoff Watts, 62 Belmore Road, Norwich, NOR.72.T, for 2s. in the U.K. What may interest many of our readers is that there is a year-long contest, which will run from January 1 to December 31 this year and following years, for which a special IOTA Award will be made to the leading station and leading SWL in each continent. Only islands listed in the directory and future amendment lists will count, and QSL confirmation is necessary—though the cards are not to be sent in for this contest. (One of the rules is that the name of the island must appear *in print* on the QSL.)

DX Briefs

At the time of going to press, there are three main sources of DX excitement: CEØXA from the San Felix group, ZD8HL operating from VP1, 2 and 3 under Hammarlund sponsorship, and VU2NRL from the Laccadive Islands. The first two should be all over before you read this, but the latter hopes to be there until about the middle of May.

VR6TC has been persuaded to try really hard for Europe, and will be on 14040 kc CW at 2130 on Monday evenings whenever possible . . . Gus Browning has been very active, mostly on CW because of poor conditions, from AC5H, AC8H, AC6H and ACØH. (An added note says "if you hear him sign AC9H, don't ask his QTH.")

CR5SP (Sao Tome) is now completely equipped with Hammarlund SSB gear and a 3-el. beam. Later in the year he will announce plans for DX-peditions to neighbouring areas, which might be interesting.

Harvey of VQ9HB was due to come on from Agalega (as VQ8BFA) towards the end of April, and will be staying for one month . . . 9M6JW is a new one in Eastern Malaysia—has been heard on 14080 kc CW.

5W1AZ (Western Samoa, in case you don't recognise the prefix) is ex-ZK1BV . . . ZD8AR is now organised as a Club Station, with at least 17 licensed operators on the island . . . 5J4RCA, the joy of WPX-hunters, is a special station in Bogota, Colombia . . . VS9OC is active again from the R.A.F. Club station, Masirah Island.

Late Flashes

The CEØXA affair was delayed, but at the time of writing was expected to arrive at the island around April 24-25 . . . also postponed was 6O1AU's trip to FL8, but FL8RA showed up on 14060 kc CW instead.

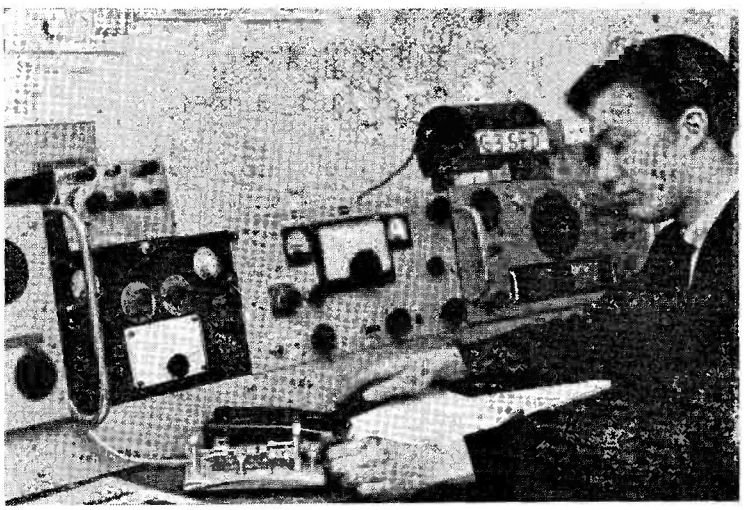
A real spate of Pacific activity has been producing early-morning signals (mostly SSB) from FO8AA, 8AG, 8AQ, 8BJ; KB6EPN and 6CB; KC6AA and 6FM; KJ6's and KS6's . . . VK9CR (Cocos-Keeling) and VK9DR (Christmas Is.) have both been very active.

Gus now expects to leave the various AC prefix areas by mid-July, returning *via* the Middle East and Europe, and getting home by Christmas.

9H1 apparently took over from ZB1 on April 17. Calls were changed as well, since 9H1W is ex-ZB1HKO.

Ten-Metre Activity

Don't forget the **Ten-Metre Activity Sunday,** arranged for **May 23.** Just come on the band between the hours of **1000** and **1700 GMT,** don't be afraid to call CQ, don't despise CW, and report all your doings to us before June 11. Incidentally, if the band proves to



G3SED is run by M. Devereux, at 15 Severn Close, Paulsgrove, Portsmouth, Hants.—one of the high scorers in the G3S/3T Top Band table. With an HRO Rx, he has a small 10w. Tx for 160m., his aerial being an inverted-L. The HF bands are also worked, using a separate 60-watt transmitter.

be wide open at 1700, there's no need to go QRT—this isn't a contest.

Sign-Off —and Note New Mailing Address

So that's it, once more. Acknowledgements and thanks to all who have written in, also to W1BB, to the *West Gulf DX Club* and the *DX News Sheet*. More entries, perhaps, for that Five-Band table? And especially in the Ten-Metre column thereof? The Ten-Metre Activity table has been dropped out only temporarily, because it's rather static. Deadline for next month, **first post on Monday, May 17**. Address everything to Editorial Dept., SHORT WAVE MAGAZINE, Buckingham, England, marking the letter "Communications and DX News." Good Hunting, 73 and—BCNU.

• • • The Mobile Scene • • •

At the moment of writing, it is not quite clear what new ruling the Ministry of Transport intends to make for mobile operation under actual running conditions—but if the intention is that microphone installation and control should be "taxi-type," *i.e.* leaving the driver with both hands for the wheel at all times, then the head fitting devised by G3ESP/M and shown on p.151 of this issue should fill the bill. Any other sort of restriction or prohibition would be sheer bureaucratic namby-pambyism so far as radio amateur /M's are concerned—after all, in more than 10 years of mobile operating by upwards of one thousand amateurs fitted /M, there has been no known accident directly attributable to the use at the time of the radio installation.

All that we gave you on p.106 of the April issue about the A.R.M.S. Rally at U.S.A.F. Croughton, Northants, and how to get there, is cancelled —they have since had to decide to use the old Barford site after all, and main details are as below, for May 23. Note that for the following Sunday, May 30, there are now no less than four events scheduled! And some more have been brought into the list, further down.

MOBILE RALLY PROGRAMME

May 9: Thanet Radio Society Mobile Rally, Cliffsend, Pegwell Bay, Ramsgate, with talk-in by G3DOE/A on 160m., G3REZ/A 4m., and G3BAC/A 2m.

May 23: A.R.M.S. Rally at R.A.F. (U.S.A.F.) Station, Barford St. John, Oxon., off the B.4031, west of Deddington on the A.423 Oxford-Banbury. Caravan and camping space available from Saturday, 22nd. Talk-in on 160m. by G3NMS, and on 2m. by G3NMR. Bus-party visits, by ticket to Croughton U.S.A.F. main control and Rx station. Trade exhibition, tombola, and many attractions; ample under-cover accommodation. Party for early arrivals on Saturday evening, May 22. GB3NMS to be on the DX bands all night. Further details from N. A. S. Fitch, G3FPK, *QTHR*.

May 30: Royal Naval A.R.S. Mobile Rally at H.M. Signal School, H.M.S. *Mercury*, Leydene, Petersfield, Hants., near the village of East Meon, approached from the A.3 London-Portsmouth or the A.32, Fareham-Alton, with AA sign-posting to the Rally site. GB3RN will give talk-in on 1880 kc, 70·26 mc, and 144·2 mc, and G3BZU will be on 3720 kc, SSB; stations will start up at 0900. Refreshments on site; official opening by Captain of the Signal School at 2.0 p.m.; an exhibition, treasure hunt, prize draw and many attractions. Entrance fee: An "unopened bottle of anything" (!), or 6d. a head in lieu. Further information from: M. J. Matthews, G3JFF, R.N.A.R.S., H.M.S. *Mercury*, Leydene, Petersfield, Hants.

May 30: Northern Mobile Rally at Harewood Park, near Leeds, organised by N.A.R.M.S. (Northern Amateur Radio Mobile Society), opening at 12 noon, with 160m. talk-in by G3OBV/M and on 2m. by G3NAO/M. Activities will include a big equipment sale, raffles and competitions; refreshments on site and covered accommodation available. Car-parking free, with a small charge for entry to the grounds. Details from: D. Binns, G3MGI, Publicity N.A.R.M.S., 80 Gipton Wood Road, Leeds, 8.

May 30: Northern Ireland Mobile Rally, first to be held in GI, organised by the Belfast & District group, at Nutts Corner Aerodrome, Co. Antrim, with talk-in on 70·26 mc, and a main station operating on the HF bands all day. A wide variety of events is planned, with good prizes. Full details not available at time of going to press, but can be obtained from: L. M. Lyske, GI3CDF, 63 Church Street, Portadown, N. Ireland.

May 30: Mobile Treasure Hunt organised by the Southgate, Finchley & District group. Assembly point in Hedge Lane, near Cambridge Roundabout, Edmonton, NGR TQ.326926, at 10.30 a.m., when competitors will be briefed. A base station will be signing G3SFG/P on Top Band, and competitors will be required to work it. Information from: R. D. Mason, G3TDM, 28 Shrubbery Gardens, Winchmore Hill, London, N.21.

June 6: RSGB National Mobile Rally at R.A.F. (U.S.A.F.) Station Wethersfield, Essex, with talk-in stations on the air from 10.0 a.m., signing GB3RS on 160m., and GB2VHF on 4m. and two metres. There will be many displays, also a /M competition, a trade exhibition and a raffle. Refreshment stalls will be available, with a centralised car-park, and two acres of covered accommodation.

June 7: (*Whit Monday*) Mobile Rally organised by the Saltash & District Amateur Radio Club, at the Playing Field, Calstock, Cornwall (NGR SX.437685), on the River Tamar, two miles south

of Gunnislake. Get on the A.390 Tavistock-Callington, and watch for the Rally sign-posting. Talk-in stations will be open during 10.0 a.m. to 2 p.m., on 160-80-4-2m., all operating as out-stations for the main control signing GB3SAL at the Rally ground. Good site facilities, with hard standings for parking; covered accommodation available; displays, competitions, and a prize draw. Visitors are asked to bring their QSL cards, and to send an s.a.e. to: D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall, for any further information required.

June 20: Hunstanton Rally, Norfolk *(details later).*

June 20: Mobile gathering, arranged by the Pembroke & District Radio Club, at the Regency Hall, Saundersfoot, Pembs., West Wales *(details later).*

June 26: *(Saturday),* Mobile Rally organised by the Loughton & District Radio Society, at Loughton Hall, Epping Forest *(details later).*

June 27: Longleat Mobile Rally, near Warminster, Wilts. *(details later).*

July 11: Tenth Anniversary Mobile Rally, Oxford, at the College of Technology.

July 11: South Shields & District R.S., at Shields.

