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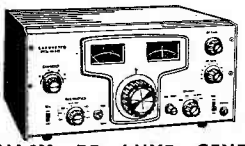
The SHORT WAVE Magazine

VOL. XXIII JANUARY, 1966 NUMBER 11

SUPERB LAFAYETTE AMATEUR EQUIPMENT



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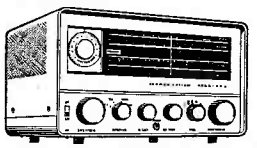

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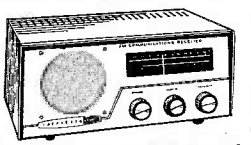

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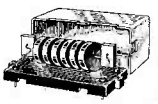

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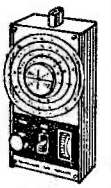

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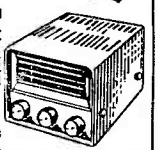

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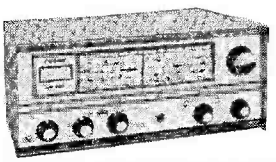

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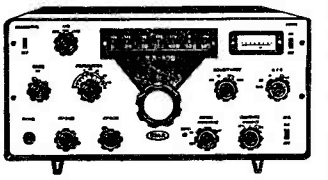

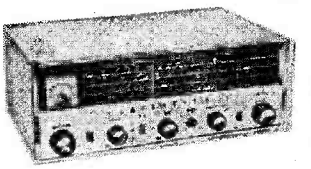

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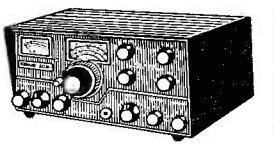
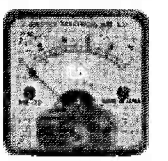


CLEAR PLASTIC PANEL METERS



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200μA	27/6	5mA	22/6	500mA	22/6	20v DC	22/6	15v AC	22/6
500μA	25/–	10mA	22/6	750mA	22/6	50v DC	22/6	50v AC	22/6
50-0-50μA	29/6	20mA	22/6	1A DC	22/6	100v DC	22/6	150v AC	22/6
100-0-100μA	27/6	50mA	22/6	2A DC	22/6	150v DC	22/6	300v AC	22/6
500-0-500μA	22/6	100mA	22/6	5A DC	22/6	300v DC	22/6	500v AC	22/6
1-0-1mA	22/6	150mA	22/6	3v DC	22/6	500v DC	22/6		

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PART EXCHANGES WELCOME

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(GB3SWM)

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CONTENTS

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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The SHORT-WAVE Magazine

EDITORIAL

Outlook *It is generally supposed—because somebody says so in print—that "the maintenance of the amateur position depends upon a united front."*

Really, it depends on nothing of the sort. It depends upon the fact of there being a sufficient number of amateurs interested in communication on a world-wide basis. Taking the world as a whole, there are now about 400,000 such stations, each individually owned and each with a stake in the continuance of the freedom of the ether, subject to reasonable safeguards acceptable to all.

The more active organisations there are, within the general framework of Amateur Radio, working towards the same end—the safeguarding of the position in our bands—the better. Far more can be done informally behind the scenes than formally at the conference table.

In the sophisticated and civilised Western world, there is no particular "danger to Amateur Radio" in the sense of losing frequencies by legislation. No modern country under-estimates the value of its radio amateur population. But the less advanced countries—which are, broadly, the emergent states of Black Africa and some other parts of the world—have a totally different outlook, because they are as yet unable to grasp what Amateur Radio means and to see where it can have advantages for their own development.

In the West, it is now hardly possible, administratively or logically, to eliminate Amateur Radio merely by legislation. For one thing, there are far too many individuals involved, each with a capital investment worth anything from £20 to £20,000, and for another there is among all these thousands a sufficient number who would be prepared to defy what they would regard as unjust and unreasonable law—and it would take years to bring their cases before the courts.

What, then, is really the problem facing Amateur Radio? It is the constant and continuing encroachment on the amateur bands by pirate commercial stations flouting the 1959 Geneva regulations. Certain irresponsible administrations are simply grabbing frequencies to suit themselves in band areas which appear to be under-loaded or lightly occupied, fully in the knowledge that practically nothing can be done officially to move them out.

Accepting, therefore, that this is the real danger—and it has been prognosticated in this space for years—it follows that "presenting a united front at any international conference" is not nearly so important as bringing pressure to bear (in whatever ways may be possible) on these irresponsible administrations.

So long as this is done, it does not matter how or by what means the indoctrination process is carried out. It can probably be achieved more effectively by small but influential groups acting privately than by relying solely on what is called "presenting a united front at official conferences."

And, anyway, in this latter context, it is the quality of our representation that is of prime importance.

Austin Forsyth, G6FO.

WORLD-WIDE COMMUNICATION

ABOUT THE HRO RECEIVER

IMPROVING BFO INJECTION FOR SSB — REVALVING CONSIDERATIONS — BANDSPREAD COIL MODIFICATIONS — IDEAS FOR BETTER SELECTIVITY — TVI AND AERIAL COUPLING

Part II

E. P. ESSERY (G3KFE)

Anyone possessing an HRO—and there must be 1,000's of them in amateur stations up and down the country, to say nothing of the rest of the world—will realise on reading this second part of his treatment of the "National HRO" that our contributor has been into the receiver pretty thoroughly. The suggestions he makes and the modifications he describes amount to good practical information on a receiver which is basically very sound but can be made much better for amateur-band conditions as they are today. The first part of his article—dealing with checking performance, alignment and general servicing—was published in our issue for November last. A concluding instalment will appear in a later issue.—Editor.

THE essential data on the HRO circuitry and alignment were given in Part I, and here the intention is to consider what can be done with a war-surplus HRO in good running order, to bring it nearer the mark for use under modern band conditions—both as regards telephony and CW—and to try, where necessary, to discuss the underlying reasons that influenced the choice of circuits.

BFO Injection

There was a theory some years ago, which gained wide acceptance, suggesting that BFO injection should be kept to a minimum. The effect of this was to enforce the use of a low RF/IF gain control setting to get a clean beat note out of the speaker—which, quite as a side issue, dictated a control setting that made the best of the IF selectivity. Further, the low level of BFO injection reduced the degree of screening needed to bring spurious signals due to BFO harmonics down to an acceptable level, making the receiver cheaper to manufacture. The advent of SSB immediately showed up the weaknesses of such receivers—and in fact demonstrated the lack of progress in design over a period of 20 years.

In order to receive SSB one has to re-insert the missing carrier at the receiver; the level of carrier injection must be enough to make the reconstituted signal look as though it were not modulated more than 100 per cent. Hence, if there is not enough BFO injection there will be more Sideband than re-inserted carrier and the signal as resolved will not be readable. There is a simple solution to this, involving the shunting of the 2 $\mu\mu$F injection condenser by a further 22 $\mu\mu$F, making C33 in the circuit on p.659 up to 24 $\mu\mu$F.

In all modern receivers one will find a product detector, together probably with a special injection oscillator; however, before you dive into the inside of the HRO and fit one, let the writer remark that in no case where a product detector is compared with a *diode detector* and *adequate* BFO, over a period of months, has any *practical* advantage been found to accrue. In no case was a signal readable on the one that was not equally readable on the other, and in the HRO the possible slight advantage of the product detector in terms of lower distortion is lost in the overall distortion produced in the rest of the receiver, which is still acceptable for communications purposes.

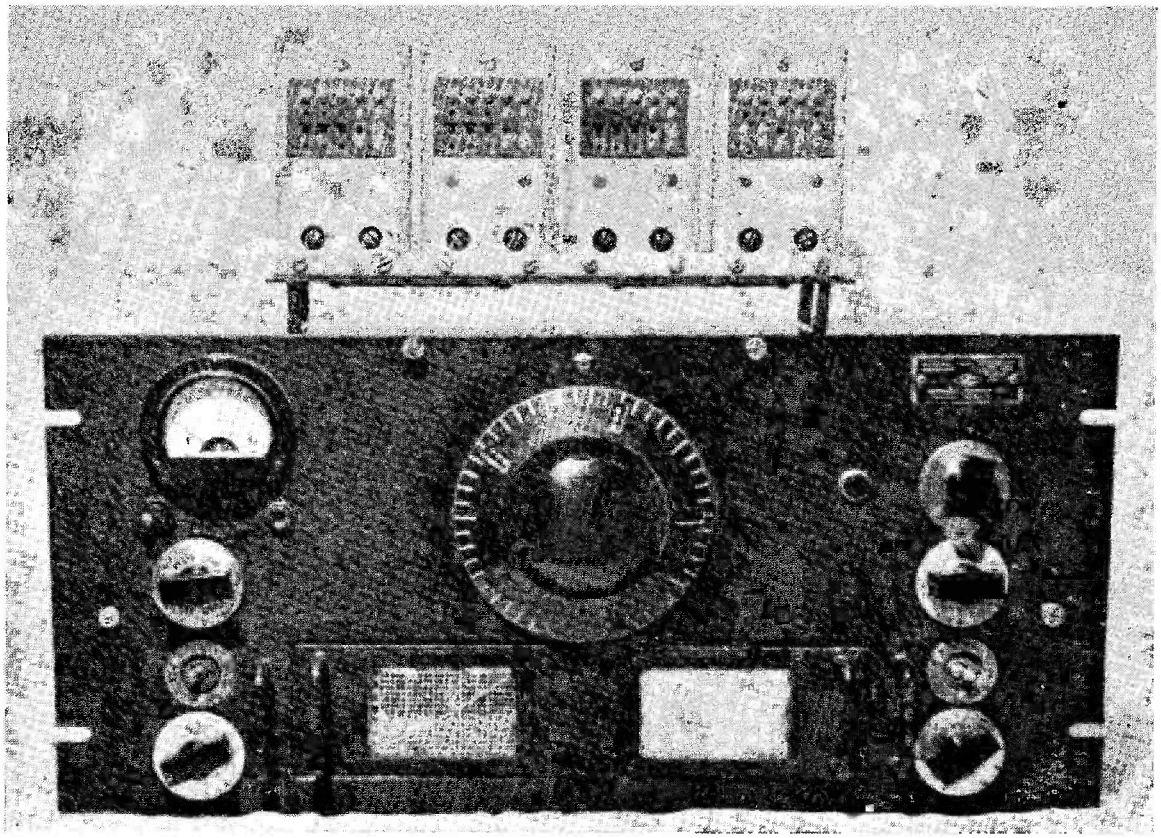
The only problem then is to find the 2 $\mu\mu$F capacitor, C33, and in fact it will be found to look more like a tagstrip than anything else; the easiest way to find it is to trace back from the circuit into the receiver until you find the "tagstrip."

BFO Alignment

When the BFO is aligned in the manner called for in the HRO manual, the BFO is aligned to the receiver IF when the BFO knob is set to position 9. A better setting for general use on the amateur bands is with the BFO set to the receiver IF when the control is set to posn. 5. This can be achieved by setting the receiver to the condition of absolute maximum selectivity, centring a signal in the middle of the passband, setting the BFO to posn. 5, and then adjusting the BFO trimmers to give zero beat with the signal. In this manner a BFO range of ± 5 kc can be achieved. When this has been done, SSB reception will be obtainable with a BFO setting at about 2-3 or 7-8; phasing at about 5; and Selectivity peaked, once again around 5. A trial on 80m., where most of the SSB signals are on LSB, and on 20m., where the majority are on USB (in accordance with the convention), will soon find the exact settings. The reception of SSB in this manner is done with the AVC switched *off*, the audio wound up to near maximum and the lowest possible RF gain control setting.

Power Pack

It will very soon be found that the receiver is prone to drift, even after warm-up, and that there is a tendency for the RF gain to shift the frequency; this latter is even more noticeable if the HRO is used with a transmitter and muted by lifting the RF and IF stages cathode line above earth on "transmit," which seems to produce a slow drift during transmission, followed by a drift back again during reception periods—which is very disconcerting and productive of lost QSO's. The usual ploy is to provide a stabilised line for the local oscillator and the BFO, which helps a lot, but the accident of having a fully stabilised supply on the bench at a time when the



Front-panel appearance of the HRO receiver—in this case the rack-mounting model, using the side slots. The tuning dial is a very neat mechanical contrivance which allows for a high degree of re-setting accuracy, particularly when the bandspread coil packs are used. The coil set standing on the receiver is a bandspread unit and — following G3KFE'S text — the trimmers to which he refers are Nos. 1-8, reading from left to right. The Rx as shown here is fitted with another coil pack — along the bottom, with the appropriate dial calibration in the window on the left — and the panel levers are to enable the coil pack to be squeezed out while not disturbing the position of the receiver.