July 25: Cornish A.R.C. Rally, Newquay, Cornwall *(as last year).*

August 15: Derby & District A.R.S., at Derby *(as last year).*

August 30: *(Bank Holiday),* Peterborough Rally.

Part of the Top Band car park at the Trentham Mobile Rally on April 11 — which, as usual, was very well attended. Mobile antennae of every sort and description were to be seen round the various parks, all of which were full by early afternoon.

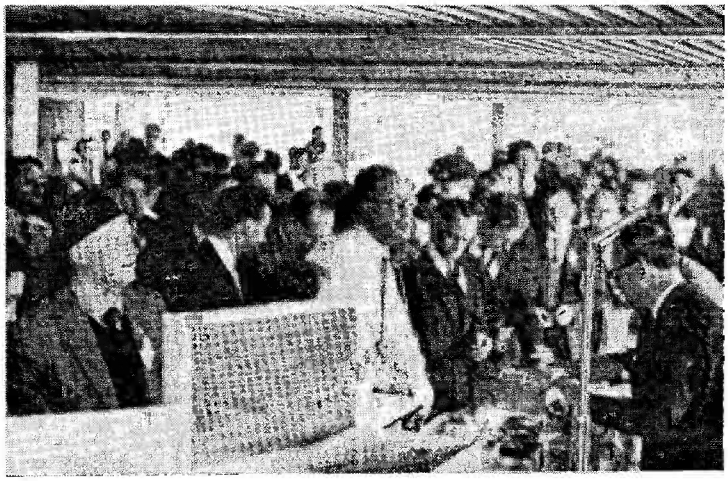
September 12: U.B.A. (Belgian) International Rally for which temporary licences for /M working will be issued to foreign visitors—general arrangements as last year. *(More details later.)*

September 12: RSGB Rally, Woburn Abbey, Beds. *(as last year).*

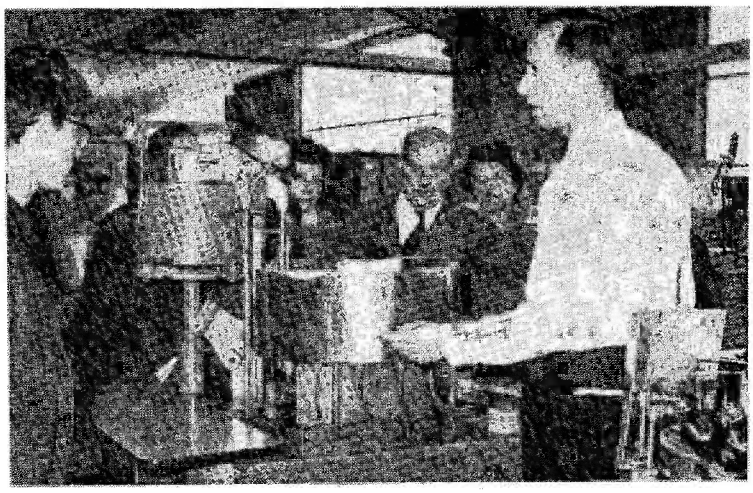
September 26: Harlow A.R.S., at Magdalen Laver, Essex.

An impression of part of the crowd at the Trentham (Midlands) Mobile Rally on April 11, for which the trade and local club stands were arranged in the ballroom — at left, along the line of pillars. One of the great advantages of Trentham as a Rally venue is that there is plenty of space, covered and outside, and it really does not matter much what the weather is like. As it happened, the Wx for Trentham this year was chilly and threatening — but that did not make much difference to the attendance.

Talk-in station G3GBU, provided by the Stoke-on-Trent Amateur Radio Society, for the Midlands Mobile Rally at Trentham. Traffic was handled on 160m., 80m. and two metres and many /M's were worked on all bands.



Choosing their prizes for the draw at the Bedford Mobile Rally on April 4, with G3IIR, near right, officiating. This was the first Rally event of the season, and was held at the premises of Texas Instruments, Ltd. who provided excellent facilities.



At the Mobile Rally held at the works of Texas Instruments, Ltd., Bedford, visitors were able to see some of the manufacturing processes involved in the production of transistors, in which the firm specialises.

All photographs taken by G3GMN

VHF BANDS

A. J. DEVON

RIGHT at the beginning of the current period, we had one of those very satisfying EDX openings, with stations workable from Scandinavia right round to the south of France and into Spain.

On the evening of March 27, EA1AB (Santander) was coming through for a short while; he was worked by GW3MFY (Bridgend) and G3JGJ (Moretonhampstead) —and it took quite some time to get *that* QTH over, on Phone, to EA1AB! There was a generally high level of activity in South Wales, the West Country and from the Channel Is.—GC2FZC and GC3KAV were on, making many good DX contacts; the former, in particular, was a loud and steady signal all the Sunday morning, 28th. By that evening, the pattern of conditions had changed somewhat; the EU's faded down, and it was not till a day or two later that the band opened again, across the North Sea and into Northern Europe, with stations like OZ5RG, SM6PU and SM7ZN having a field-day peeling off the G's. This was around March 31/April 1st, and a particularly good contact noted on the evening of the 1st was GM2DRD /SM7ZN, on CW, 579 both ways. F2BJ, F3LP, F3XY, F8CH, F8VQ and F8WN were also doing well with the G's. And one quite remarkable QSO was F1ES/G5ZT, with a transistorised milliwatt Tx at the Paris end, giving G5ZT a 56-phone signal! Altogether, G5ZT worked 23 F's, including several /M's and other French QRP stations.

"Lyrids" MS Result: At 0430z on April 22, EA4AO/G5YV made it a full QSO, with many S9+ pings, and reflections averaging about one a minute; this puts Harold up to 25C in Countries. Some details about EA4AO's station appear overleaf.

"Oscar" Tidy-Up: It now seems to be established that the first EU/W contact on two metres via *Oscar III* was by HB9RG /W1BU; no G/W two-way's were achieved, though G3EDD had a near-miss with W1BU; he logged about 20 stations, including K2GUG and W4ELO; and Brian had the mortifying experience of hearing himself called *via* satellite on no less than five occasions, the caller signing in QSB or QRM each time!

G6AG tried at various times for K2GUG, K2IEJ, W1BU, W2AMJ and WA2MWA; Mac's actual two-way contacts were with DL3YBA, HB9RG and SM7OSC, and he has had signal reports from W1, W2, W3 and W4, as well as from numerous G's and EU's. All the loggings we have seen show G6AG to have been one of the most active and successful stations on for the *Oscar III* operation. He could only have missed a W two-way by a whisker.

For G5YV, the best *Oscar* DX heard was W4AO—and Harold had just got his circularly polarised steerable array completed when (strictly in accordance with Murphy's Law) the translator petered out! That this beam would have done things for him is proved by the fact that the *hi*-beacon signal is a good two S-points stronger than with the regular 2m. aerial.

G3CDK (Wallington, Sy.) copied about 25 different stations on the return channel, two of the most interesting in his list, apart from three W's, being SP3GB and UR2DZ, not reported by anyone else. G5ZT includes, in his heard-list, I1EHC and SP3LQJ.

Oscar III finished transponding by March 22—but until quite recently could still be heard going round with his *hi's*, abandoned and ignored. Poor old Oscar!

Four Metres: The general impression seems to be that there is as much, if not more, happening on four as there is on two metres; we have numerous claims for the 4m. All-Time, and some for the Three-Band Annual. G3MOT (Hillingdon, Middx.) has now worked 310 different stations on the band; G3OWA (Old Coulsdon, Sy.) has 272S; and G3OHH up in Macclesfield has 229S booked in. GC3OBM on Guernsey has advanced to 16C in 4m. Counties, with no less than 26 stations worked in three hours during the March opening—more, he says, than during the previous twelve months! G3PPG, the BBC Club station at Evesham, running 50w. with a 4-ele beam, register 21 counties; one of their operators is G3DEF, who is often out /M on Sunday mornings. G2BJY (Walsall) is *not* so happy about progress on 70 mc—having tried CW for a year, he has had to revert to AM phone for his few Sunday-morning QSO's.

Four-Metre Expeditions: G3JHM *(QTHR)* will be EI4AW, /M or /P, and GI3JHM, from various of the rarer Irish counties during July 8-21, on 70·32 mc with Phone *and* CW—the latter being preferred for DX tests. Skeds are invited.

G3BHT (1 Firs Link, Freshfield, Formby, Lancs.) writes that he also will be in EI with 4-metre gear—and, oddly enough, from July 21 until August 4, immediately following G3JHM's trip.

70-Centimetre Notes: G2XV (Cambridge) is now at the top of the All-Time with 42C, and besides that Gerry has worked 10 countries on 70 cm. G3OBD (Poole) is at 16C in Counties, with F3LP a recent QSO on 430 mc. G3EKP (Blackburn) runs a regular sked with G2OI (Eccles), and is in the Three-Band Annual on all bands.

We are very glad to hear, this time, from several G8/3's—who are, of course, confined to 70 cm. as their *lowest*-frequency band. G8AEK (Hemel Hempstead) runs 24w. in a tripler-PA, his beam is

an 8/8 slot at 35ft., with a T.W. converter into the main Rx; since starting up in February, 37 stations have been worked, including three EU's. He is keen on the idea of a table for G8/3's only. Well, we would like to do this, but a difficulty at the moment is finding space for all the other tables we ought to be showing!

G8ADH (Ringwood, Hants.) has a QQV03-20A PA taking 20w., a 16-ele stack, and on the Rx side a transistor pre-amp. into a ground-grid RF stage, with a xtal mixer. During the early-April opening he had first-time QSO's with eight stations, including ON4HN, with six others heard; one of these was G8ACQ (Lincoln) at 5,9.

G8AAC (Barnsley) is running a transistorised milliwatt Tx, using ASY67's in the early stages, with an ASZ21 doubling to 432 mc; this is modulated on the emitter by an ASY26-ASY28 arrangement, the estimated carrier power being 50 mW, with a modulator capability of 250 mW. The whole Tx is in a box about 7 by 4 by 2in., with a 9v. battery; the future plan is to use AFY19's to push the power up to a watt or so, and then to try tripling to 1296 mc, with AFY19's. Incidentally, G8AAC remarks that he finds most transistors will oscillate or amplify in Class-C up to at least six times their rated F_t—he has had the 150 mc ASY67's doubling from 216 to 432 mc, and the AF117 (F_t 70 mc) doubling to 216 mc. The Rx at G8AAC is a modified G2DD (as described in SHORT WAVE MAGAZINE for March 1953), with a long-Yagi under construction.

During the week-end May 29-30, in connection with the R.N.A.R.S. Rally at Petersfield (*see* p.169), G8ACI/A will be on 432·4 mc, at a good site 650ft. a.s.l. Skeds can be fixed through G3JFF (*QTHR*).