HRO pack was out of action, very soon convinced the writer that the fully stabilised power pack is a *must* for the best results—which is rather obvious when one realises that the HT drain of the receiver varies between 40 and 60 mA at a constant 200 volts from the stabilised pack. If the HT is not stabilised the conditions into which the oscillators look change with every shift of the controls, the circulating current in the oscillator coils is continually varying and hence changing the temperature of the windings, so the heat distribution in the cabinet is also changing, and so on. Not all of these changes are quick acting, and so the receiver is constantly drifting to a greater or lesser extent. Stabilising the entire HT is simple and easy, and coupled with reasonable attention to ventilation by leaving the lid open a quarter-inch or so in the case of a table model (and a few judicious holes in the lid of a rack model) will work wonders with any HRO. But it is no good then piling a load of papers on top of the receiver to stop it getting cold! A suitable power unit is shown in Fig. 1, and has a lot of other handy uses around the shack which make it always a useful piece of gear.

Revalving

There must be more utter drivel talked in radio clubs, by people who ought to know better, about the revalving of war-surplus receivers than almost anything else. There seems to be an idea that a miniature valve is in some way better than an octal valve or a UX-based one, and will ensure that magically the receiver will hear more DX and sound more " lively." This is dangerously far from true.

The factors that affect a receiver's ability to hear a weak signal are functions of selectivity, sensitivity, and signal-to-noise ratio, and stability. The first and last are not connected with the valves to any serious extent, the other two being very much inter-linked with each other, and with the valve behaviour.

It may be said that the receiver front-end does not come into the picture at all on the 160, 80 and 40 metre bands due to the high level of noise picked up on these bands by the aerial, some of it being natural and some of it man-made at the average QTH. Very little can be done about it, and the result is that no RF stage is necessary in front of

a war-surplus type (*e.g.* 6K8) mixer in good circuitry and condition—as many R.1475 users have found to their benefit when they modded the guard channel to Top Band.

The writer once did a test comparison of the R.1475 against a post-war receiver with one RF stage, which is still in some demand, and found that the R.1475 won hands down over the other receiver, due entirely to the fact that the test signal was lost in QRM on one receiver and was in the clear on the other, this being due to the better selectivity on the R.1475, both receivers being well up to scratch at the time of the test. Eventually the post-war beauty was disposed of because of the consistency with which it failed to produce the signals in spite of its little glass valves.

This argument ceases to be quite so true on Twenty, where the noise level on the aerial is often lower, and the receiver has to be a lot more sensitive to hear signals only a little above the aerial noise. On Fifteen and Ten, it is fair to say that for most of the time there is virtually no noise on the aerial, and then we have reached the condition that arises on VHF, where the noise in the first stage of the receiver is the limiting factor, and all efforts must be turned to this end.

Thus we are saying that the receiver, if it is an HRO in good condition, will not miss anything that may appear between Top Band and Twenty, but will be a bit poor on the two higher-frequency bands. But wait—these are just the bands on which we would like to have some more stability, so a crystal-controlled converter is a must in any case.

There is still another consideration, and that is the matter of cross-modulation, which is very apt to occur with the short grid-base of the high-gain low-noise valve types, of which, incidentally, the best of the bunch by far until very recently was the 6AC7, at least in the area below 30 mc that we are considering. The 6AC7 is on the despised octal base, too !

Now we can begin to see that the main factor is going to be a question of band operating interests ; local QRM which often is a matter of old G3XYZ down the road ; and simply whether spares can be got for old valves. In general, there is no justification in revalving a receiver in good condition. If the valves *are* down and replacements are not obtainable, then the selection of new ones should be on the

Table of Values

Fig. 1. Stabilised PSU for the HRO

C1, C2 = 16 μF, 500v. DC wkng., elect.
R1 = 100 ohms
R2 = 470,000 ohms
R3, R5 = 10,000 ohms
R4 = 22,000 ohms
R6 = 82,000 ohms
RV1 = 20,000-ohm 5w. linear pot.
Ch.1 = 10 Hy. 120 mA choke
T1 = 350-0-350v. 120 mA, 5v. 2A, 6·3v. 2A, 6·3v. 4½A.
V1 = GZ32, or equiv.
V2 = 6L6G, or KT66
V3 = EF80, or equiv.
V4 = VR-105/30, or equiv.

Note: All fixed resistors are one-watt rating to 20% tolerance. Iron-cored items Ch.1 and T1 should be rated for continuous running.

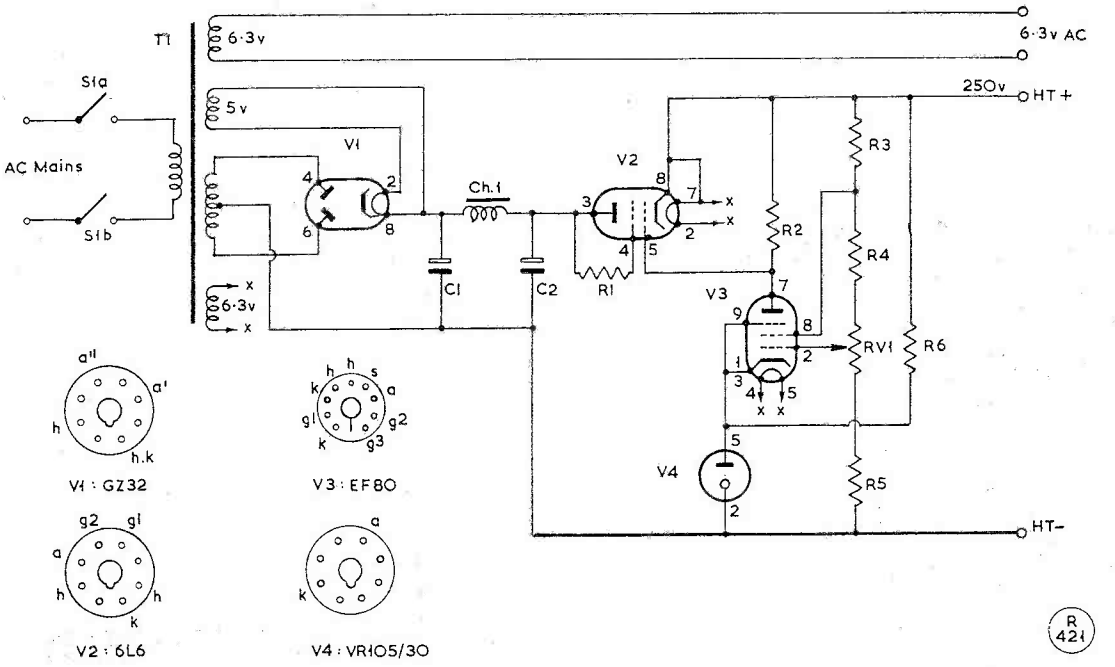


Fig. 1. Circuit of a stabilised power pack for the HRO. This will take care of the wide variations in current loading with shifting of the controls (see text). Besides this, such a PSU is in itself a very useful piece of equipment to have on the bench. To set up the pack for any HRO, potentiometer RV1 is adjusted to give 250v. output with the Rx connected and warmed up.

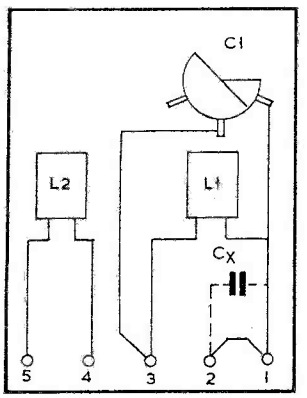


Fig. 2A. RF and mixer coil modification for bandspread. On Top Band condenser Cx should be 33 $\mu\mu$F. For other bands, Cx is the bandspread padder, variable preset, calculated as given in the text. Wiring changes involve removing the link between points 1 and 2 and paralleling Cx as shown, L1/L2/C1 being existing components.

consideration of getting the best possible cross-modulation characteristics unless all operation is on Twenty and there are no locals near enough to give trouble. In this case the first RF can well be a 6AC7 with a higher value of screen resistor than is usual to give as much protection as possible against cross-modulation. If supply problems force one to revalve then possibly the 6BE6 and 6BA6 series are the best ones to go for. But before cutting into the receiver it is suggested that tests be made with an adaptor consisting of a suitable valve base wired to an octal or UX plug as the case may be, followed by realignment and a period in service. Accurate measurements will show that most cases of revalving to "hot up" the HRO in fact degrade the performance and only very rarely will any significant improvement occur in comparison with an unmodified receiver in good condition. Most spectacular improvements after revalving result from the (accidental) clearing of faults !

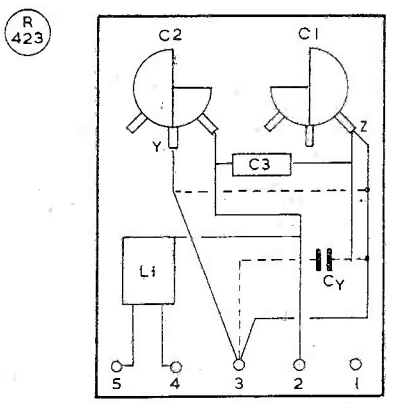


Fig. 2B. Wiring alterations for the HRO oscillator. The changes are to remove the links between points Y and 3, and Z and 3 ; connect Y and Z ; and parallel Cy across points 3 and Z. For Top Band Cy is 33 $\mu\mu$F ; on other bands, Cy is a bandspread padder. Existing components are L1, C1, C2, C3. See text.

Bandspread

The possession and use of the bandspread coils in the HRO are a boon which no other receiver giving general coverage can match. However, a set of bandspread coils is a rarity, and to buy would cost more than the receiver is worth. We must therefore make them for ourselves—which is quite possible, if we first consider the principle involved.

A bandspread coil can be identified by looking at the contact block carrying the pips which mate with the fingers in the actual receiver, which appear on the topside of each of the four boxes making up the assembly. In front of each of the pips there is a recess in the moulding which may or may not be filled with a small piece of metal. If the piece of metal is tapped for a countersunk screw in two cases on each block, and a screw is in one of each pair but not the other, then you have a bandspread coil. They are made for 1·7-4·0 mc (BS80) ; 3·5-7·3 mc (BS40) ; 7·0-14·4 mc (BS20), and 14·0-30·0 mc (BS10). Looking at one of these bandspread coils from above with the calibration graphs facing you, the screws are in the left-hand position on each contact block to give normal coverage ; shifting the screws from the left-hand position to the vacant right-hand hole on each block will give the bandspread condition.

What do these magic screws do ? In fact it is all very simple, and all that happens is that the screw in the left-hand hole shorts out a padder capacitor which reduces the effective swing of the tuning gang, while the absence of the screw in the other hole disconnects the trimmer provided to bring the other end of the bandspread range into line. Hence, the statement that an adjustment of the general coverage alignment will upset the bandspread but not the other way about.

Let us first of all consider the creation of a Top Band bandspread coil from a 0·9-2·05 mc coil. The method is due to G3NEE, and was published in the Southgate Club "Newsletter" in July, 1962. In Fig. 2A here, replace the link between tags 1 and 2 by a 33 $\mu\mu$F 1 per cent silver mica capacitor, Cx. In the Oscillator section (*see* Fig. 2B) the links from Y to tag 3, and from Z to tag 3, are removed, and Y is then linked to Z. The link Y-Z is then joined to one end of another 33 $\mu\mu$F similar condenser Cy, the other end of which is joined to tag 3. Re-assemble and carry out a re-alignment, padding the oscillator with the No. 7 trimmer, as shown in the previous article, and trimming with the No. 8 trimmer, to get nice bandspread of Top Band. The RF stages are trimmed with the ex-GC trimmers, juggling things till a nice even gain is obtained over the band consistent with the desired spread.

Looking at the circuit on p.658, which shows a receiver with a bandspread coil plugged in, a pair of points marked 1 and 2 will be seen in the grid circuit of the first and second RF, mixer, and local oscillator valves respectively ; in the bandspread condition, the pair marked 1 will be linked in each

case, and in the general coverage case the screws will be linking the points 2, and a few moments consideration will show that in each case, the shorting of the points 2 by the screw will short out a trimmer, which is the thing we have regarded as a bandspread padder.

Making Bandspread Coils for the HRO

In the first instance let us disregard Top Band, which we have already dealt with, and concentrate on the method of converting a general-coverage coil. In each case, it will have been noticed that the bandspread area is located at the HF end of the general-coverage range. *This is fundamental* to the working of the system. Now, if we are prepared to adjust the existing parallel trimmer, (*i.e.*, the GC one), then our problem will resolve into a matter of calculating the approximate value of the bandspread padder, and fitting an appropriate trimmer in the places where G3NEE put his 33 $\mu\mu$F in Figs. 2A and 2B, other wiring being as per these two sketches.