Then we have a request from G6AAL/T (Datchet, Bucks.) asking for possible co-operation, from the Slough-Windsor area, in his tests with slow-scan TV; he is using normal 405-line video, with 5 watts into a 6/6 beam, and an appropriate Rx arrangement. (Write him at 127 Horton Road, Datchet, Bucks.)

Two-Metre Gen.: There is a good deal of this, because so many people had such a good time during the opening early on. G2CDX (Cambridge) was busy knocking off the EU's; in spite of a local mains failure which put him off the air at the height of the EDX activity (Murphy's Law again) he worked about 25 EU's, and had the interesting experience of noting 5,9 QRM between OZ9PZ, DJ6CA and a PAØ, all together on 144·89 mc. Well, that is exactly how things went, and how they always go when we get a big Continental occasion.

G3TLB (Tunbridge Wells) has a total of 210 different stations worked on 2m. since starting up last September; though he missed the best of the early-April opening, he got GC2FZC and some of the nearer EU's. Very new on the two-metre air is G3UAN (Kenton, Middx.), running a G. & D. CTX-2 with which, he says, he has had some very nice contacts with the locals.

GI3SLI (Downpatrick) is going well in Annual Counties, with 25C to date. He is off to ZB2 in July, on R.A.F. duty (taking the 2m. gear in hopes!) and in the meantime would appreciate skeds "to get GI3SLI as high as possible in the charts before I have to close for 2½ years." He is also keen on mobile, and was signing EI5AW/M during April, on a trip into Eire, when he visited EI2A and EI2AK. GI3SLI says that EI2A "gives a very good talk-in and a guided tour of Ireland."

We also acknowledge claims for the various tables and useful two-metre reports from: G3FYR (Orpington, Kent), G3LAS (Berkhamsted), G2AXI (Basingstoke), G3BNL (Keyworth, Notts.), G3SML (Earl Shilton, Leics.), G3AHB (Slough, Bucks.), G3SKR (Wembley, Middx.), G3GSO (Derby) and G3SXK (Danbury, Essex).

London VHF Convention: Held on April 10, this was again a very successful show, with the Dinner sitting over-booked. The

THREE-BAND ANNUAL VHF TABLE

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	TOTAL pts.
G3EDD	5	1	53	13	17	2	91
G3BNL	17	2	35	9	16	2	81
G3OWA	31	4	37	8	—	—	80
G3HRH	12	1	45	8	5	1	72
G2BJY	26	2	37	5	—	—	70
G2AXI	19	3	39	8	—	—	69
G5UM	16	2	27	3	12	3	63
G3FIJ	12	2	31	6	9	3	63
G3LAS	5	1	36	11	—	—	53
G2CIW	—	—	12	3	24	7	46
G3EKP	13	5	15	5	3	1	42
G3TLB	—	—	34	6	—	—	40
G3OHH	28	5	—	—	—	—	33
G3HWR	14	3	6	1	7	1	32
G5FK	12	1	14	1	3	1	32
G2DHV	6	1	11	1	1	1	21

Scores are since September 1st, 1964, and will accrue until August 31st this year. Position is shown by last-column total, as aggregate of all scores. Own county and country score as one each. Entries may be made for a single band, any two, or all three. Claims should be sent in as often as possible to keep the table up-to-date. New entries can be made at any time.

attendance represented almost all parts of the U.K., and Dr. R. L. Smith-Rose, as one of the guests, was in tremendous form with a series of most improbable stories ! G3HRH took the chair, supported by G3IIR, and the toast of the evening was proposed by G5PJ, Chief Telecommunications Engineer, Min. of Aviation, who admitted to having started with chemy-rectifiers as the only way to get adequate HT in the early days. G5UM, one of our real old timers on VHF, spoke gracefully for the visitors and guests.

The next big VHF occasion will be the North-West VHF Convention, in Manchester on September 18, at the Grosvenor Hotel, Deansgate, for which Geoff Barnes, G3AOS (*QTHR*) is making the arrangements for visitors.

Note to Close: For the June issue, please write A.J.D. to: Editorial Dept., Short Wave Magazine, Buckingham. Post by **May 23 latest,** and head your letter "VHF Bands," or A. J. Devon, or whatever, simply to ensure that it goes into the right tray. Till we meet again on June 4, keep the beam turning and watch the Wx charts. *73 de A.J.D.*

THE OTHER MAN'S STATION — EA4AO

THE station of EA4AO—owned and operated by Jesus Martin-Cordova Barreda, Paseo de Extramadura 170/4, Madrid 11—is of particular interest, and really part of this month's "VHF Bands," because as all followers of A.J.D's piece know, EA4AO is one of the leading EDX operators on two metres.

Specialising in long-range VHF work using the difficult meteor-shower technique, he has had two-way contacts with several European countries, including England, and is a keen and reliable schedule-keeper for the regular MS appearances, with some excellent results, as reported in "VHF Bands" from time to time.

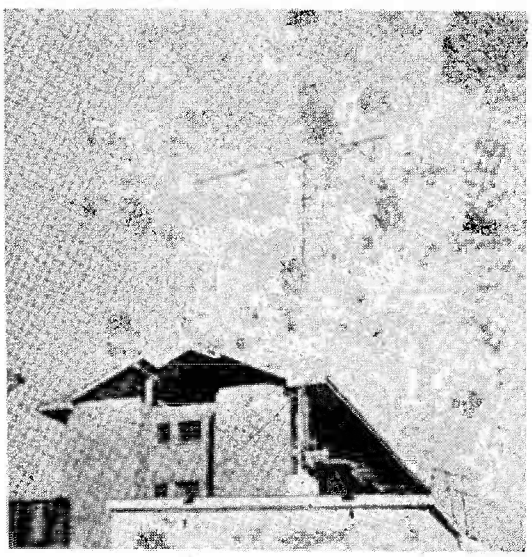
Of course, EA4AO was on the ball for *Oscar III*, though he was not able to join in until Pass No. 46, because of being away from Madrid on business until March 13—thus, he lost the best of the translator. But then keeping with it until Pass No. 198, Martin heard and worked some remarkable DX—including a solid QSO with W2AZL on No. 157; he also worked DJ3EN, DL9GU, DL3YBA, HB9RG and ON4FG. His heard-list includes G3BA, G3LTF, G6AG, K2GUG, SM5BSZ, SM6CSO, SM7OSC, SM7ZN and W1BU. These were all positive indentifications, the three G's having been logged several times; uncertain stations heard included an OK1, OK2 and a YU1, and EA4AO had a partial contact with SM5BSZ on Pass No. 171. He has also had a number of cards reporting reception of his own signals, through *Oscar III*, by various European stations. Altogether, a very interesting result, which does Martin much credit.

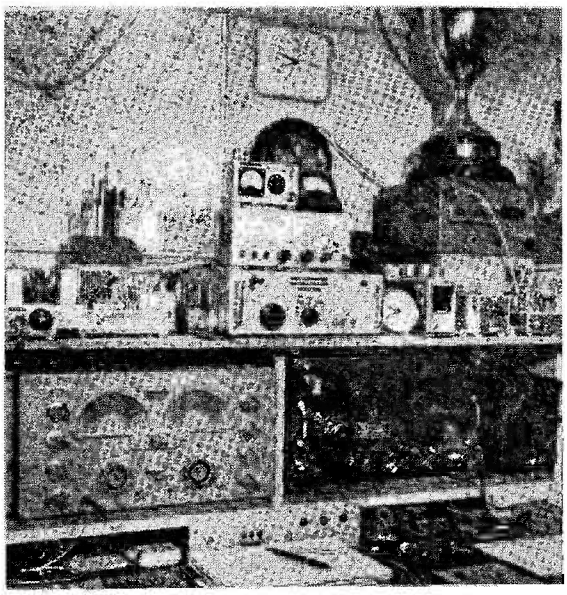
Now to take a look at the gear at EA4AO. At lower right, alongside, is the two-metre 10-element long-Yagi with which all his DX has been done to date—though a move to a more suitable QTH for VHF is in prospect, because new building near him "now darkens Central Europe from 035° to 075°."

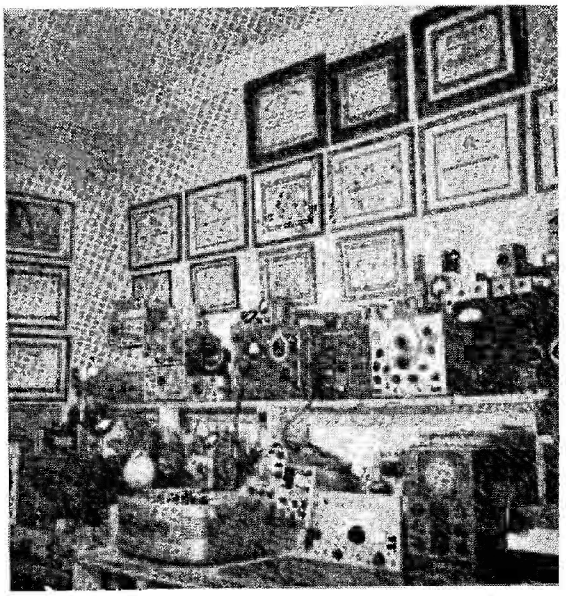
The picture at upper left on the opposite page shows the receiving position, with a National NC-173 and a BC-342N, both fed from the same two-metre converter, for simultaneous reception of two different signals (very useful for the *Oscar III* operation). A second VHF converter has a push-pull 6CW4 Nuvistor pre-amp. The Rx side is operated with a Lamb-type noise silencer, and a "noise blanker" made from a British surplus radar unit, the Type W.47090A. Two xtal marker units give 1000/100/10 kc points, essential for accurate frequency setting in connection with MS work. The two CC converters can be separately switched, through the noise silencer, into a 12AT7 as a cathode follower, to feed signal output into the two receivers, as tunable IF/AF amplifiers.

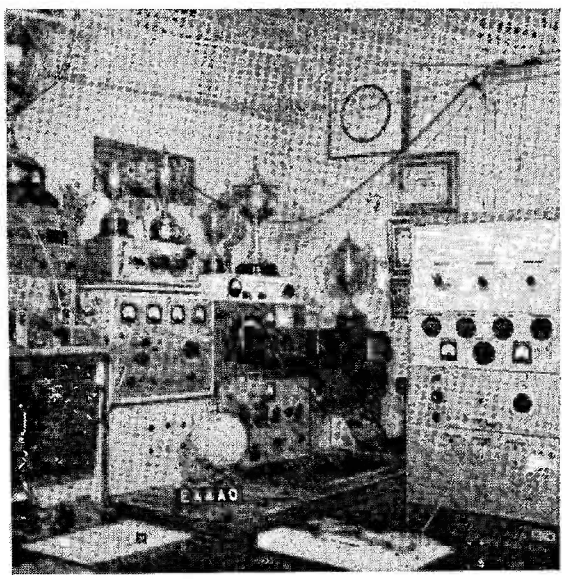
At lower left on p.175 is the Tx gear at EA4AO. From left to right is a 100-watt two-metre transmitter, with phase modulator; various units including an R.1392, an R.1132A and a transistorised VHF/FM Rx for output monitoring; an ART-13 transmitter, not yet in operation; and then, in the rack, the complete 260-watt Tx, running push-pull 826 triodes in the PA, used in *Oscar III* and MS operations.

The picture at upper right is what EA4AO calls









the "laboratory corner," the gear including an HQ-129X receiver and FM tuner, tape recorder, two oscilloscopes and an audio oscillator, a Cossor DB 'scope, signal generators, grid dippers, and a VHF wobbulator. At lower right above, is the owner-operator himself, in the other lab. corner, taking readings on a modified British surplus Test Set type W.5799, with a fine array of tools and measuring instruments.

With the exception of the named equipment items, all the gear at EA4AO is home-constructed; this includes not only the transmitters and receiving converters, but also much of the bench test gear. His shack is an oblong room, with the work-bench and constructional facilities down one side, and the operating equipment laid out along the other. In other words, looking at the photographs again, the two at left take in one side, and the two on the right the opposite side.

An old timer, the callsign was originally EAR-96 (in the early Spanish licensing sequence); then he was EK1AO and later CN2AO in Tangier; this was about 15 years ago, and at that time Martin's main interest was—Top Band!

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.

DL2AP, J. Fowler *(G3SVN)*, c/o COMCEN, Hq. (Unit), R.A.F. Germany, B.F.P.O. 40.

DL2AY, M. G. Taylor, c/o Joint Signal Board (Germany), Hq. B.A.O.R., B.F.P.O. 40.

EI4AV, J. J. Canavan, Gulladuff House, Moville, Co. Donegal.

G2HCX, A. Haycock, Cherry Trees, Woodlands Road, Pownall Park, Wilmslow, Cheshire.

G3SED, M. Devereux, 15 Severn Close, Paulsgrove, Portsmouth, Hants.

G3SID, M. P. Fox, Leigh Villa, Middle Leigh, Street, Somerset. *(Tel. Street 2561.)*

G3TAJ, R. T. Marchant, 154 Essex Road, Leyton, London, E.10.

G3TJC, E. Ross, 20 Briarwood, Wrose, Shipley, Yorkshire.

G3TNX, V. Allison, 14 Silverdale Drive, Winlaton, Co. Durham.

G3TOA, J. Otter, 9 Otter's Cottages, Newark Road, Lincoln, Lincs.

G3TPW, S. R. Webb, 31 James Street, Chadderton, Oldham, Lancs.

G3TTB, P. B. Clegg, 148 Heath Park Road, Romford, Essex.

G3TWT, E. V. Robinson, 176 Gill Avenue, Fishponds, Bristol.

G3TXK, C. Moss, 224 Belmont Road, Bolton, Lancs.

G3TXP, L. S. Duffy, 60 Snatchup, Redbourn, St. Albans, Herts.

G3TXV, R. Hunter, 77 Kenmore Avenue, Kenton, Harrow, Middlesex.

G3TYH, M. J. Cooney, 16A Sussex Crescent, Northolt, Middlesex.

G3TYQ, B. P. Stimpson, 52 Lowbrook Lane, Tidbury Green, Solihull, Warks. *(Tel. Wythall 2113.)*

GM3TYS, I. G. Drysdale, 40 Angusfield Avenue, Aberdeen.

GI3TZC, J. J. Canavan, 363 Gortgar Villas, Greysteel, Londonderry.

G3TZI, A. Senior, Park View, Bilsby, Alford, Lincs. *(Tel. Alford 3189.)*

G3TZJ, P. V. Coverdale, 425 Fulbridge Road, Werrington, Peterborough, Northants.

G3TZP, I. E. Rodwell, Wellfield, Park Lane, Lane End, High Wycombe, Bucks. *(Tel. Lane End 449.)*

G3TZV, P. Fry, 57 Ambleside Road, Flixton, Manchester, Lancs. *(Tel. URMston 5705.)*

G3TZY, J. M. Colbert, 132 Coldnailhurst Avenue, Braintree, Essex.

G3UAB, Loddon Valley Contest Club, c/o M. W. Cleland, 5 Northcourt Avenue, Reading, Berks.

G3UAF, M. Smith, 138 Market Street, Clay Cross, Chesterfield, Derbyshire.

G3UAF/A, M. Smith, 293 Wilmslow Road, Manchester, 15.

G3UAJ, R. J. Phipps, 51 James Lane, Leytonstone, London, E.11.

G3UAN, R. S. Finley, 44 Radstock Avenue, Kenton, Middlesex. *(Tel. WOR 2576.)*

G3UAS, T. D. W. Morgan, 89 High Street, Northwood, Middlesex.

G3UAX, R. H. Stansfield, 51 Colemans Moor Road, Woodley, Reading, Berks.

G3UBC, W. T. Guilfoyle, 15 Agar Crescent, Bracknell, Berks.

G3UBD, G. M. Higgins, 9 Oxford Street, Keighley, Yorkshire.

GM3UBK, D. W. Adaway, 9 Pennyland Drive, Thurso, Caithness.

G3UBS, B. J. Speakman, Merrydown, Burley Lane, Quarndon, Derby.

GM3UBT, W. Scobie, 52 Kinloss Park, Cupar, Fife.

G3UBW, S. J. Cook, 26 Mount Harry Road, Sevenoaks, Kent. *(Tel. Sevenoaks 52410.)*

G3UBX, J. P. H. Burden, 28 Coalway Road, Wolverhampton, Staffs.

GW3UCJ, M. J. P. Evans, 4 Gower Crescent, Baglan, Port Talbot, Glam.

G3UCM, S. N. Gall, 175 Coulsdon Road, Old Coulsdon, Surrey. *(Tel. Downland 5342.)*

G8AEJ, W. E. F. Green, 12 Kenilworth Road, Penge, London, S.E.20. *(Tel. SYD 3990.)*

G8AHH, D. G. Lomax, A.M.I.P.R.E., 92 Hampton Road, Birchfields, Birmingham, 6. *(Tel. NORthern 4319.)*

CHANGE OF ADDRESS

G3AGS, T. H. Davison, 18 Boardman Road, Higher Crumpsall, Manchester, 8.

G3ARD, F. V. Bellamy, 13 Oakley Drive, Spalding, Lincs. *(Tel. Spalding 3616.)*

G3FLK, B. C. Munro, 20 Warneford Garden, Withycombe Park, St. Johns Road, Exmouth, Devon.

G3IJU, E. Briggs, c/o Sgts' Mess, R.A.F. Station, El-Adem, B.F.P.O. 56.

G3KEQ, J. P. Mitchell, 75 Rectory Park, Sanderstead, Surrey.

G3PEP, W. C. Pitman, 8 Tywarnhayle Road, Perranporth, Cornwall.

G3PMT/A, J. S. Russell, c/o Sgts' Mess, R.A.F. Station, Locking, Weston-super-Mare, Somerset.

G3RKC, W. J. Bryan, 196 Radburn Close, Latton Bush, Harlow, Essex.

G3RLM, K. R. Belcher, Hollyoaks, Courtmead Road, Cuckfield, Sussex.

GW3RVG, D. Sedgebeer, Abberly, Sardis, Saundersfoot, Pembs.

G3TDH, R. W. Stevens, 66 Peartree Road, Stopsley, Luton, Beds.

G3TRD, J. Bellamy, 13 Oakley Drive, Spalding, Lincs. *(Tel. Spalding 3616.)*

AMENDMENT

GI3GTR, R. B. McKinty, 64 Glenholm Drive, Newtownbreda, Belfast, 8. *(Re-issue.)* *(Tel. Belfast 644352.)*

G3PDS, W. Lawrence, 9 Dunslade Road, Erdington, Birmingham, 23.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for Next Issue: Friday, May 14)

(Address all reports for this feature to "Club Secretary")

ONE of the most useful functions of the Club Movement is the presentation of our hobby to the general public, who tend (as is well known) to regard radio amateurs as a bunch of freaks. So anything that can be done to dispel this opinion is valuable.

Midland A.R.S. seem to have done an excellent job at the Birmingham Boat Show, which ran for a fortnight and involved them in at least 100 hours of operating time. They put GB3BBS on the air for more than 400 QSO's, with three transmitters. In addition they had closed-circuit TV, telecine and live amateur TV from G6MXT/T, beamed direct to the exhibition from Smethwick. **Slade** also made their contribution with D/F equipment and closed-circuit TV from their exhibition studio.

Immediately after this effort, Midland were involved in the MARS/CARS/Bristol Contest, and hardly was that finished before the Trentham Rally was upon them. Midland are, of course, a very large society, founded more than 30 years ago and with a current membership of over 100. They meet in what they call the "cultural surroundings" of the Birmingham and Midland Institute, in the centre of Birmingham and next door to the famous Town Hall, and are very proud of their association with the Institute.

However, enterprise and energy are not confined to the larger societies, and many of the smaller groups of enthusiasts are capable of pulling their weight on a lesser scale. So . . . don't let your size deter you from any interesting projects that come within your reach. And, by the way, don't forget to tell us about them. Success stories will stir up others to emulate you; failures or near-failures will enable others to profit from the mistakes made.

The message, in short, is: "Go to it. Do *Something.* And give every member something useful to do."

ACTIVITY REPORTS

Bedford report that the general content of their meetings is social and technical, with actual operating rather in the background. They also have regular Morse classes. Next meetings: May 11, Test Equipment; May 27, Antennae.

Slade have two interesting "non-radio" meetings during May. On the 14th their member Mr. D. Collins will talk about Logic and Digital Circuits, and on May 28 the subject is Designing an Electronic Organ—a talk and demonstration by Mr. R. E. Edmunds. Every Wednesday evening they have slow Morse, and continue their constructional project—a flying-spot scanner which is being built from scratch.

Southgate have a talk by Truvox, Ltd., on May 13, postponed from some months back. The 30th is the date for their Mobile Treasure Hunt, starting from Hedge Lane, Edmonton, at 10.30 a.m.—all mobileers welcome, and the Nat. Grid Ref. for the start is TQ 326926; further details from the secretary. **Cheshunt** held their first AGM on March 19 and reported a growth in membership from 19 to 28 in their first year; they say that their local paper has contributed greatly to the growth by its good coverage of club activities—and due credit for this is also given to their publicity officer, G3GBL, who now becomes chairman. On May 14 they will meet for a talk on Interference Suppression by Messrs. Belling and Lee.