Let us look at the calculation for a conversion of a 40-20 GC coil to bandspread 20 metres.

The gang swing is 10 to 225 $\mu\mu$F.
Valve capacity, say 15 $\mu\mu$F
Circuit strays, say 10 $\mu\mu$F
Main trimmer, say 15 $\mu\mu$F (about mid-setting).

Hence, the RF gangs will swing from 50 to 270 $\mu\mu$F in their GC role. This will not apply to the oscillator gang, due to the presence of the padder, in this case 0·0026 μF.

The standard formula for two capacitors in series is :

Eq.1 $C_{TOT} = \dfrac{C_1 . C_2}{C_1 + C_2}$, where C_{TOT} is the resultant, and C_1 and C_2 are the two capacities.

Re-arranging, we get :

Eq.2 $C_2 = \dfrac{C_{TOT}\ C_1}{C_1 - C_{TOT}}$ which we will soon need.

Now, putting in values into *Eq.1* appropriate to our oscillator circuit and a 40-20 GC coil, we get :

$$C_{TOT} = \frac{C_1 . C_2}{C_1 + C_2}, \text{ i.e. } \frac{225 \times 2600}{2825} = 208\ \mu\mu F$$

that is, the oscillator gang maximum has been reduced from 225 to 208 $\mu\mu$F, and hence the total swing, assuming the same strays as for the RF gangs, becomes 50 to 253 $\mu\mu$F.

We now have to find the value of the inductance in each case. This we can do by means of a set of ABACs, or by calculation ; let us firstly look at the calculations, and then at the method using the ABACs which are available either in the Public Library or possibly in the shack.

$\omega L = \dfrac{1}{\omega C}$, as we learned in the R.A.E.

Whence $L = \dfrac{1}{\omega^2 C}$ where $\omega = 2\pi f$, f being frequency, *i.e.*, $L = \dfrac{1}{4\pi^2 f^2 C}$ ———*Eq.3*

Now, C is 50 $\mu\mu$F when f is 14·4 mc, and assuming $\pi^2 = 10$. Then $L = \dfrac{10^6}{4 \times 10 \times (14{\cdot}4)^2 \times 10^6 \times 10^6 \times 50 \times 10^{-12}}$

$= 2{\cdot}4\ \mu$H.

By the same argument as for *Eq.3* we may say that $C = \dfrac{1}{\omega^2 L}$ ———*Eq.4*

Let us say we want the bandspread to have an LF limit of 13·9 mc, to give us a bit of leeway, then this frequency must occur when 2·2 μH is resonated with some capacity, found from *Eq.4*. Call this C_t. Then :

$$C_t = \frac{10^{12}}{4 \times 10 \times (13{\cdot}9)^2 \times 10^{12} \times 2{\cdot}4 \times 10^{-6}} =$$

54 $\mu\mu$F. Of this 54 $\mu\mu$F we know that about 40 are already in the circuit as strays, so our bandspread padder will need to reduce the 225 $\mu\mu$F maximum capacity of the gang to 14 $\mu\mu$F.

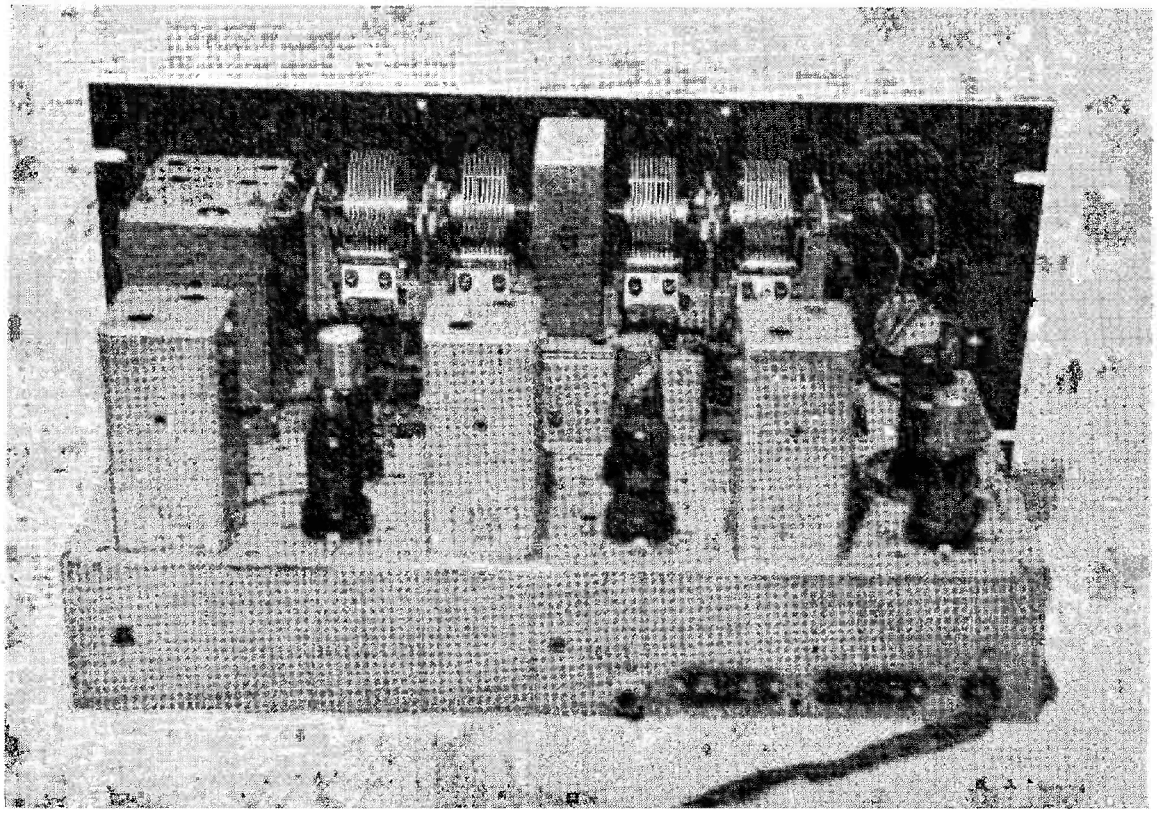
From *Eq.2*, $C_2 = \dfrac{C_{TOT}\ C_1}{C_1 - C_{TOT}}$, *i.e.*, $\dfrac{225{\cdot}14}{225 - 14}$

$= 14{\cdot}9\ \mu\mu$F.

A 3-30 $\mu\mu$F trimmer will do nicely, therefore. A similar argument may be applied to the oscillator, but the gang maximum capacity will be 208, not 225 $\mu\mu$F, if the existing padder is left in, and the frequencies will be 455 kc higher at each stage, with similar results. The existing padder may in most cases be removed and the calculation adjusted accordingly.

By Use of ABACs

Obtain a copy of *Radio Data Charts*, published by Iliffe's, from the local library, if it is not already in the shack (also obtainable from Publications Dept., *Short Wave Magazine*). Using Chart No. 2, to be found on p.9, headed "Inductance, Capacity, and Frequency—Short Wave" project from 253 $\mu\mu$F, through 7·0 mc to the inductance line ; likewise from 55 $\mu\mu$F through 14·4 mc to the inductance line.



Looking into the HRO, showing the four-gang tuner unit, which is the great feature of this receiver. It is this excellent mechanical arrangement which, combined with plug-in coil packs, makes the National HRO so effective as a general-coverage and amateur-band receiver. Though the octal-based valves used (see text) are regarded as obsolete by modern standards, as explained by G3KFE in his article there is no real need to replace them unless they are down on emission or are otherwise faulty. If the set is in good order, the front-end gain will be adequate on the LF bands.

The two projected lines should meet at about 2·2 μH. If they don't, assume the inductance to be in the middle of the space between the lines you have projected. Back-project from the inductance so found, through 13·9 mc to find the new value of total max. C, deduct the 45 $\mu\mu$F for strays and apply Formula 2 to get the nominal value of the bandspread padder capacitor. Don't forget that the oscillator calculation is exactly the same *except* that the frequency is always 455 kc higher than the signal frequencies. We find that the ABAC gives us a C at 13·9 mc of 58 $\mu\mu$F and hence the nominal value for the bandspread trimmer of 14·9 $\mu\mu$F as before. Likewise for the oscillator.

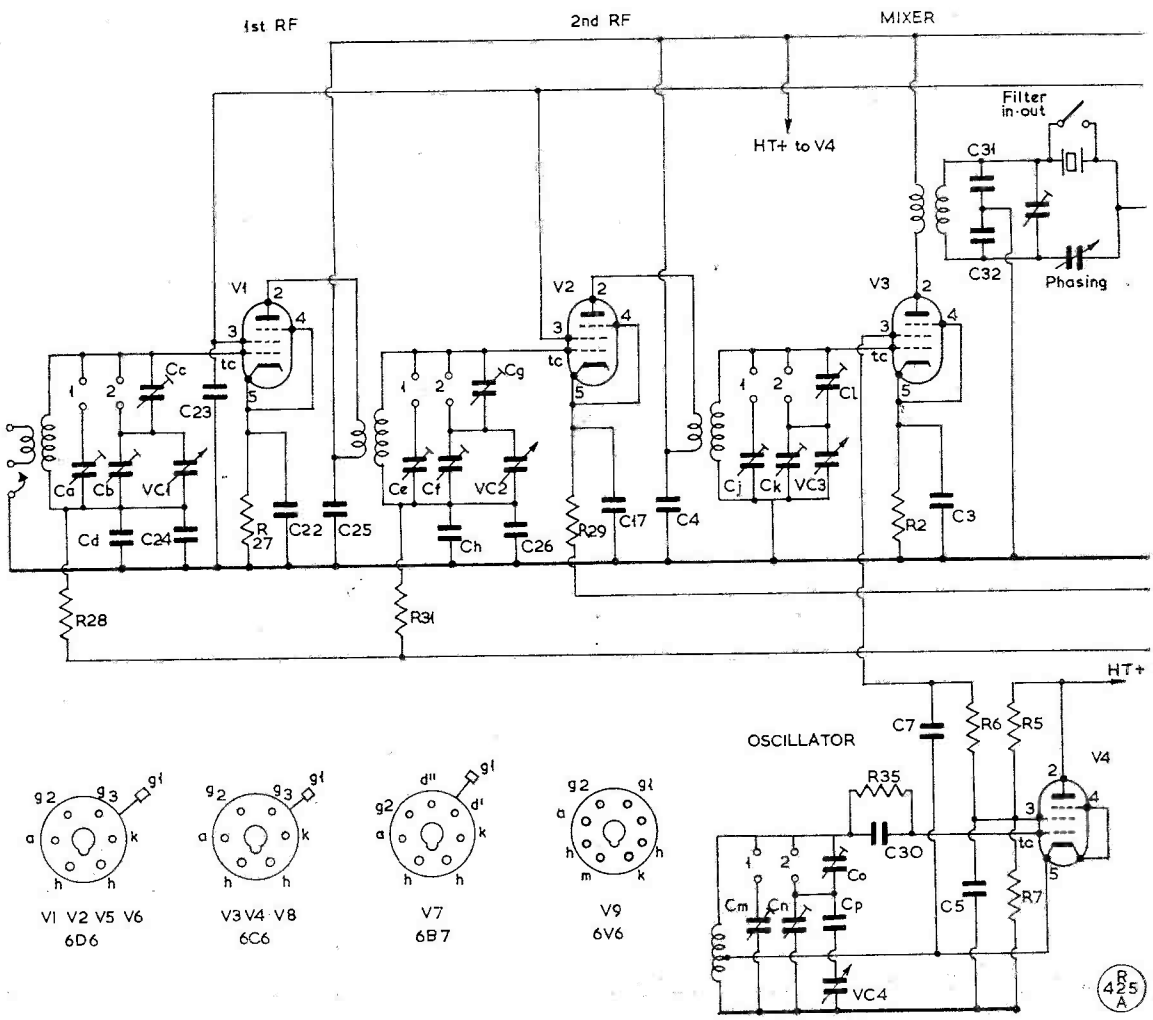
Coil Modification

Now to the practical work. The first thing to do is to install trimmers of the desired value ; probably the best sort of trimmer to use would be one of the same type, cannibalised out of an old LF band coil, if necessary pruning off a few vanes with great care. If these trimmers are not available, then one will have to scratch about a bit to find suitable ones which can be adapted to the purpose. The *criteria* for these capacitors are the same as for a good VFO. One thing to avoid is the type of trimmer with a ceramic end plate and aluminium vanes, as sometimes found in American surplus. Similar ones with brass vanes are sometimes available and seem to be much better. The trimmers should be mounted in such a manner that they can be adjusted with the coilset in the receiver, either by using the hole provided in the top face for the bandspread trimmer, or through the back of the coilset. The latter method involves the provision of a suitable hole in the receiver metalwork to mate.