Bromsgrove continue their monthly meetings (second Friday), at 8 p.m. in the Co-operative Rooms, High Street. Their membership is also increasing, and many young SWL's come along each month—a healthy sign. On May 14 at 8 p.m. G6WI will be talking on 14 mc Operation and Conditions—visitors will be most welcome.

Acton, Brentford and Chiswick will meet on May 16 for a talk, followed by a discussion, on the ever-popular subject of "Antennae"; 7.30 p.m. at 66 High Road, Chiswick, and visitors welcomed. **Mid-Warwickshire** cover the same subject on May 17, when they will have a talk arranged by J-Beam Aerials, Ltd. On the 31st the subject will be Radio Theory, Part V—Oscillators. Both meetings at the C.D. Training School, Harrington House, Newbold Terrace, Leamington Spa, 7.45 p.m.

A new club has recently been formed in East London, to be known as the **Newham** Radio and Electronics Society; they held their first meeting on March 17, but intend to gather on Mondays in future; the QTH given in the panel is actually that of the treasurer (G3LRO), but we shall doubtless be given further details in due course.

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IMPORTANT NOTICE

Club secretaries and others concerned are reminded that the new address for this feature is: Editorial Department, Short Wave Magazine, Buckingham, England, with the letter marked "Club Secretary." This QTH change takes effect immediately.

West Kent will meet twice during May; on the 14th, final arrangements for N.F.D.; and on the 28th a talk and demonstration on Oscillators by G2UJ, which will cover the problem of designing really stable ones—7.30 at Culverden House, Tunbridge Wells.

Cray Valley (*QUA*, April) will be hearing about Workshop Practice (G3MQT) on May 6, and on June 3 the title of the talk is "How it All Began," by G2VB. At the AGM they elected G2MI president, G3JJC chairman, G3KYV secretary. **Loughborough,** continuing their weekly meetings, have an SWL Night on May 7; a Components Sale on the 14th; Field Day Preparations on the 21st; and a lecture on TVI by G2CVV on the 28th; all meetings at their Hq., Bleach Yard, Wards End, Loughborough, 7.30 p.m. The AGM is booked for June 25.

Halifax (*Newsletter* No. 3) held their Annual Dinner on March 30, and had a talk on "Life as a Ship's Radio Operator" at their April meeting. On May 25 they will have a Two-Metre Evening, at G3IGW's QTH, and during June will be visiting the R.N.V.R. Communications Centre at Bradford.

Wimbledon heard a talk about Mobile Rallies, by G3JEQ, during April. On May 14 G6QN and G3EPU will be demonstrating the aligning of a superhet, and on May 21 and 22 they will all be very busy putting on their station for the Wimbledon Exhibition. **Wirral,** having held their Junk Sale on May 5, will be having a Video Tape Lecture (subject not mentioned) on May 19.

Torbay report their March meeting—a talk and demonstration with the intriguing title of "Top-Band Noises," by G3ABU; some Maritime Communication Equipment was loaned for the occasion by Messrs. Westronics of Brixham. **Spen Valley** will be visiting the Wharfedale Works (Idle, Bradford) on May 13; on May 27 there will be a discussion on Communication by Earth Satellites, led by Mr. H. Tomlinson, A.M.I.E.E. (N.E. Region, G.P.O.)—both meetings at Heckmondwicke Grammar School, 7.30 p.m. They report a turnout of 62 for their Annual Dinner on April 3 at Dewsbury, which was very successful.

Luton report a good period of activity; they have built a console for their K.W. Viceroy and are preparing two N.F.D. stations. On May 4 they were due to have had a demonstration of gear by Messrs. Green & Davis. **Northern Heights** are visiting Manchester Civil Airport on May 12, and Manchester Radio Society on June 9. In between these events,

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
A.E.R.E. (HARWELL): V. J. Galpin, Building 347.3, A.E.R.E., Harwell, Berks.
ALDRIDGE: R. K. Furness, G3RUI, 17 Hillingford Avenue, Pheasey Estate, Great Barr, Birmingham 22A.
A.R.M.S.: N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10.
BADEN-POWELL HOUSE: A. Watts, G3FXC, 8 Thornycroft Court, Kew Road, Richmond, Surrey.
BEDFORD: J. R. Clarke, G3OWQ, 12 Robin Hill, Brickhill, Beds.
BURY & ROSSENDALE: K. Drinkwater, G3RHR, 16 Lindadale Avenue, Accrington.
CHESHAM: D. Kind, 19 Hollybush Road, Chesham.
CHESHUNT: B. B. Charge, 64a High Street, Waltham Cross, Herts.
CHESTER: R. Trickey, G3DRB, 31 Penzby Avenue, Chester.
CLIFTON: J. Rose, G3OGE, 63 Broomfield Road, Beckenham, Kent.
CORNISH: M. J. Harvey, Oak Farm, Carnon Downs, Truro.
COVENTRY: A. J. Wilkes, G3PQQ, 141 Overslade Crescent, Coundon, Coventry.
CRAWLEY: R. G. B. Vaughan, G3FRV, 5 Filbert Crescent, Gossops Green, Crawley.
CRAY VALLEY: S. W. H. Harrison, G3KYV, 30 Plaistow Grove, Bromley.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
EAST KENT: E. S. Wood, G3TMI, 18 Dover Street, Canterbury.
GUILDFORD: M. Birch, G3KMO, Sorrento, White Lane, Ash Green, Nr. Aldershot, Hants.
HALIFAX: J. Ingham, G3RMQ, Lambert House, Greetland, Halifax.
HARLOW: G. O'Donald, G3TLJ, Great East, Roydon Road, Harlow.
HARROW: C. J. Rees, G3TUX, 17 Colburn Avenue, Hatch End, Pinner.
LOUGHBOROUGH: G. P. Bateman, G3LCG, 24 Farndale Drive, Loughborough.
LUTON: P. W. Thompson, G3TUI, 1 St. Michaels Crescent, Luton.
MANCHESTER: K. Kahn, G3RTU, 12 Cliffdale Drive, Manchester 8.
MEDWAY: M. J. Winter, G3OHP, 47 Watling Street, Strood.
MIDLAND: C. J. Haycock, G3JDJ, 29a Wellington Road, Birmingham 20.
MID-WARWICKSHIRE: H. C. Loxley, 51 Guy Street, Warwick.
NEWARK: G. Francis, G3TWV, 93 Balderton Gate, Newark.
NEWBURY: H. E. Newland, G3TEK, c/o 42 Woodlands Road, Baughurst, Basingstoke.
NEWHAM: J. H. Tinker, G3LRO, 68 Caulfield Road, London, E.6.
NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.
NORTH KENT: P. G. Wells, 25 St. Davids Road, Hextable, Swanley.
PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.
PLYMOUTH: R. Hooper, G3SCW, 2 Chestnut Road, Peverell, Plymouth.
PRESTON: C. Noblet, 178 West Park Avenue, Ashton, Preston.
QUEEN'S UNIVERSITY, BELFAST: D. V. McCaughan, B.Sc., GI3RTS, 69 Galwally Park, Belfast 8.
R.A.I.B.C.: Mrs. F. Woolley, G3ESR, 10 Sturton Road, Saxilby, Lincoln.
READING: N. C. Taylor, G3TOQ, 83 Stoneham Close, Reading.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash.
SLADE: D. Wilson, 177 Dower Road, Four Oaks, Sutton Coldfield.
SOUTH BIRMINGHAM: J. Rowley, G3TQO, 195 Castle Lane, Solihull.
SOUTHGATE: R. E. Wilkinson, G3TXA, 23 Ashridge Gardens, London, N.13.
SOUTH HANTS: G. J. Meikle, G3NIM, 34 Victoria Road, Netley Abbey.
SOUTH LONDON MOBILE: J. R. Doughty, 17 Hookham Court, Patmore Estate, London, S.W.8.
SOUTH SHIELDS: D. Forster, G3KZZ, 41 Marlborough Street, South Shields.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, Leeds.
TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.
UNIVERSITY OF KEELE: V. J. Reynolds, G3COY, Dept. of Comms., University of Keele, Staffs.
VERULAM: G. Slaughter, G3PAO, 5 Leggatts Wood Avenue, Watford.
WEST KENT: H. F. Richards, 17 Reynolds Lane, Tunbridge Wells.
WIMBLEDON: E. N. Hurle, G3RZN, 156 Monkleigh Road, Morden, Surrey.
WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral.
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil.

Overseas

AERONAUTICAL CENTRE, OKLAHOMA: Postal Station 18, Oklahoma City, Okla., U.S.A.
NIGERIA: P.O. Box 2873, Lagos, Nigeria.

on May 26, they will hear a tape lecture on microphones, by the late G2SU. On May 29 they will be operating from the Warley Charity Gala.

Latest addition to the growing list of University radio clubs is that of **Queen's University, Belfast.** This very active body has about 70 members, 10 of them licensed; a 120-watt CW/AM transmitter (home-built) and a double-conversion receiver enable the club to be very active on the HF bands. Not many meetings, but every lunchtime, from noon until 2 p.m., the clubrooms are packed with members. GI6YW is their president, and GI3LLQ secretary. They suggest that a University Station Net at lunchtime might now be a practicable proposition — how about that? Other University clubs please note.

Glimpse of a happy occasion, of unusual amateur interest — everyone in the picture holds a callsign! Left to right, G3PXD, G3RWY, the bridegroom G3MQD, the bride DJ6BS, G3SGM and G3NMH. Peter and Wanda met on the air, in a 14 mc QSO in July, 1961, and one thing duly led to another — they were married in Devizes, Wilts., on March 6, surrounded by their radio amateur friends.

Plymouth (*QUA*, April) have had some very successful meetings and visits (they say that the Torbay Annual Dinner on March 6 was the best such event ever attended by members). Their AGM was held on May 4, just before publication, so no details yet available.

Aldridge, since their formation in January, have worked up to an attendance of 30, and hope soon that they may be able to move to permanent premises. Their president is now G3NXP; secretary/treasurer G3RUI. An R.A.E. course and Morse class have been formed, and several candidates for the May and November exams. are lined up. The club recently combined with the underwater section of Walsall Police to find the depth of a local lake by ultrasonic Asdic—an interesting exercise if not quite radio!

North Kent (*Newsletter*, April) report on some very successful meetings held recently, and are looking forward to the Erith Show and Sports on August Bank Holiday. On May 13 they will be hearing an A.R.M.S. lecture on Mobile Matters.

Reading will meet at the QTH of G5HZ on May 29 at 2.30 p.m. for a full-scale rehearsal for Field Day; this will take the place of their normal evening meeting. **South Birmingham** (*QSP*, April) have their half-yearly Junk Sale on May 20, and, at their June meeting, a demonstration and display of Heathkit products.