Wiring is similar to that given in Fig. 2A and Fig. 2B ; the subsequent adjustment is similar to that of a normal BS coil, but using the new trimmer as the bandspread padder and trimming with the general coverage trimmer.

Bandspreading the 21 and 28 mc Ranges

This is best *not* done by modifying a normal coil as it will be found that the stability still leaves something to be desired. It is suggested that these two ranges be covered by means of a crystal-controlled converter, working into the HRO on some

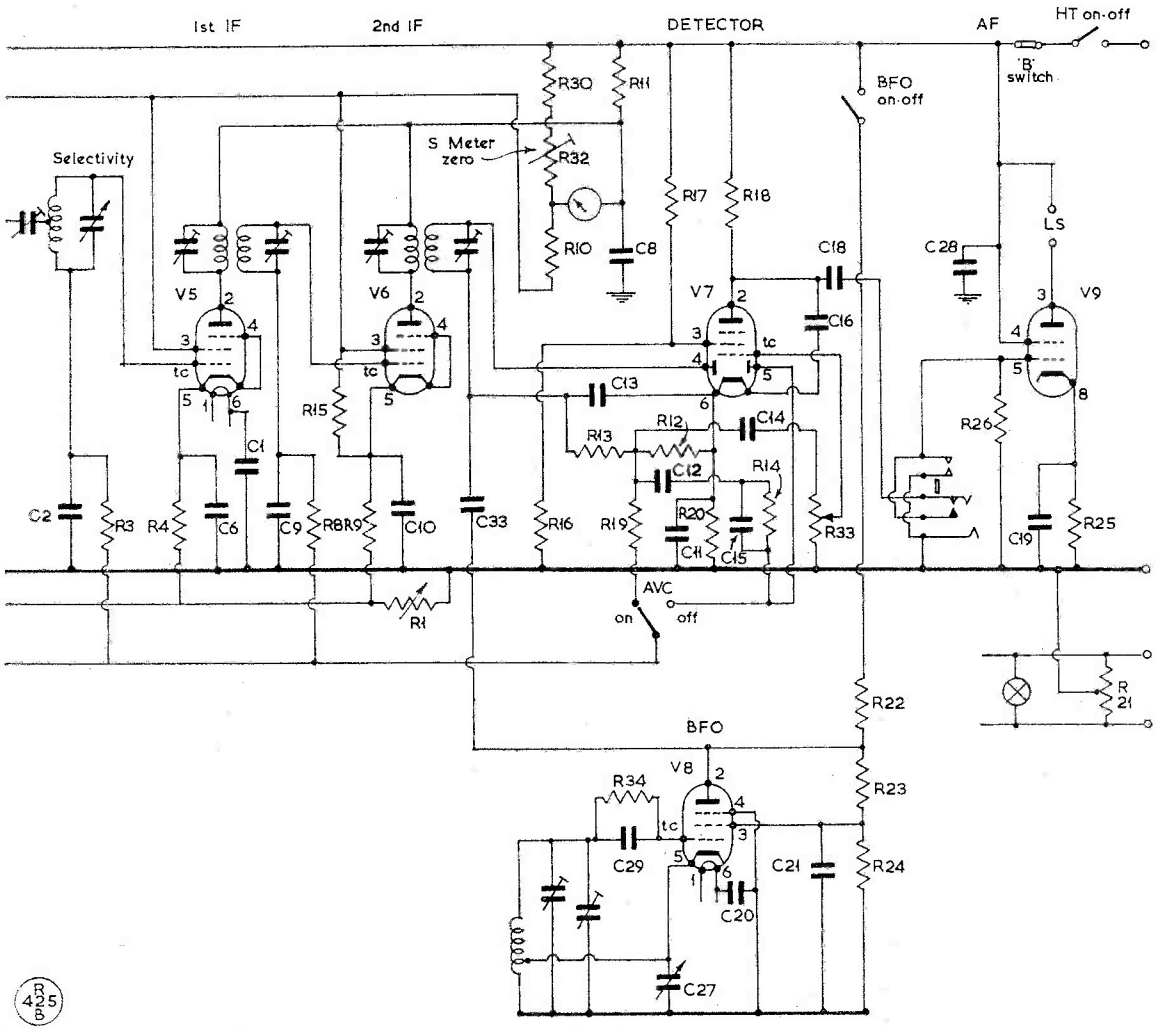


non-amateur band as the tunable IF. Apart from anything else the *National* HRO coils for the ten-metre band are designed on a different basis and there will be complications in the calculations; however, if a CC converter is used—such as the one in the *Amateur Radio Circuits Book*, p.12; the *Amateur Radio Handbook*, p.423; the *ARRL Handbook*, 1963 Edition, p.127—and arranged to cover a tunable IF of 5·0 to 5·5 mc, then it only remains to provide a suitable bandspread coil for the HRO. It is suggested that the tunable IF be as suggested here, *i.e.* a 500 kc swing, so that Ten is covered in four "bites," rather than attempt to get a tunable IF of, say, 5-7 mc, as the gain of the converter is liable to be uneven, and in any event not enough spread for SSB will be available.

(To Be Concluded)

Table of Values

C1	=	1st IF heater by-pass	= 0·1 μF, 400v. DC
C2	=	1st IF grid filter	= ·01 μF, 600v. DC
C3	=	Mixer cathode decoupling	= 0·1 μF, 400v. DC
C4	=	2nd RF HT decoupling	= 0·1 μF, 600v. DC
C5	=	Local Osc. screen decoupling	= 0·1 μF, 600v. DC
C6	=	1st IF cathode decoupling	= 0·1 μF, 400v. DC
C7	=	Local Osc. cathode to Mixer screen	= ·01 μF, 600v. DC
C8	=	1st and 2nd IF HT decoupling	= 0·25 μF, 600v. DC
C9	=	2nd IF grid decoupling	= ·01 μF, 600v. DC
C10	=	2nd IF cathode decoupling	= 0·1 μF, 400v. DC
C11	=	6B7 cathode decoupling (elect.)	= 10 μF, 50v. DC
C12	=	6B7 diode filter	= 100 μμF, 1000v. DC
C13	=	6B7 diode filter	= 250 μμF, 1000v. DC
C14	=	6B7 diode to AF gain control	= 0·1 μF, 400v. DC
C15	=	6B7 diode decoupling	= ·01 μF, 600v. DC
C16	=	6B7 pentode anode decoupling	= 500 μμF, 1000v. DC
C17	=	2nd RF stage cathode decoupling	= 0·1 μF, 400v. DC
C18	=	6B7 pentode anode to output grid	= 0·1 μF, 600v. DC
C19	=	Output stage cathode decoupling	= 10 μF, 50v. DC
C20	=	BFO heater decoupling	= 0·1 μF, 400v. DC
C21	=	BFO screen decoupling	= 0·1 μF, 400v. DC
C22	=	1st RF stage cathode decoupling	= 0·1 μF, 400v. DC
C23	=	Common screen decoupling, RF/IF stages	= 0·1 μF, 400v. DC



BASIC CIRCUIT OF THE NATIONAL HRO, AS REFERRED TO IN THE TEXT

C24	1st RF stage grid decoupling	·01 μF, 600v. DC
C25	1st RF stage HT decoupling	0·1 μF, 600v. DC
C26	2nd RF grid decoupling	·01 μF, 600v. DC
C27	BFO tuning	120 μμF, var.
C28	6B7 pentode HT decoupling	·01 μF, 600v. DC
C29	BFO grid	·001 μF, 500v. DC
C30	Local Osc. grid decoupling	100 μμF, 1000v. DC
C31	Crystal filter bridge	100 μμF, 1000v. DC
C32	Crystal filter bridge	100 μμF, 1000v. DC
C33	BFO coupling to detector (*see text*)	2 μμF, 400v. DC
Ca-Cp	Fitted in coil packs, values depend on frequency range	
R1	RF gain control	10,000-ohm, log.
R2	Mixer bias	5,000 ohms, ½w.
R3	1st IF grid to AVC	½-megohm, ½w.
R4	1st IF cathode bias	300 ohms, ½w.
R5	Local Osc. screen	50,000 ohms, ½w.
R6	Mixer screen	100,000 ohms, ½w.
R7	Local Osc. HT bleed	100,000 ohms, ½w.
R8	2nd IF grid to AVC	500,000 ohms, ½w.
R9	2nd IF cathode bias, selected	1,000-5,000 ohms, ½w.
R10	RF and IF screens to S-meter	1,500 ohms, 2w.
R11	S-meter bridge arm. selected	250-2,500 ohms, ½w.
R12	6B7 diode load	500,000 ohms. ½w.
R13	6B7 diode filter	50,000 ohms, ½w.
R14	6B7 diode equalising	250,000 ohms, ½w.
R15	Common HT feed, RF/IF screens	30,000 ohms, 2w.
R16	6B7 screen bleed	20,000 ohms, ½w.
R17	6B7 screen load	100,000 ohms, 2w.
R18	6B7 anode load	100,000 ohms, 2w.
R19	AVC filter	½-megohm, ½w.
R20	6B7 cathode bias	800 ohms, ½w.
R21	Heater hum-balance, c.t.	60 ohms, 3w.
R22	BFO anode	100,000 ohms, ½w.
R23	BFO screen	250,000 ohms, ½w.
R24	BFO screen bleed	100,000 ohms, ½w.
R25	Output stage cathode bias	500 ohms, 2w.
R26	Output stage grid	500,000 ohms, ½w.
R27	1st RF stage cathode bias	300 ohms, ½w.
R28	1st RF grid to AVC	500,000 ohms, ½w.
R29	2nd RF stage cathode bias	300 ohms, ½w.
R30	S-meter bridge, selected between	0-2,000 ohms, ½w.
R31	2nd RF stage grid to AVC	500,000 ohms, ½w.
R32	S-meter zero set potentiometer	1,000-ohm 1w. lin.
R33	Audio gain control	500,000 ohms, 1w. log
R34	BFO grid	50,000 ohms, ½w.
R35	Local oscillator grid	20,000 ohms, ½w.

V1, V2, V5, V6 = 6D6 (UX), or 6K7 (octal)
V3, V4, V8 = 6C6 (UX), or 6J7 (octal)
V7 = 6B7 (UX), or 6B8 (octal)
V9 = Type 42 (UX), or 6V6 (octal)

V1, 1st RF stage; V2, 2nd RF stage; V3, mixer; V4, Local oscillator; V5, 1st IF stage; V6, 2nd IF stage; V7, detector-audio; V8, BFO; V9, output stage.

DISCUSSING SINGLE SIDEBAND

PRACTICAL CONSIDERATIONS — CARRIER SUPPRESSION — TYPES OF BALANCED MODULATOR — FILTER REQUIREMENTS — STARTING TO CONSTRUCT

Part II

B. A. WATLING (G3RNL)

The first article in this new series on Sideband appeared in our issue for December last. It is hoped that by careful reading those who do not at present quite understand basic SSB techniques will be able to start on the construction of Sideband equipment—that, at least, is the aim of the series.—Editor.

IN the majority of Sideband transmitters the SSB signal is generated at a fixed frequency and then heterodyned to the required amateur band. Frequency *multiplication* should not be tried because the transmitted signal is only intelligence and doubling that does not mean you will get any more!

Probably the most common start-frequency is 455 kc for original generation of the signal. If this is mixed with a VFO, running at 3045 kc to 3545 kc, then the sum of these covers the 80-metre band. Operation on other bands could be obtained by switching the VFO. But this is most undesirable, because VFO stability is of prime importance. It would be better to heterodyne the 80-metre signal into the other bands. With this method automatic sideband selection can be effected for the correct bands, *e.g.*, if the original SSB signal is LSB on 80m., then an oscillator which adds to, or is subtracted from, that frequency will still provide LSB output. If the 80m. signal is subtracted from the oscillator then sideband reversal will occur. This then can be used for 20, 15 and 10 metres. Another useful fixed frequency for generating the SSB signal is 9 mc. When mixed with a VFO running 5·0 mc to 5·5 mc this will produce 14 mc (9 + 5 = 14) and 4 mc (9 − 5 = 4). As 80m. and 20m. are the two most popular bands this could be a useful arrangement. One other generator frequency that is perhaps worth mentioning is 8 mc. This, mixed with 6 − 6·5 mc, provides the 20m. and 160m. bands. (Work it out for yourself.)

As for VHF, it is a relatively simple matter to take the output from an HF band transmitter and mix this up to either four metres or two metres —*see* SHORT WAVE MAGAZINE, July, 1962.