Clifton lost the Inter-Club Trophy to Crystal Palace at their fifth Annual Quiz, held in April; they have arranged a D/F Field Day for May 23. **Chester** have organised a Junk Sale for May 11, and their other meetings will include a Film Show by G3DRB and this year's Constructional Competition, with more prizes than formerly. Meetings every Tuesday except the first, which is a Net-Night—8 p.m. in the YMCA, Chester.

Preston will be hearing G3RUW on Transistor Transmitters, on May 11, and on the 25th will be discussing their N.F.D. arrangements. New and old members are welcome at these meetings, in St. Paul's School, Pole Street, Preston, at 7.30 p.m.

Harlow are in process of occupying new headquarters rented from the Harlow Development Corporation for their exclusive use—at Mark Hall Barn, First Avenue. Club nights will in future be Tuesday and Thursday, and there will shortly be an official opening ceremony. Much of the club's growth over the past twelve years goes to the credit of G3ERN, who has been elected president of the club. Incidentally, they are applying for the callsign of the late president, G6UT, as a memorial to another keen member and well-known Old-Timer. This is a nice gesture which deserves to succeed.

South London Mobile Club (*see* panel for new secretary's QTH) will meet on May 8 for a talk on Radar by G3MFB. On May 22 and 23 they will be holding a *weekend camp*, to which all visitors will be welcome—write the hon. secretary for details.

Harrow are showing a great interest in Mobile working, and more than half the stations in a recent net were /M, on their way to the Bedford Rally. G5PP—well-known mobileer—has promised them a lecture-demonstration in the near future. Of Harrow's 80 members, half now hold licences (G3UBQ is the latest addition) and there is still a flourishing R.A.E. class. The Constructional Contest will be held at the end of May.

East Kent had a talk on Ten Metres by G3MDT, one of their specialists on that band; G3MDO gave the first of a series of three talks on SSB; the club station G3LTY is doing well on Top Band phone, and the latest licensed member is G3UAP, aged fourteen and already making his mark on 160 metres.

Verulam (*News Sheet* No. 12) report some interesting meetings during March and April, and on March 30 a strong contingent of their members visited the Luton club. They also supported the

Mobile Rally at Texas Instruments, Bedford. **Reigate,** too, enjoyed the social side, with a visit to Crawley's Annual Dinner in March. On April 9-10 they operated G3REI/A from the local Rotary Club exhibition. Next meeting is on May 15 (George and Dragon, Redhill), and on the same day they will be visiting the I.T.A. TV station at Norwood Hill. Sunday, May 30, is booked for a 432-mc trial.

Derby have a full programme for the Spring, with regular weekly meetings. May 12, a Technical Film Show (G3SZJ/T and G3KQF); May 19, D/F Practice Night, with social evening and ragchew for non-participants; May 26, Basic Principles of TV (G3KQF); and June 2, Junk Sale.

University of Keele ran two out-stations for the Trentham Gardens Mobile Rally on April 11—one on Top Band, one on two metres. The cadets of **235** and **238 ATC** Squadrons also played their part in preparing the stands and manning their own display.

The International Amateur Radio Club, based on Geneva and with a strong I.T.U. affiliation, is truly international in character. Here we see OK1WI, this year's I.A.R.C. president, with HB9AEQ, presenting his membership certificate to Mr. Z. Moskwa (lower right), the Polish Minister of Telecommunications. Looking on are HB9UD, HB9AAB and F8RU, who is secretary of the I.A.R.C.

Next event for the **Coventry** Amateur Radio Society is on May 10, when they will have their own station, G2ASF, on the air, for which a variety of gear has been constructed by members, including transmitters and an RA-1 receiver; the aerial situation is posing a bit of a problem, however. All meetings are at their Hq., Westfield House, Radford Road, and a very good *Newsletter* is published regularly, produced (at the moment) as a joint effort by committee members. C.A.R.S. is one of the stronger and more active amateur club groups, and covers a wide range of Amateur Radio interests.

At **Guildford** they have a new hon. secretary (G3KMO), who informs us that their next meetings are scheduled for May 14 (for the G6CJ aerial lecture), and May 28 (to arrange for Field Day). In the list of forthcoming events, we notice that G2YL is on the programme for July 9, to talk on her recent world-wide travels.

Our friends of **R.A.I.B.C.** (the Radio Amateur Invalid and Bedfast Club) are, we are very sorry to hear, beginning to run into financial difficulties with *Radial,* their monthly journal distributed free to members (who are, of course, nearly all in the invalid category). In fact, were it not for the fact that they get a good deal of help, directly and indirectly, it would not be possible for the R.A.I.B.C. to do as much for members as it is doing. Their current problem is the increased postage chargeable after May 17 on the 400 copies a month of *Radial*—amounting to about another £10 a year, which is a lot out of their resources.

Bury and Rossendale enjoyed their Annual Dinner, draw and film show held in March. Their meeting on May 11 will be a Young Members' night, with the old hands doing their best to answer questions from the youngsters. Meeting place is a private room at The Old Boar's Head, The Rock, Bury—8 p.m.

Newbury, getting together on the last Friday in the canteen of Messrs. Elliotts of Newbury, Ltd., West Street, have elected G3JMT chairman; contests manager G2CPM; meetings manager G3LLK, and secretary/treasurer G3TEK. On May 28 the subject will be "Brush up your Contest Operating," by G3LLK.

South Hants, we learn from *QUA* (April), continues to be a very active region. The Southampton Group will be meeting on May 8, and the Wessex Group on May 7 and 17—the latter at the Cricketers Arms, Windham Road, Bournemouth. A Mobile Rally, in conjunction with the B.A.C. Amateur Radio Group, is being arranged for September 5, at Hurn Airport.

Yeovil will meet on May 7, when they will be visited by the South Dorset club, together with G5UH and G5QA; on this occasion G5UH will give a talk on Amateur Television. **South Shields** (also meeting on May 7) will hear about Tunnel Diodes from G3RDI of Sunderland Technical College. On June 4 ZL3HD/G3SUJ will be telling them about Amateur Radio in New Zealand. The first Friday is reserved for these full meetings: on the other Fridays SWL's are instructed and the club Tx, G3DDI, is in operation. All meetings are at Trinity House Social Centre, Laygate, South Shields, at 7.30 p.m.

Chesham, reporting after a long absence, have a new secretary (*see* panel for QTH) and several new

callsigns among their membership; R.A.E. and Morse tuition are in full swing, and May 23 is the date for their first Open Day and Get-Together, at Berry Farm, Whelpley Hill, near Bovingdon. Anyone in the vicinity is welcome to drop in for a chat. (Talk-in on 1920 kc from 1100 hrs. onwards.)

A.E.R.E., Harwell (*QAV*, April) report an outstanding meeting in March, when Mr. H. V. Sims of the BBC gave his talk on Transmitting Aerials. The club also visited the G4NT Hamfest at E.T.E.I., Ltd., High Wycombe. On May 18 the club will welcome Peter Blair (G3LTF), who is to talk on Moonbounce. Friends and visitors from other clubs are invited to join them.

Crawley report a record attendance of 70 at their Annual Dinner, when G2UJ and his XYL were guests. At their May meeting (on the 26th), Vic Hartopp and associates from J-Beam Aerials will give a lecture on VHF Aerials.

Manchester are running their usual full programme, with a talk by G3RTU on Station Control (May 12); R.A.E. and CW Tuition (May 19); and a discussion of N.F.D. Arrangements (May 26). **Peterborough** saw some home-constructed SSB gear at their March meeting, when G3RED and G3LOC demonstrated a receiver and transmitter respectively. On May 7 the subject will be Radio Astronomy, and the meeting will be at 7.15 p.m. in the Lecture Hall of Peterborough Technical College.

Saltash (*Tamar Pegasus*, April) have a tape lecture on Mobile Operation on May 7; on the 21st there is a talk on VHF by G3LMG; and meetings will continue on alternate Fridays at the Toc H Hall, Burraton, Saltash. **Newark** have arranged several visits to manufacturers of radio equipment, their Junior Section is growing rapidly, and six members are taking R.A.E. this year. They also have their own magazine for the first time, and they meet every Monday and Thursday at The Hall, Guildhall Street.

Crystal Palace (*Newsletter* No. 113) are very pleased at having won back the Shield as a result of their Inter-Club Quiz with Clifton. Their April meeting was a Film Show (followed by N.F.D. discussion) and the May meeting, on the 15th, is "to be anounced." **Baden-Powell House** held their first AGM in April, and report good progress on their Scout club station, G3TGS, which will be on the air on May 15-16 as GB3BP from Gilwell Park, Essex—SSB on all bands. The next meeting, on May 20, will include Part II of "Introducing Radio."

Cornish (*The Cornish Link*, April) held their AGM and elected G3NKE president, G3XC vice-president, G3OCB chairman and M. J. Harvey secretary (*see* panel for QTH). The May meeting was due on the day before publication (May 6)—more news next month.

SMALL ADVERTISEMENTS

(" SITUATIONS " AND " TRADE ")

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QSL Cards: Your own design, or standard layout. Send s.a.e. to—G3LQI, Stan Williams, 79 South Street, Lancing, Sussex.

K.W. Viceroy Mk. III Transmitter, £120. KW-77 Receiver, £80. Both these units are in mint condition. Nuvistor two-metre Converter, £8. Two-metre Tx, 832A PA, with modulator, £8. Dependapac Transistor Power Supply and Control Box for use with this 2m. gear, £10: Minimitter MR.37 Rx, covering 10-160m., professionally realigned, £25. H.P. Terms, and delivery, arranged.—Roberts Radio Service, 82 Duke Street, Southport, Lancs. *(Tel. 3990.)*

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DX-100U, with 160m. mod., £59. SBE 1-kW Linear, £89. Professionally modified 21in. TV Rx for Ch. 1, Ch. 3 and 70 cm. amateur TV bands, £39. Another, in an instrument case, is available at £59. BRT-400 Rx, £89. 2M90 and LM100, 100-watt two-metre Tx by G. & D., £30 o.n.o. for this complete CW/Phone rig.—104 Hornsey Road, London, N.7.

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R.M.E. DB-23 Pre-Selector, £13. 20m. and 80m. BS coils, £3 each. All carriage paid. WANTED: 17·5 mc xtal, FT-243 holder.—Box No. 4110, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: LG.300 Mk. II Transmitter with Power Unit and Modulator. SALE: Heathkit V-7AU Valve Voltmeter, new, £9 10s.—Thompson, 134 Royal Oak Road, Manchester, 23. *(Tel. Wythenshawe 2897.)*

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FOR SALE: Lafayette HA-63 and Codar Q-Multiplier, both less than two months old and almost unused; still under guarantee; would deliver reasonable distance. Price about £23.—Please phone (London) *KEL 2831* after 6.30 p.m.