The steps taken to produce an SSB signal are, first, to eliminate the carrier and at the same time produce the two sidebands. A bandpass filter is then used to accept the desired sideband and eliminate the unwanted one. This filter should not exceed a bandwidth of 3 kc at 6 dB down—and the steeper its skirt the better. Commercial filters can be obtained at quite reasonable prices, centred on either 455 kc or 9 mc. Alternatively, you could build your own using surplus crystals. However, this can be a tedious and frustrating process, particularly where

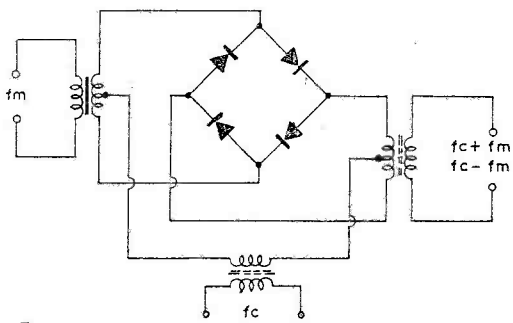


Figure 1.

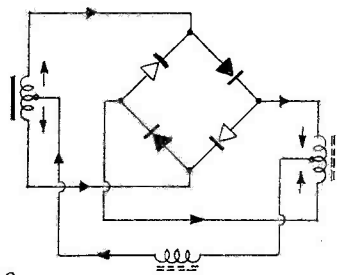


Figure 2.

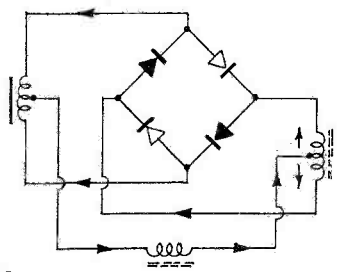


Figure 3.

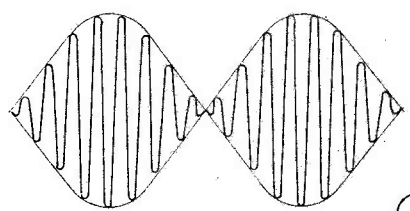


Figure 4

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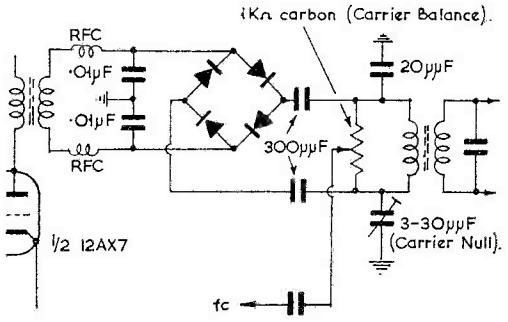


Figure 5.

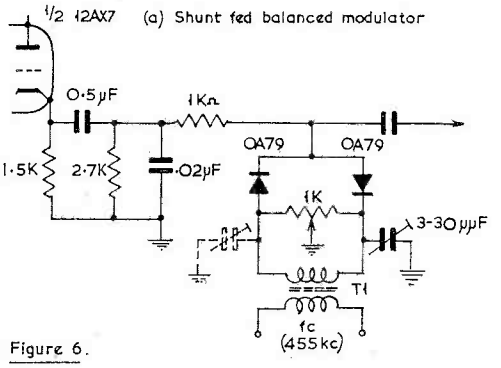


Figure 6.

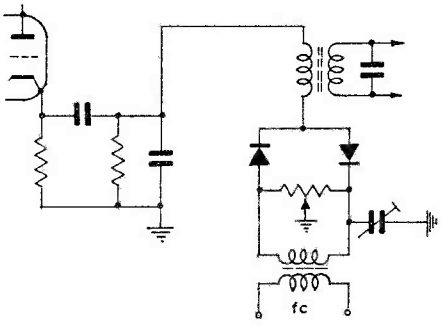


Figure 7

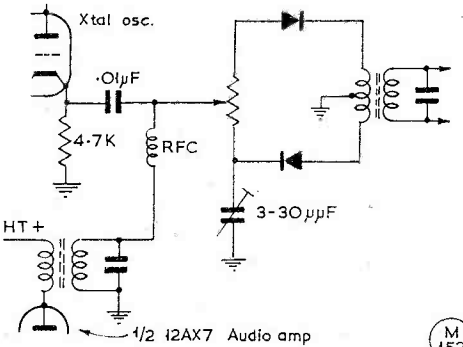


Figure 8

equipment for measuring frequency accurately and plotting bandpass characteristics is relatively primitive.

Suppressing the Carrier

This is performed by a balanced modulator—in effect, a mixer which produces, from a carrier and audio, a double-sideband suppressed-carrier signal (DSB). Many different circuits are in use these days so only the more common types need be discussed.

The 4-diode Ring Bridge balanced modulator: The basic circuit of this is shown in Fig. 1. It has been used successfully for many years by the G.P.O. However, for amateur use, it is not considered necessary to go this far. To get the best results matched diodes are required. With no audio applied the carrier is balanced out in the output transformer.

Diagrams Fig. 2 and Fig. 3 show the conditions for both half-cycles of *fc*, as at Fig. 2, 1st half-cycle, and Fig. 3, 2nd half-cycle.

(What happens now when audio is applied?) Well, this will unbalance the bridge by causing one of the two diodes, at that particular time, to conduct more and the other one less—*fc* and *fm* will mix and the output will contain the sum and difference frequencies only. (What does the output look like?) Remember the vector diagrams on p.595, December? Well, if you remove the carrier frequency from that and resolve the two sideband vectors we can arrive at the envelope shape, which is as shown in Fig. 4 here.

It may, from a cursory glance, look to you like an AM signal—but it isn't. More careful scrutiny will reveal that the RF inside the envelope changes phase at the cross-over point. Looking at the vector again one half-cycle will produce the resultant vector pointing one way while on the other half-cycle the resultant will be pointing exactly 180° around.

It is necessary for practical circuits to have the carrier at least ten times as large as the audio to prevent distortion. In fact, the greater the ratio the better. The limiting factor is how much you can suppress the carrier.

At Fig. 5 is a practical circuit utilising this type of balanced modulator. All the audio stage need be is a single 12AX7. Compare that with your 100 watt modulator! The diodes used should be matched for both forward and reverse resistance. OA79's, or similar, will do the job nicely. The carrier balance potentiometer must be a carbon track type. Wirewounds are *not* suitable. The carrier *null* trimmer should be adjusted, after the balance pot. is set up, for minimum carrier output. The audio transformer could be a standard output transformer to match a 15-ohm speaker. One with an output impedance of 500 ohms would be better.

Developments based on this type of modulator

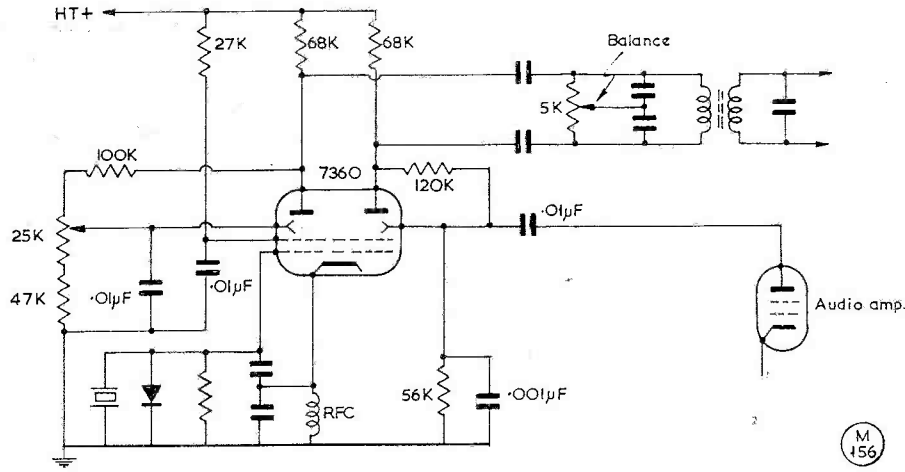


Figure 9

have produced simpler versions fully capable of suppressing the carrier to the required degree.

Two-diode Balanced Modulators are most commonly used in amateur SSB equipment. The two forms it takes are the series fed and the shunt fed, as shown in Figs. 6 and 7.

T1 can be a standard 465 kc IF transformer with the secondary removed. In place of it about 80 turns, 40 each side of the primary, should be wound on. If adjustment of the carrier *null* trimmer does not improve the carrier suppression then it should be connected to the other side of the carrier balance potentiometer (shown dotted).

One other circuit that is very popular in the States is given in Fig. 8. A circuit that will produce results far superior to those previously described uses a 7360 beam deflection valve. This method, of course, is far more expensive than diode circuits, but deserves a mention for its interest, and Fig. 9 shows the arrangement. The valve doubles as an oscillator and balanced modulator. The diode is necessary to prevent the control grid being driven too positive.

The electron beam leaving the cathode is split into two by the beam-forming plates which guide their part of the beam on to the associated anode. Balance is obtained by fixing the potential on one plate while the other can be varied to adjust its associated anode current until it is equal to the other. As with the diode modulators, the balance is upset by the application of audio. This is applied to one of the beam-forming plates and on the positive half-cycle aids the fixed potential while during the negative half-cycle it opposes it, thereby unbalancing the circuit.

Various other arrangements can be used with a

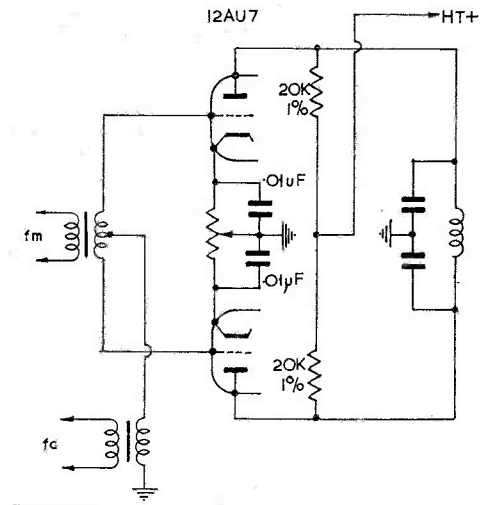


Figure 10

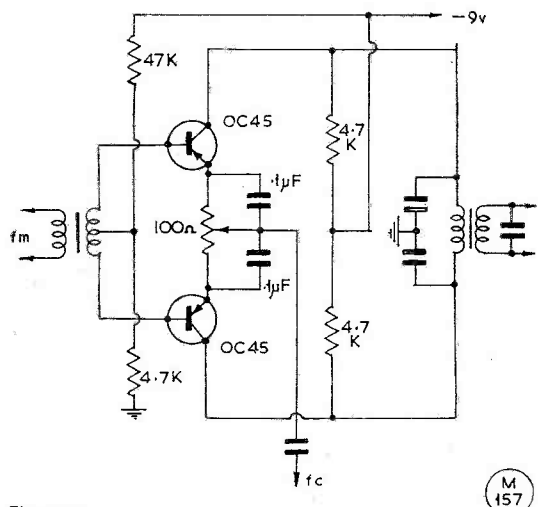


Figure 11

twin-triode (12AU7, 6SN7, etc.) or two transistors.

Some typical circuits are shown in Fig. 10 (a valve type balanced modulator) and Fig. 11, which uses transistors.

We now have a signal consisting of two sidebands only with the carrier suppressed by about 40 dB down from the peak—*see* Fig. 12.

This signal as it is could be transmitted, but the receiving of it is a little tricky. Not only do you have to get the re-inserted carrier at the correct frequency, but also at the correct phase for undistorted reception. Don't be put off completely. It *can* be received by an ordinary communications receiver—it's just that it will not sound so good as SSB. If you do decide to go DSB while you are waiting to buy a filter, then a tip that is useful to remember is to cut the low frequencies of your audio at about 300 c.p.s. and below. Otherwise, the two sidebands will beat together and produce a horrible rumbling noise with your signal.

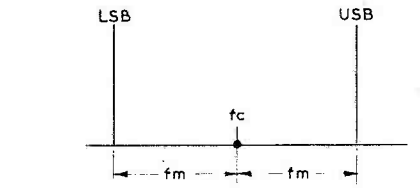


Figure 12

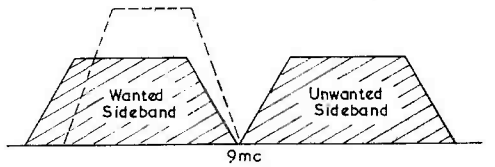


Figure 13

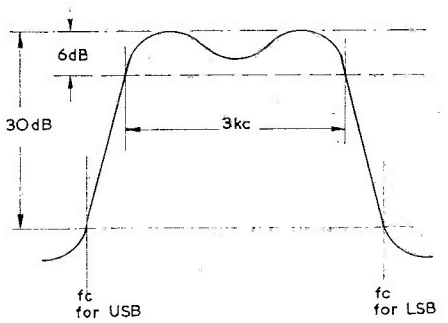


Figure 14

About the Filter

What do we need a filter for? To accept one sideband and reject the other. Let's suppose we require to keep the lower sideband from an original carrier at 9 mc. The response curve of the filter must accept frequencies from 8999·7 kc (300 c.p.s. below the carrier) to 8997 kc and *reject all others.* The ideal response curve of a filter with the rough positioning of the carrier is as in Fig. 13, which shows the ideal curve shape—and some filters can get very near it. You could arrange, using just one filter, to switch from upper to lower sideband by switching the carrier oscillator from one side of the passband to the other. A more practical shape of the filter curve with the carrier positions for USB and LSB appears as Fig. 14.