EXCHANGE: Hallicrafters VHF Rx S.27, 27-145 mc, AM/FM, 250v. AC, in good condition, with manual for CR-100, must have S-meter and manual if possible; or sell S.27 £20.—A. Blair, 13 The Chesters, Ebchester, Consett, Co. Durham.

SALE: HRO, bandspread coils, power supply, £20. Also B2 Tx/Rx, power supply, coils and crystals, £8. 1,000-volt power supply, £3. Buyer collects Tunbridge Wells.—Box No. 4111, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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WANTED: K.W. Vanguard, also ex-R.A.F. Box Kite. Condition, price and details to—G3SSN, 40 Mowbray Avenue, Blackburn, Lancs.

CR.693/B.13 Rx, AM/CW/SSB, 15 kc to 20 mc, modified with 12AU7's, £10 o.n.o.?—Beesley, 36 Beckett Road, Worcester.

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SMALL ADVERTISEMENTS, READERS—*continued*

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SMALL ADVERTISEMENTS, READERS—*continued*

TOP Band Mobile Transmitter, 12 volt, size 4¼in. high by 5¾in. wide by 8in. long, £9, complete with relay.—23 Dene Path, South Ockendon, Essex.

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WANTED: August, 1958, *Short Wave Magazine,* with article "Getting the Most from your AR88" by D. M. Gill, 4S7MG. (Replies airmailed Calcutta.)—Box No. 4117, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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MOVING QTH: Following gear must go, nearest offer accepted: R.1155, S-meter, internal PSU/speaker, mod. for Top Band, £7. Pye P.T.112, mod. for 4 metres, with Tx xtal, variable tuning, control unit, £7. MCR-1 with four coil units, no PSU, £3 10s. W.1191, with calibration charts, mains PSU, £3 10s. Marconi Wavemeter GL/T No. 3, mains, for 4 metres, £4.—D. T. Price, G3LYU, 29 Pytchley Road, Rugby, Warwickshire.

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FOR SALE: 90-watt Phone/CW Tx, 10-80 metres, built-in PSU, 4 xtals; newly built from kit, cost £35, accept £25 and carriage. Woden UMØ Mod. xformer, 15s. 30-watt Mod. xformer, 7s. 6d. "Joystick" and ATU, 30s.—G3SVQ, 10 Farley Hill, Luton, Beds. *(22977.)*

HEATHKIT Mohican Rx, professionally aligned, complete with handbook. Heathkit PSU, Model UBE-1. "Joystick" indoor VF aerial and "Joystick" Rx ATU. All in pristine condition, £30 the lot. Buyer collects.—Barnett, 7 Cochrane Court, London, E.10. *(Tel. LEY 9366.)*

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SALE: Panda Cub, £19 10s. CR-100, £9. Woden UM1, £1. 14in. TV Rx, £1. Buyer collects.—59 Lechlade Road, Great Barr, Birmingham, 22A.

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SALE: BRT-400D Receiver, fitted product detector; excellent condition, £65 or offers? Advance signal generator, built-in 1 mc xtal oscillator, £5.—G3KBC, *QTHR.*

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£7 OFFERED for TCS, BC-348 or similar; must be in good condition and ready for mains operation.—Cummings, 114 Meltham Avenue, Withington, Manchester, 20.

WANTED: Tx with mains PSU and VFO, covering 20-80m., CW/Phone, to suit beginner. —D. Roberts, GW3UBV, 33 St. Martin's Park, Haverfordwest, Pembs., West Wales.

SELL Home-Built Top Band mobile station, VFO-controlled 10-watt Tx and superhet Rx in one case size 16in. by 6¼in. by 7in., plus crystal calibrator, four meters including S-meter, G3FIF whip, speaker, 12-volt vib. PSU. A snip at £12 10s.—Bird, 14 Old Nank Lane, Blackburn, Lancs. *(Tel. Blackburn 58312.)*

EXCHANGE: Mint 888A for mint AR88LF, or similar receiver covering 420-520 kc and amateur bands. Cash adjustment.—Cottrell, 117 Mount Road, Birkenhead, Cheshire. *(Tel. Rock Ferry 1385.)*

KW-76 Receiver with speaker, mains PSU, Heathkit Q-Multiplier and S-meter, £34. Four QV04-7, 5s. each. Carriage extra.—D. Yeo, 8 Bothwell Street, Edinburgh, 7.

SALE: Labgear LG.50, 40w. phone 60w. CW, 10-80m., complete table-top Tx, in excellent condition. Delivered free 100 miles or in London area, or carriage paid.—G3PMQ, 77 Catton Grove Road, Norwich, Norfolk, NOR 76.N.

WANTED: Kokusai Filter 455/10K, with or without matching crystals; also Eddystone 898 dial.—GI3TZB, 13 Belmont Church Road, Belfast 4, N.I.

SALE: CDR TR11A, complete with thrust bearing, 60ft. 4-core cable, 60ft. air-spaced coax, as new. Also Class-D Wavemeter Mk. II, 240v. input.—G3KNA, *QTHR.*

FOR SALE: **SB-10U** Single-Sideband Adaptor, very good condition, £23. **KW-2000 and Power Supply,** as new, £159. **WANTED:** 500-cycle Collins filter, 455 kc or near, also **Viceroy Mk. III** or later, and **KW-77.** —Laburnums, Chertsey Road, Chobham, Woking, Surrey. *(Tel. Chobham 8483.)*

SALE: Top Band Tx, Philpotts cabinet, professionally built, £8. Pye "Reporter," high-band, immaculate, £7. 50-watt Modulator, p/p 807's, UM3, £5. Top Band/80m. bandspread receiver, transistor-valve, Philpotts cabinet, professionally built, superb performance, less dial, £8. Power supply unit, heavy duty, high voltage, £3. All items carriage extra.—Whitty, 59 Longfold, Maghull, Lancs.

SALE: K.W. "Valiant" Mobile Transmitter, 10-160m., 50 watts AM/CW, £25. Minimitter 200, pair TT21's final, 10-80m., 240v. CW, 150w. AM, £55. KW-76A Mobile Receiver, 10-160m., £18 10s. Minimitter 8-band converter, 10-160m. and general coverage, £11 10s.—G3EMW, *QTHR. (Tel. Ruislip 7810.)*

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Codar PR-30 or PR-30X, in good condition, reasonable.—A. Jenkins, 2 Dunvegan Close, West Molesey, Surrey.

FOR SALE: K.W. built "Vanguard," 10-160m., in good condition, £45. HRO, with PSU and coils, £20. Quality Vortexion tape-recorder, with splicer and mic., £48; spare deck, £15. Carriage extra on all items.—7 Standard Road, Downe, Orpington, Kent.

WANTED: Minimitter Top 2-7 Tx. Please state condition and lowest price.—Garner, Barbon, Aigburth Hall Road, Liverpool, 19.

FOR Transistor DC/DC converters, 12-300 volt transformers, 60-watt output, with circuit and notes, 35s. Cascode crystal-controlled two-metre converter, built-in PSU, £7 10s. W6DPU-type *de luxe* electronic keyer, complete and in excellent condition, £10.—B. M. Sandall, 21 Dale View, Ilkeston, Derbyshire.

CORNWALL: Holiday accommodation, modern bungalow, minutes beach, bed-breakfast, evening meal optional, car space.—Terms from: G6AY, Lohengrin, Swanpool, Falmouth, Cornwall.

SALE: Hallicrafters SX-100 Receiver, £50. Heathkit DX-40U and VFO, assembled but unused, £35. Prefer buyer collects.—C. D. Street, The Coulins, Chine Walk, West Parley, Dorset. *(Tel. Northbourne 4165.)*

OFFERED: R.C.A. AR-8516L Communications Receiver, 18 valves, 18 bands 80 kc-30 mc, crystal controlled, tunable 1st IF, Collins mechanical filter, superb, new in 1964, perfect unused condition, £85.—18 Kidborough Road, Crawley, Sussex. *(Tel. Crawley 22695.)*

SELLING: Complete G3HSC Morse Record Course, to 14 w.p.m., with instructions, as new, 30s.—Box No. 4120, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SHACK CLEARANCE: S.640 in mint condition; BC-348Q in good working order; pre-selector; S-meter for S.640; all-wave signal generator; speakers, valves, transformers, resistances and condensers, new and used—the lot. Any offers? WANTED: AR88LF manual, to purchase.—Borer, 37 Broadway, Ripley, Derbyshire.

WANTED: K.W. "Vanguard," factory built, recent model, with or without 160m. Will collect Midlands or North.—Box No. 4119, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Good communication receiver, amateur bandspread, S-meter, BFO. Also Codar A.T.5, pair transistor walkie-talkies.—33 Pitt Street, Southport, Lancashire.

SALE: KW-160, excellent condition, £18. Delivered 20 miles Epsom, or carriage extra.—G3TQY, Ashar, Cross Road, Tadworth, Surrey. *(Tel. Tadworth 3247.)*

GONE All-Transistor. Have for sale R.109T, with S-meter and transistor output, 1·8-8·5 mc, £10. R.208, 10-60 mc, £10. B.44 Mk. III, £8. Transistor PSU, 12v. DC in, 240v. 100w. AC out, £10. Pye 444 Transistor Portable, LW/MW and SW 1·7-3·8 mc, £10. Buyers collect.—Thornes, 219 Old Bank Road, Dewsbury, Yorkshire.

GOOD R.C.A. AR-77E, with manual, £13, carriage paid.—Box No. 4121, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING an HRO with seven coils, 12v. and mains power supplies. £15. WANTED: The matching Modulator/PSU for Labgear LG.300.—96 Blackamoor Lane, Maidenhead, Berks. *(26723.)*

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED: Mosley TA-33Jr., good price offered for as-new Beam.—Details to: Kennedy, 39 Mains Avenue, Ardencaple, Helensburgh, Dunbartonshire, Scotland.

WANTED: KW-77, recent model, must be in FB order; or EXCHANGE for brand-new, boxed, Bush 23in. TV Rx. Replies to—S. MacMahon, 15 Algeo Drive, Derrychara, Enniskillen, Northern Ireland.

WANTED: Manual for HRO-5T.—Edwards, Flat A, 241 Hyde Park Road, Leeds, 6.

FOR SALE: AR88D, immaculate condition, overhauled and realigned, with trimming tools and manual, £50; also one needing attention, £25. R.216 Power Unit, £12 10s. AVO Oscillator, 95 kc-80 mc, £11. BC-453, £4 15s. BC-455 (less outer case), £2 15s. S.27 output xformer, 17s. 6d. S-meters for HRO and AR-77, 45s. each. All foregoing brand new. Wooden case for BC-221, £2. AR-88 speaker, 45s. SX-28 mains xformer, £2. R.C.A. VoltOhmst, £5. Triple Command Rx rack, 25s. Manual for HRO (MX) (5T), 25s. BC-221M, 20s. 62 Set, 15s. 18 Set, 10s.—A. J. Reynolds, 139 Waller Road, New Cross, London, S.E.14. *(Tel. New Cross 1443 after 7.30 p.m.)*

METROPOLIS MINUS TWELVE MILES—GLORIOUS EPPING FOREST — FOR LOUGHTON & DISTRICT MOBILE RALLY—BCNU SATURDAY, 26 JUNE—DON'T BE LATE!