The way these shapes can be obtained is discussed in the next section. First of all, let's look at a block diagram and then the circuit of a fixed-frequency Sideband generator section which, by the fitting of the appropriate RF transformers, can be used for 455 kc, 9 mc or what-have-you. (Fig. 15.)

A useful way of building a Sideband rig is to construct it in sections, on separate chassis. This means that if you want to change the design or do any mods. at a later date you don't have to cannibalise the whole lot. Let's have a look at the circuit shown in Fig. 16 and then discuss a few points about it.

The filter assembly (which will include the components required to match it to the balanced modulator) will be discussed later. Let's assume for the moment that we will be using a filter centred at 455 kc, and consider T1 and T2. (The same techniques will apply to any other frequency.)

For 455 kc T1 and T2 can start off as standard 465 kc IF transformers. For T1 its secondary is removed and replaced by about 80 turns, 40 each side of the primary, thereby distributing the capacity more evenly. About 4 volts of RF output is required from this secondary winding. T2 is simpler. Remove the capacitor tuning the secondary and

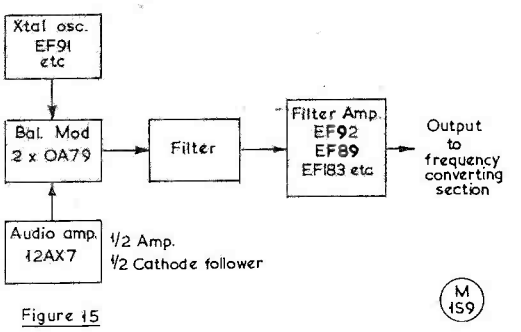


Figure 15

replace with two others (C16 and C17 in Fig. 16) of twice the value of the one you removed. These can be placed outside the can if need be, providing the leads are kept short. This then provides us with a push-pull output with a capacitive centre tap to which the VFO output is fed.

In the circuit diagram a link is shown connecting the bottom end of V3 grid resistor to earth. This is put there so that later, when a form of AGC

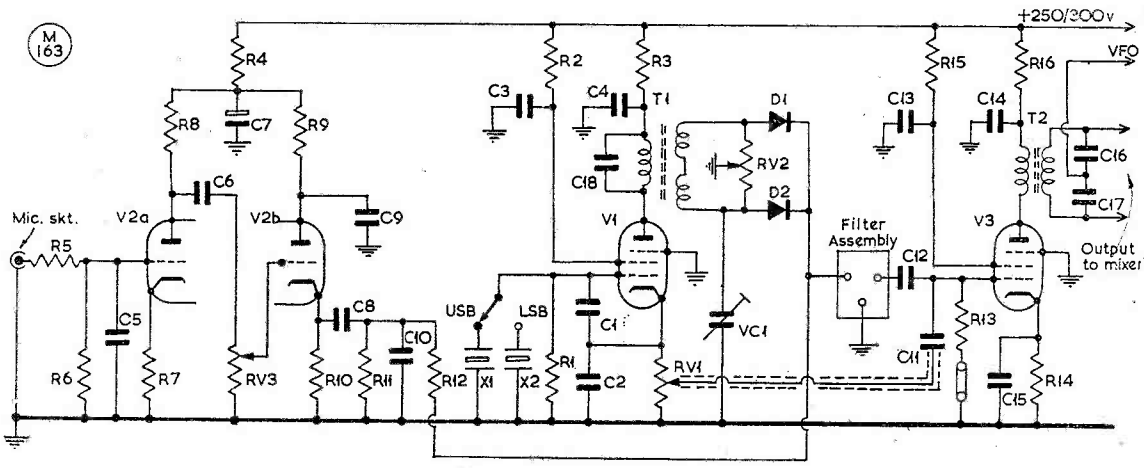


Fig. 16. Circuit Diagram for a fixed-frequency Sideband Generator

is added, it can be fed to the bottom of R13, thereby controlling V3.

No constructional details are going to be given, but a rough layout of the chassis for this section may be useful, and is shown at Fig. 17.

The cut-out for the filter assembly enables this to be made and/or modified later without disturbing the rest of the section. The cut-out for the control circuitry likewise allows this to be assembled separately, and initially can be simply a single-switch press-to-talk (PTT) control, perhaps later replaced with a more sophisticated voice-control circuit (VOX). A suggested arrangement for this type of design is to have a plug at the rear, fixed to chassis to make all the interconnections between chassis. A skeleton framework for the complete item could be made with runners so that each chassis, with its own front panel section, could slide in and plug into a socket panel at the rear, behind which all the chassis interconnection wiring is done.

This constructional arrangement does enable the rig to be easily modified. Just pull out a chassis. If you're the type who likes to build a prototype before the final version, what could be easier than this way ?

Now you've got to thinking about it, why not go out and buy a chassis then ? Go on—get the tools out and get on SSB. You'll never regret it !

(*More to come*)

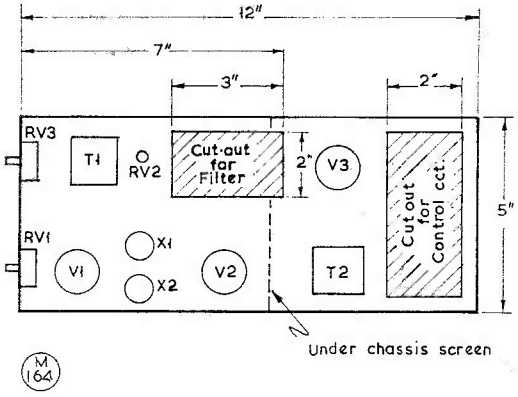


Fig. 17. Suggested layout for a fixed-frequency Sideband Generator. Any other arrangement would do as well.

Table of Values

Fig. 16. Fixed Frequency Sideband Generator

C1, C2	= ·002 μF	R6	= 1 megohm
C3, C4, C13, C14,		R7, R12	= 1,000 ohms
		R10	= 1,500 ohms
C15	= ·01 μF	R11	= 2,700 ohms
C5	= 47 μμF	R14	= 220 ohms
C6	= ·001 μF	RV1	= 1,000-ohm, log.
C7	= 16 μF	RV2	= 1,000-ohm, lin. (carbon)
C8, C9	= 0·5 μF		
C10	= ·02 μF	RV3	= 0·5 megohm, log.
C11	= 10 μμF	D1, D2	= OA79 (matched pair)
C12	= 470 μμF		
C16, C17	= *see text*	X1, X2	= Filter assembly, T1, T2 as required (*see text*)
VC1	= 3-30 μμF		
R1, R5, R8, R13,			
R15	= 100,000 ohms	V1	= EF91
R2	= 47,000 ohms	V2	= 12AX7
R3, R9,		V3	= EF92, or equivalents
R16	= 4,700 ohms		
R4	= 15,000 ohms		

G.P.O. SHIP-SHORE RADIO

The Post Office, operating the world's most complex radio communications system for contact with ships anywhere on the oceans, has now added a new title to its film library. Called *Ship-to-Shore*, it deals with day-to-day operating experiences at Land's End Radio, GLD, probably the world's busiest and best-known coastal radio station, manned by a team of able and courteous operators, prepared to cope with any contingency that may arise, on either CW or Phone. The film is now available, on 16 mm., through the Central Film Library, free of charge to "any suitable organisation"—which could be your local Club. It is worth seeing.

THE PRACTICAL APPLICATIONS OF SEMICONDUCTORS

IN THE AMATEUR STATION

Part XI

T/P MOTOR SPEED CONTROL

M. I. DAVIS, B.Sc.

This is the logical continuation of the article in our June, 1965, issue, and describes an ingenious method of obtaining accurate speed control of a teleprinter motor by the use of a phototransistor.
—Editor.

THIS time we shall examine a circuit involving the use of a semiconductor device which we have not yet discussed—the silicon controlled rectifier (SCR). A detailed description of how this device works would be out of place here; reference to Fig. 1 will show that it has many points of similarity to the more familiar thyratron. Given a fixed supply voltage, neither device will turn on until some form of excitation is applied to the control electrode. When either gate current is passed, or trigger voltage applied, respectively, each device turns on and stays on until the supply is turned off, irrespective of whether the trigger remains on.

When an SCR is turned on, the voltage drop across it is about 0·8v.; roughly what one would expect from an ordinary silicon junction diode. This means that high currents may be passed without excessive dissipation, and the SCR finds many applications in the field of power control for this reason. Many SCR's can also handle high voltage—a p.i.v. of 500 volts is not at all uncommon; mean forward currents of 70 amps. or more can be realised from one device.

Fortunately for our electricity bills, teleprinter motors do not require this amount of current. SCR's suitable for the control of their speed may be quite small, and will dissipate little heat.

Fig. 2 shows a block diagram of the system it is proposed to use. It will be immediately apparent that this circuit will only work for DC motors. Those readers who have installed AC motors on their machines can refer to the relevant paragraph at the end of this article; the DC motor owners are in the worse plight to start with, with the noise from brushes and governor to suppress, not to mention the DC supply problem.

The author's machine power-supply, before this modification, was an ex-GPO unit. The available DC output was switchable from 110v. to 180v., at 2A, provided by large selenium rectifiers. All of this unit, apart from the centre-tapped transformer and the associated switches and fuses, was scrapped, and the new circuitry built in the original case. Note that even the power circuitry above is diagrammatic only; suitable filtering, smoothing and transient protection will be discussed later.

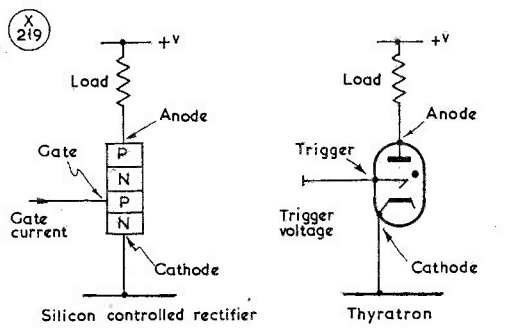


Fig. 1. The SCR and thyratron systems compared—see text.

Principle of Phase Control

As will be seen from Fig. 3, the amount of power appearing at the output of one of the SCR's may be varied by altering the time after the commencement of a positive half-wave of supply, at which the gate signal is turned on.

In case 1, after smoothing, a low voltage will be obtained; in case 2, nearly the full output voltage will appear. Thus, by altering the *phase* relationship of the gate signal and the supply, we can have complete control over the output.

An important point to remember is that the SCR is always fully on or switched off. As opposed to the series transistor in a stabilised power supply, no dissipation of any magnitude takes place, since there is virtually no voltage across the device when current flows. It is for this reason that the extra circuitry needed to achieve phase control is justified.

As in all arrangements to stabilise some parameter of a system, a sample of the output performance is

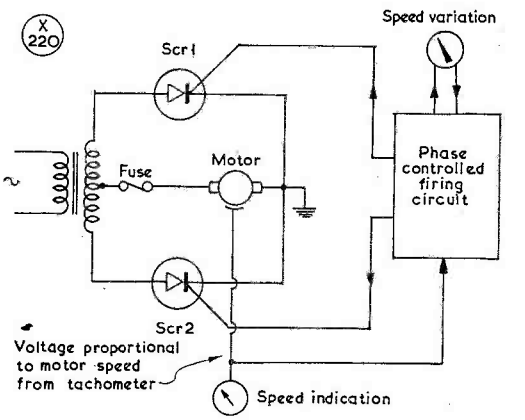


Fig. 2. Block schematic of an overall phase-control system. In the case of a shunt-wound motor, it is usually sufficient to control only the field.