WANTED: Co-axial change-over relay, and transmitting type 350 $\mu\mu$F variable condenser. SALE: Acos stick microphone, new, £1.—133 Station Road, Cropston, Leicester.

FREE! On 3501-3505 kc CW, on most days except Fridays. I will present the first U.K. station to make contact with me—while we are both using *indoor* "Joysticks" with only the 8ft. of feeder as supplied—to one year's free subscription to the New Zealand Association of Radio Transmitters (N.Z.A.R.T.), which includes a monthly issue of *Break-In* and an up-to-date ZL call book. This offer is not impossible, because G5WP has worked me on 3·5 mc and gave me RST-569, when I was using the "Joystick" against the shack wall. Pse use the code-word "Joyin," and I will tune up my indoor "Joystick" immediately. Who will be the first G?—*73 de Alan Frame,* ZL4GA, and *QTHR.*

WANTED: Collins TCS-12 Transmitter, original or modified, but must be in clean condition, with circuit data.—Ingram, 49 Lime Tree Avenue, Broadway, Worcs.

COMPLETE AM Station: 90-watt Heath 10-80m., fixed-portable-mobile, AC and DC power supplies; mobile mounting brackets; factory checked and fully operational, £75 o.n.o.? Going Sideband.—G3RQB, 21 Ryeland Road, Duston, Northants.

GOING QRT: Sphinx SSB Tx, brand new with control unit, £65. RA-1 Rx, with speaker and calibrator, £38. Minimitter Top 2-7 Tx, £18. Z-match with 25w. ATU, £3 10s. Call any evening.—G3NJQ, 50 Vicarage Road, Norwich, Norfolk. *(Tel. Norwich 48615.)*

SALE: Heathkit Mohican with built-in crystal calibrator, cadmium accumulator and manual, £25.—Burchall, 71 Byfleet Road, New Haw, Weybridge, Surrey. *(Tel. Weybridge 47017.)*

SALE: A Green & Davis Linear, few months old, perfect, £75. Apache Tx, professionally wired, perfect. £80.—Box No. 4122, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

WAVEMETERS Class-D Mk. II, new, in case with headphones, 70s., post/packing 5s.; less case and headphones, 56s., post/packing 4s. DL5 and CLR5 headphones, 8s. 6d., carriage paid.—Langdon, 13 Sambrook Road, Fallings Park, Wolverhampton, Staffs.

FOR SALE: 500 kc crystals, 10s. each.—Cleall, 28 Oldham Avenue, Wyken, Coventry, Warks.

WANTED: Loan of handbook for frequency indicating instrument Type CRR-74028, Model LM-13.—Radio & Electronics Club, c/o Personnel Dept., English Electric Co. Ltd., Kidsgrove, Staffs.

MAINS Bush VHF-90C; new Brown's Type "F" headphones; Hallicrafters SR-150 handbook. Offers before Wednesday 12th. WANTED: Communications receiver.—Box No. 4123, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Lafayette "Precon" amateur preselector/converter, as new, £9 10s.—E. Quick, 9 Trenwith Terrace, St. Ives, Cornwall.

WANTED: "Joystick" with associated ATU; also American 19 Tx/Rx ATU. Please write.—B. D. Austin, 82 Blumfield Crescent, Slough, Bucks.

COMPLETE RTTY equipment, comprising T.U. ZA-39384 and matching power supply unit; Creed 7B Printer and 110v. motor supply power pack, £20. Also Creed Type 3X printer with cover and rolls of paper, £5.—Townsend, 203 Charlton Road, Shepperton, Middlesex.

HALLICRAFTERS Tx/Rx, 80-160m., relay controlled, six-channel transmitter, 45w. output, 12v. and 115/250v. power packs, £35 carriage extra.—Box No. 4124, Short Wave Magazine Ltd., 55 Victoria Street, London, S.W.1.

WANTED: HRO Receiver, without Coils or PSU. All replies acknowledged.—Box No. 4125, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Eddystone 840C, only a few months old and as new; frequency coverage from medium-wave up to 30 mc, built in speaker, colour two-tone grey; cost £62 new, sell for £35.—*Ring* G3IWE *(QTHR)* at *Warrington 64178.*

FOR SALE: AR88D, with S-meter and manual, good condition, £35. Buyer arranges carriage.—*Apply evenings,* T. F. Dodd, 47 Belton Street, Moldgreen, Huddersfield, Yorkshire.

SALE: Eddystone EA-12, few months old, virtually brand new, at £155. "Joystick" *de luxe* and ATU-3, unused, £4. Avometer Model 8, Mk. II, unused, £17. Eddystone S-meter, unused, £3 10s. Panoramic Adaptor IP-69A, £9.—Box No. 4126, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

THE well-known FL8A Audio Filters, giving high selectivity for CW reception, 7s. 6d. each, plus 2s. postage, or 2s. 6d. for two. Send s.a.e. for comprehensive lists of components and gear for disposal to—G6GR, 223 Tettenhall Road, Wolverhampton, Staffs.

FOR SALE: FB 10-80m. AM/CW 150-200w. Tx, 813 PA, 2/811 mod., £40. Rx, incomplete, Geloso front-end, 4·6 mc/465 kc IF, Q-multiplier, £10. R.C.A. TE-149 Wavemeter, 2·5-5·0 mc, £7 10s. o.n.o.? Cyldon 200+200 $\mu\mu$F, 0·1in. spacing, £1. WANTED: Good BC-221.—G3ISD, 3 Gorecourt Road, Sittingbourne, Kent.

SMALL ADVERTISEMENTS. READERS—*continued*

SALE: BC-348, PSU, £14. R.1132A, £3. Xtal filter for HRO, new, £1.—Robinson, 25 Hamilton Avenue, Tolworth, Surrey. *(Tel. Lower Hook 2918.)*

HEATHKIT Mohican, 550 kc-30 mc, bandspread on all amateur bands, as new, £25. RCX Panoramic Adaptor (see the signals as well as hear them), IF input 450-475 kc, £35. G2DAF linear amplifier, 2/813's, separately metered plate-screen-grid, in "Viceroy" cabinet, no power supply, offers? Power supply, 240v. in, 3,000v. DC out, solid state rectifiers, metered voltage, interlock switching, in cabinet 9in. x 12in. x 9in., offers? Enormous power supply, with 866 rectifiers, giving 2,000v. DC, with block-paper smoothing condensers, fixed and swinging chokes, transformer 2300-0-2300v. 500 mA, offers? Hicock Microvolt Signal Generator, 85 kc-144 mc, 100/1,000 kc crystals, plus RF VTVM, perfect, £15. Williamson 15w. hi-fi amplifier and pre-amp, 15-ohm output, offers? BM3 mike and stand, 30s. Slow Morse LP record, offers? Transformer 240v. in, 1,000-0-1,000v. 300 mA out, offers? Electrolytics, eight at 100 μF, 350v. wkng., offers? Transmitting variable condenser, widespaced, 250 $\mu\mu$F, 10s. Speakers, 2in. to 12in.; valves, 807's/octals; variable capacitors and trimmers; slow-motion drives; meters, etc., etc. G3SRZ clearing out; everything must go; no reasonable offer refused. Buyers collect.—7 Broadlands Avenue, Hockley, Essex.

EXCHANGE: About £140-worth of 3-rail Hornby railway; five locos., rolling stock, stations, model houses, scenery accessories, electric points, signals, etc., etc. Would anyone like to swop for really good communications receiver? Cash adjustment if necessary.—Dutfield, Overton Grange, Ludlow, Shropshire. *(Tel. Ludlow 2810.)*

AR88D, new condition, complete with manual, £40. Triplett (U.S.A.) Signal Generator, 100 kc-150 mc, brand new in case with manual, £13 10s. AVO-8 Mk. II, brand new leads, manual, £16 10s. AVO-40 Mk. II, brand new in leather carrying case, leads, manual, £14. R.C.A. Voltohmyst VTVM, brand new in carton with manual, etc., £15. "Command" receivers, all brand new mint in original cartons, one only of each, 190-550 kc, 550-1500 kc, £7 10s. each; 1·5-3·0 mc, £10. Jones (U.S.A.) Micromatch VSWR Bridge, brand new precision instrument, £10 10s. CT.53 Signal Generator, 8-330 mc, brand new, with manual and charts, SP600 JX series, full technical manual, latest issue, 45s. Original auto-xformer for BC-342, 35s.; QQV03-20A, brand new, 35s.; BC-221 lightweight phones. new, 21s. All items plus postage. WANTED: AN/USM-26 Signal Generator, or similar type of laboratory standard by Boonton or Hewlett Packard. Also QQV06-40A's and cowl-gill motor.—Box No. 4127, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: HQ-100A plus Codar Preselector, £55. G.E.C. Miniscope, with handbook, £6. B.44 modified for 70·26 mc, with microphone, £7. Ae. coil for 52 Set, 10s. Absorption wavemeter, 1·5-9·0 mc, 10s. Garrard RC-72A record changer, £2. Deliver 30 miles, carriage extra.—G3JFF, 32 Briar Close, Horndean, Hants.

WANTED: LG.300 complete with Modulator and Power Pack.—Full details to: G3NOW, 16 Lloyd Road, Worcester Park, Surrey. *(Tel. DERwent 0720.)*

FOR SALE: HRO Rx, nine coils, 28-30 mc bandspread, good condition but needs aligning, no PSU, £12. CR-100, noise limiter, manual, AVC line needs attention, £10. Two new 813's, 40s. each. Electroniques Q-multiplier, 465 kc IF, £2.—G3PKA, 44 Sparrow Close, R.A.F. Brampton, Hunts.

WANTED: Complete 160m. Mobile Rig, or will consider odd units. All replies answered.—Turk, 94 Heysham Road, Southport, Lancs.

A Tx with 829B final, 807's modr., for 10-80m., 150-watt, in 6ft. rack-and-panel; four PSU's, 15 meters, remote VFO, beautiful job, £35.—G3OKX, 21 Addison Drive, Alfreton, Derbyshire.

SALE: Minimitter Mercury, perfect, £40. SX-28 plus speaker, £12. Minimitter 10-15-20 Beam, £10. 12 Set Tx complete, less valves, free to recently licensed station. Surrey.—Box No. 4128, Short Wave Magazine, 55 Victoria Street, London, S.W.1.

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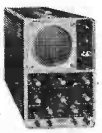
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