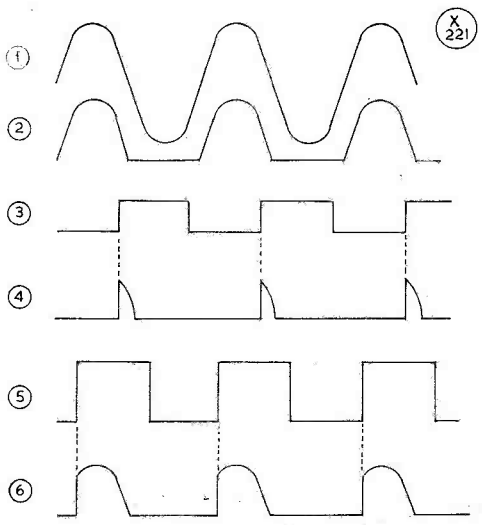


Fig. 3. Diagrammatic representation of a phase-control system. (1) The AC input; (2) Half-wave rectification by diode or SCR, gate permanently on; (3) Gate signal, case 1; (4) Output, case 1; (5) Gate signal, case 2; and (6) Output, case 2. See text for discussion.

fed back to a circuit where a comparison is made with the desired output, and steps are then taken to ensure that the error is zero. The error is frequently amplified to achieve precise control. In this case, the feedback consists of a voltage proportional to motor speed, which is compared with a standard voltage representing the desired speed. Any discrepancy causes the phase-controlled firing circuit to alter the conduction angle, and hence to apply more or less power, as appropriate, to bring the speed of the motor back to the desired value.

Practical Tachometer Circuit

The centrifugal type of governor, as fitted to most machines, is fairly accurate, but it is difficult to change speeds and does produce a lot of electrical noise, as it switches large currents on and off continuously. To carry out the modification, this governor is removed, but its housing drum is replaced, and a white stripe is painted on the periphery. A small lamp and photocell convert the speed of rotation into the frequency of the train of pulses received. It might be thought that it would be sufficient to feed these pulses, *via* a diode, into a C-R network to obtain a voltage linearly proportional to motor speed. This is not so, however, since as the speed increases, the duration of the pulse is reduced, because the white band passes under the photocell more quickly. We therefore arrange that each pulse is of fixed duration and amplitude, and that only the frequency of the pulses varies with r.p.m. variation. The final circuit of this part of the equipment appears in Fig. 4. Component values are not very critical in general, and any audio transistors will do. It may, of course, be necessary for readers to alter any of these circuits for their own reasons; this has always been the aim of this series of articles.

The OCP71 may be replaced by an OC71 which has been dipped in acetone to remove the paint. Tr1 and Tr2 constitute a monostable multivibrator, into which the train of pulses of variable width and frequency and somewhat unknown amplitude, is fed *via* C3. Tr1 is normally on, under the influence of base current from R1. When PTr1 conducts, as a white stripe passes under it, the base of Tr2 is pulled towards earth, turning Tr2 off and Tr3 on. Then Tr3 collector moves positive until held by the zener voltage of D2, which ensures that the pulse at Tr3 collector is of constant amplitude. After a fixed time, determined by R1 and C1, the monostable reverts to its original state, and waits for the next pulse from the photo-transistor, PTr1. Thus D1 passes fixed elements of charge into C2 at a rate depending on r.p.m., and so the voltage across this capacitor is linearly speed-dependent.

One or two odd points about this part of the circuit before we move on to the phase-controlled firing circuit: The bulb is driven from DC to eliminate the effects of a 50 c/s superimposition on the collector waveform of the OCP71 (Fig. 5), and for the same reason, this device is shielded from ambient light.

The meter M is optional. A movement of 5 mA may be arranged, with an adjustable shunt, to read r.p.m. in thousands. It is worth noting at this point that this circuit makes an ideal tachometer to measure the speed of *any* rotating shaft. If the meter is not used, the top of the 1K resistor is, of course, connected to the negative supply.

Phase Control Firing Circuit

This is the heart of the system, and contains the circuitry which causes the SCR's to conduct more or less, to alter the motor speed, under the influence of the feedback voltage. To obtain synchronism with the AC mains, a small voltage is transformer-coupled into the input, where the diode and C-R network convert it into a sawtooth waveform. This is then superimposed on the feedback voltage to give a sawtooth with a variable DC level. The next section of the circuit is a Schmitt trigger, which is a voltage-sensitive switching device, giving a DC step with a fast rise-time when the voltage at its input reaches a certain critical level. It is the rise of this pulse which causes the SCR's to turn on.

The operation of the circuit is shown in Fig. 6. It will be seen that the higher the DC feedback voltage, the earlier in the mains cycle the SCR's will be turned on. Since this is incorrect in "sense," a simple inverter is used. If this were not done, the motor would tend to run away, since an increase of speed would increase feedback voltage and thus turn the SCR's on earlier, causing a further increase in speed. The feedback system has now become a "closed loop" arrangement, and with suitable gain, it can control the speed to whatever accuracy we require.

It should be made clear at this stage that the construction of this equipment is not recommended to those readers who do not have access to an oscilloscope, and who are not prepared to experiment

with the circuit to obtain optimum performance. Note that the final stage of the firing is merely an amplifier and inverting phase-splitter to drive the two SCR's in antiphase.

The Schmitt Trigger

Many readers will be familiar with the principle of operation of the Schmitt Trigger circuit, but since they will probably have to set it up, and subsequently service it, a brief description will be given—*see* Fig. 6. Since the two transistors Tr2, Tr3, share a common undecoupled emitter load resistor R6 changes in the emitter current of one will alter the emitter voltage of the other. The other form of coupling between the transistors is the potential divider, which has a capacitor C2 across the upper half purely to speed up the movement of charge into the base. These two cross-couplings cause the circuit to be regenerative, *i.e.*, to have an avalanche action as in the monostable multivibrator, except that in this case the output stays up for as long as the input exceeds a certain critical voltage level, instead of being dependent on internal timing components. If the left-hand transistor is off, and the other on, and the input voltage is rising, then when it reaches a potential about 0·7 volts above that of the emitters, the left-hand transistor will turn on. Its collector will fall, causing the base of the right-hand transistor to fall, and hence this component will start to turn off. Current through the common emitter resistor R6 will drop, and the left-hand transistor will thus be more heavily biased to turn on, since its base-emitter voltage will be higher. This action proceeds very rapidly until the left-hand transistor is fully on, and the other is cut off. This state continues until the input voltage falls, when the circuit reverts quickly, by the reverse avalanche process, to its original state.

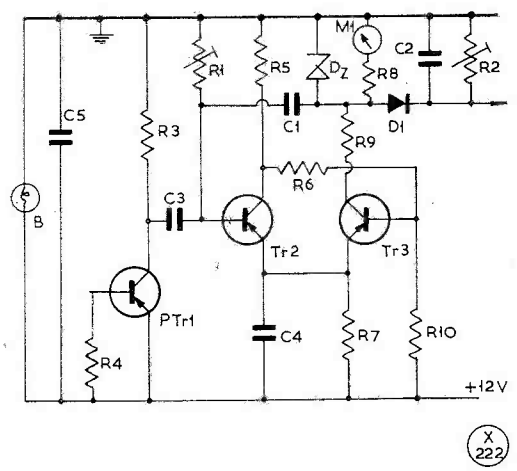


Fig. 4. The Tachometer, or speed determining, circuit. The values of C1, C2 and R1, R2 must be chosen so that the time they determine for the monostable (0.7 CR) is less than the shortest duration pulse arriving from PTr1 at C3. To determine the length of the pulse, read the motor speed from its name-plate, and calculate the time of one revolution. Use a tape-measure to work out the ratio of dark-to-white paint on the governor, and calculate the time the white stripe takes to pass under the phototransistor. It is probably acceptable to make R1 about 20K, choosing C1 to suit; it could be between .05 and 0.5 μF.

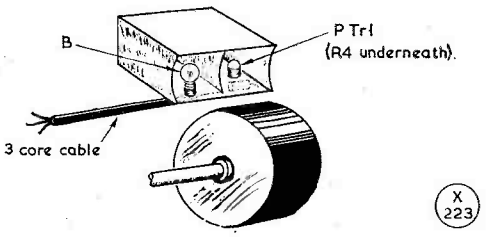


Fig. 5. Mounting of the phototransistor, PTr1 in Fig. 4. The screening material can be bent up from tin-plate, and the focusing arranged so that the governor is scanned as it revolves. Note that in this sketch as drawn, there should be a definite white stripe painted (or stuck on with white paper) on the rotating element.

Initial Setting-up of the System

There are two possible courses of action. The speed of the motor can be measured and adjusted to the correct value, with the individual units of the equipment being added and checked, one at a time; or the gear may be all put together, and a signal fed to the printer. The unit is then adjusted for the best print-out. The former method is by far the best.

The first move is to make sure that the printer and T.U. are working perfectly. Then arrange for the surface of the governor drum to be of a dark, non-reflecting nature. A coat of correctly-applied black crackle paint will ensure this. When dry, paint a white stripe about ½in. wide across the drum (or attach a piece of white adhesive tape)—Fig. 5 as drawn here does not show this quite clearly; the white stripe should be definite, and not shaded.

Run the printer and receiver for some time and print out a known-accurate signal. This will ensure that the machine is running at constant speed.

The tachometer can be calibrated in one of two ways. It may be assumed that the printer under the above conditions is running at the correct speed. The tacho' is then applied, and R1 is adjusted to obtain the correct scale reading. Alternatively, the mains may be stepped down by a heater transformer to about 6 volts, half-wave rectified without smoothing, and squared, using a single transistor Class-B amplifier and a zener diode. This output is used in place of the phototransistor to calibrate the meter, since 50 c/s is equivalent to 3000 r.p.m.

At this stage, the internal governor is removed,

Table of Values

Fig. 4. Circuit of a Tachometer, for speed control

C1, C2	= see text	D1	= Low-power *Si* diode with back resistance 500K
C3	= 1 μF		
C4	= 10 μF	D2	= OAZ245, or similar
C5	= 100 μF		
R1, R2	= see text	PTr1	= OCP71, photo-transistor, *Mullard*
R3	= 10,000 ohms		
R4, R6	= 4,700 ohms		
R5, R8	= 1,000 ohms	Tr2, Tr3	= Any low-power type with gain of 30 or more
R7	= 270 ohms		
R9	= 220 ohms		
R10	= 6,800 ohms		

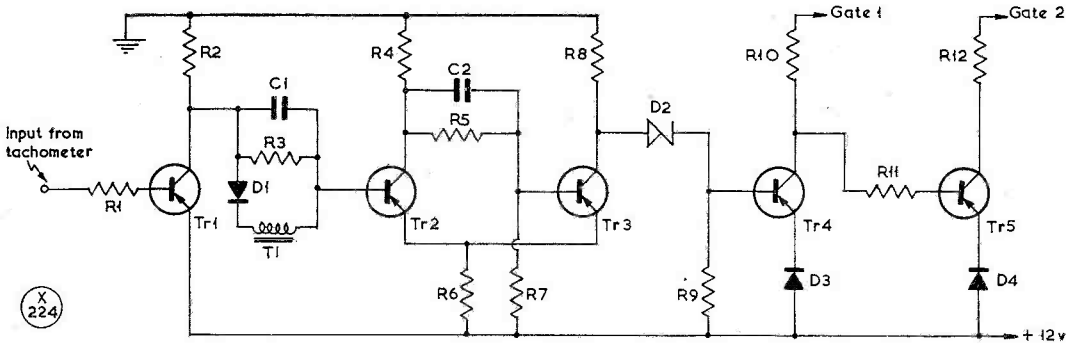


Fig. 6. The phase-control circuit, to work with the tachometer arrangement of Fig. 4, to give accurate speed control of a teleprinter motor. This configuration, intended for the control of DC motors—as usually involved in T/P mechanisms—can also be applied where the teleprinter drive motor runs on AC, with the modification mentioned in the text. Values are not critical, and roughly equivalent semiconductors can be used. The essence of the Fig. 4/Fig. 6 circuitry lies in its adjustment.

and the SCR system interposed between the motor and the transformer. *Use Fuses.* It is also a good idea to put an ammeter in the circuit. The terminal on the phase control firing circuit to which the DC feedback voltage is applied should be connected to a potentiometer across the 12-volt supply; 1K would be a suitable value. Set the pot. so that the SCR's tend to turn on as late as possible. Check the circuit throughout with an oscilloscope, or, failing this, use an Avo and high-impedance headphones to check for the 50 c/s sawtooth (easily distinguishable from the hum of a 50 c/s sinewave). Switch on. With any luck, the motor will either be stationary, or will be turning very slowly. Now rotate the pot. when the speed should increase, and can be measured on the tacho'. When the speed is fairly close to that required, attempt to print; do not stick out for complete accuracy at this stage, because this is only the coarse adjustment, but when the copy appears readable in places measure the voltage at R1 slider as accurately as possible. Move the meter to the output side of the tachometer, and measure the output voltage, adjusting R2 until it is the same as the pot. slider voltage.

At this stage, we have an open-loop control system, and can alter speeds at will, so if readers wish to run their machines at different rates to copy transmissions of various speeds, now is the time to go through all of them, and make the corresponding voltage measurements as above. In this case, a multi-way switch and several pre-set potentiometers for R2 will be required to implement the speed changing.

The final stage is, of course, to close the loop by connecting the output of the tacho' to the input of the phase-controlled firing circuit, and carry out final adjustments to R2 so that printing is perfect. Once this has been done, speed should always be constant. If accuracy is insufficient, the 12-volt rail may need stabilisation—a simple series stabiliser as described by the author in a previous article will do the trick. For the ultimate in accuracy, a DC-coupled Class-A common emitter amplifier could be used between the tachometer and the control input, to amplify the error voltage and so give closer control.

The author would be happy to give more details to anyone contemplating the building of a unit of this type for T/P control, and would be interested in the comments or queries of those who take, or have taken, the plunge into the field of electronic speed control of teleprinter motors.

Table of Values

Fig. 6. The Phase-Control circuit

C1	= 1 μF	R8	= 180 ohms
C2	= ·01 μF	R9	= 1,500 ohms
R1	= 20,000 ohms	R10,	
R2	= 1,000 ohms	R12	= 56 ohms
R3	= 10,000 ohms	R11	= 330 ohms
R4, R6	= 360 ohms	D1	= OA81
R5	= 2,200 ohms	D2	= OAZ242
R7	= 3,300 ohms	D3, D4	= OA200

Notes: All transistors can be OC42, or equivalent. T1 is a 3-volt mains transformer.

And Finally—

It is possible to apply the same principles to the control of AC motors. In such a case, two SCR's in a parallel back-to-back configuration are wired in series with the motor and its supply transformer. The phase-control signals (two, in anti-phase) are generated in the same way as before, and applied to the appropriate SCR so that there is always a unidirectional path in the direction in which the AC happens to be flowing at any given instant.

If noise trouble is experienced, it is most probably due to the fast turn-on of current when the SCR's fire, and will almost certainly be radiated rather than mains-borne. It is therefore a sound idea to screen all leads. If more suppression is required, paper condensers can be used here and there.

Editorial Note: This concludes our contributor's work for the time being. Over the months for which this series has been running, under the general title of

VHF BANDS

A. J. DEVON

THERE being not much to report this time in the way of operating activity, the opportunity is being taken of showing all the current Tables, amended to date (as far as A.J.D.'s information goes). If any necessary corrections could be notified by the due date for February, they can be taken in and the tables affected carried forward for the next appearance. In the ordinary way, it is intended to show only the current ones on a regular monthly basis, *i.e.*, the all-time tabular matter will appear as space and opportunity permit.

Having just completed the spread displayed in these pages, your A.J.D. would again ask that claims be made clearly, on a separate sheet for each table, with callsign on every piece of paper. This is of enormous help in doing the work quickly and accurately. *Tnx !*

Turning now to other matters : On the subject, broached here last month, about the reception of GB3LER and the possibility of a regular listening watch somewhere on the north-east coast to try to explain the apparent anomaly of the non-appearance of the GM's when GB3LER is coming through well, G3IOE (Newcastle) writes as follows : "It is quite usual for there to be no GM's audible when GB3LER is S9 ; my experience is that if this beacon indicates anything at all, it is that there is a path to Scandinavia. It also proves that it would be well worth somebody's while to start up on two metres from Shetland." He goes on to say : "Up here, we have long been used to what GB3VHF does *not* indicate as regards conditions to the south. The only signals that seem to correlate with GB3VHF are G2JF (+ 4 S-pts. on GB3VHF), and G5MA (+ 2 S-pts.)". Which are indeed interesting observations.

G3IOE also touches upon the band plan and the discussions now raging about it. He wants it

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1965

Starting Figure, 14

From Home QTH only

Worked	Station
52	G3DY (215)
50	G3TLB
44	G3HRH
38	G3TQZ
37	G3UFA
36	G3FIJ (98)
33	G3FNM (65)
32	G3IOE
31	G3AHB
19	G2CDX
18	G3KQF, G3THC
17	G3BNL

This annual Counties Worked Table will run till August 31, 1966. All two-metre operators who work 14 or more Counties on the band are eligible for entry. QSL cards or other proofs are not required. After the first 14 worked, simply claim from time to time with counties as they accrue, giving callsign and date for the county worked. Total of stations worked in excess of 50S may also be claimed and will be shown in brackets after callsign. To keep the Table up-to-date, claims should be made at frequent intervals. Operators new to VHF are particularly invited to join Annual Counties.

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED

Starting Figure, 4

Worked	Station
46	G2XV
42	G2CIW
36	G3JMA
35	G3KPT, *G6NF*
33	G3JHM/A, G3LTF, G8ADC
32	G3LHA, G3LQR, GW3ATM
31	G3JWQ, G5YV
30	G3EDD, G3KEQ
28	G3HAZ, G3HBW, G3NNG
26	GW2ADZ
23	G3BKQ, G6NB
21	G3AYC, G3FIJ, G3IOO, G5UM (138)
18	G2OI, G3KQF
17	EI2W, G3BA, G3BNL, G3MPS, G5QA, G8ADS
16	G2DDD, G3BYY, G3MED, G3OBD
15	G4AC, G4RO
14	G2BDX, G2HDZ, G3AHB, G3FAN, G5DS
13	G3HRH, G3HWR, G3OWA, *G6XA*
12	G3NJO/T, *G5BD*
10	G3IRW, G3LZN, G5FK
9	G3EKP
7	G2HDY, G3JHM, G6AX/P
6	G3KHA, G3WW
5	G3FUL, G3IRA, G3IUD, G3LTN, G5ML, GC2FZC
4	G3JGY

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

"Practical Applications of Semiconductors," he has disseminated a great deal of valuable information on the subject of transistory, much of it quite new in the radio amateur field. All his circuits have been built, tested and measured for performance, and the word "Practical" in the heading has all along been fully justified. Mr. Davis will be glad to help readers with transistor problems within the scope of his articles, and can be reached c/o The Editor, SHORT WAVE MAGAZINE, Buckingham.

SWL's interested are invited to send in 4-metre logs covering periods 1000 to 1300z and 1500 to 1900z, Sunday, January 16, CW and phone.

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

28 G5YV (DL, EA, EI, F, G, GC, GD, GI, GM, GW, HB, HG, I, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UP, UQ, UR, YU)

27 ON4FG (DL, EA, EI, F, G, GC, GI, GM, GW, HB, HG, LA, LX, LZ, OE, OH. OK, ON. OZ, PA, SM, SP, UA, UC, UP, UR, YU)

26 G3LTF (DL, EA, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, LZ, OE, OH, OK, ON, OZ, PA, SM, SP, UA, UP, UR)

26 UA1DZ (DL, DM, G, HB, HG, LA, LX, LZ, OE, OH, OHØ, OK, ON, OZ, PA, SM, SP, UA, UB, UC, UO, UP, UQ, UR, YO, YU)

24 G2JF, OK2WCG, UP2ON

23 G3CCH

22 G3LAS

21 G3HBW

20 G3BLP, OK1VR

19 G3EDD, G6RH, PAØFB

18 G2CIW, G5MA, G6NB, OKIDE, ON4BZ

17 G2XV, G3HRH

16 G3AYC, G3BA, G3CO, G3GHO, G3KEQ, G6XM

15 G3DKF, G3FIJ, G3FZL, G3KQF, G3PTM, G3RMB, G4MW, GM3EGW, UR2CQ

14 G2FJR, G2HDZ, G3AOX, G3FAN, G3HAZ, G3IOO, G3JAM, G3JWQ, G3KPT, G3NUE, G3PBV, G3SAR, G3WS, G4LU, *G5BD*, G5DS, G6LI, G8OU

13 EI2W, G2CDX, G2HIF, G2HOP, G3AOS, G3DMU, G3DVK, G3EHY, *G3GPT*, G3GWL, G3IIT, G3LHA, G3NNG, G3OHD, G3PSL, G6XX, G8VZ, GC2FZC

12 EI2A, F8MX, G2BJY, G3AHB, G3BNC, G3BOC, G3FNM, G3GFD, G3GHI, G3GSO, G3JLA, G3JXN, G3OBD, G3OWA, G3WW, G5CP, G5JU, G5ML, G8DR, GW2HIY, GW3MFY

11 G2AJ, G2AXI, G2CZS, G3ABA, G3BDQ, G3IUD, G3JHM/A, G3JYP, G3JZN, *G3KUH*, G4RO, G4SA, G5UD, G5UM, G6XA, PAØVDZ

10 G2AHP, G2DHV, G2FQP, G3BK, G3DLU, G3GSE, G3LAR, G3LRP, G3LTN, G3MED, G3OSA, G3RTF, G3XD/A, G5MR, G5TN, G8IC, GW3ATM, GW5MQ

9 G2BHN, G2DVD, G2FCL, G3BYY, G3FUR, G3OJY, G3SXK, G4LX, G8GP, GC3EBK, GI3ONF, GM3DIQ, GM3LDU

8 G2BDX, G2DDD, G2XC, G3AEP, G3AGS, G3CCA, G3EKX, *G3GBO*, G3HCU, G3HWJ, G3KHA, G3PKT, G3MPS, G3UFQ, G3VM, G5BM, G5BY, G8SB, GM3JFG

kept as it is, with perhaps the addition "somewhere" (but where?) of a 100 kc CW-only area, which would enable many more long-distance QSO's to be made. Well, there is not the slightest doubt that even under flat conditions much more GDX could be worked regularly if CW were to be used—every serious long-distance sked and most contests prove it, over and over again.

G3IGW (Halifax) has the same idea, his suggestion being the 100 kc at the LF end of the two-metre band, this being consistent with the reservation of the LF areas of the HF/DX bands for CW working. As G3IGW is canvassing this idea strongly, those interested are invited to drop him a card *(QTHR)* with their views.

Still on the CW theme, the MS boys report on various results—and failures. For the *Leonids* meteor appearance in November, G5YV had skeds with LZ2FA, OHØRJ and SV1AB, but nothing happened. During the *Geminids*, Harold had UA1MC on sked and though he was heard at S9+ at times, it was impossible to copy the UA signal because of over-fast sending on an auto-keyer! So they are going to try again, with UA1MC slowed down to a more reasonable speed for the peculiar conditions of MS working. EA4AO (Madrid) also had several *Leonids* schedules, but again results were negative, though SM6CSO did copy a 100-sec. burst from EA4AO.

Guy of ON4FG (Brussels), a well-known VHF/DX operator, likewise reports attempts during the recent meteor showers, his only result being the reception of YO7VS in the *Perseids* period. Guy also had the tantalising experience of hearing and calling—and hearing and calling—GD3FOC during the big October opening, but no joy. The point here is that ON4FG only needs GD to complete all U.K. countries, to put him in the front row in Countries Worked, and he has been pursuing GD literally for years! However, Guy has had the consolation of working UC by MS, and so goes up to 27C in Countries.

On the G8/3 front, an interesting report from G8ADS (Dunstable) who, with G8ADC, is working on 70-centimetre transistorised gear. They have a Tx running 180-200 mW with a 2N2369 as PA, and a good contact recently was with G8AJD (Potters Bar) from G8ADC's QTH near Luton.

G3KQF (Borrowash, Derbys.)

FOUR METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8

From Home QTH Only

Worked	Station
56	G3EHY
52	G3IUD
50	EI2W, G3OHH (264)
49	G3SKR (430)
40	G2OI
39	G3OWA (401), G3PJK
38	G3JHM/A
35	G3BOC, G3MOT (261)
33	G2BJY, G5FK, G5JU
32	G3NUE
31	G3PMJ
30	G3BNL, GM3EGW
29	G3AYT
26	G3LAS, G3LQR, G3LZN
25	G3FIJ, G3RDQ
24	G2AXI, GI3HXV
22	G3FIJ, G3HWR (236), GC3OBM
21	G3HRH, G3OJE, G3PPG
20	G3EKP, G5UM (144)
17	G5CP
16	G3BJR, G3FDW
14	G3OKJ
12	G3TKQ, G5DS
11	G3LHA, G3PRQ. G2SNA, G3TOT
10	G2BDX, G3ICO
9	G2DHV
8	G3NNO, G8VN

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

writes : "I find that I am now spending more time on 70 cm. than two metres. The spirit amongst the G8/3's seems to be something like the enthusiasm there used to be on two metres 10 years ago." G3KQF got his first EU contact on 430 mc during the big opening, and is now starting on the much more difficult undertaking of getting gear going for the 23-centimetre band.

First letter on the two-metre clip is from G3EDD (Cambridge), staking his claims for the Three-Band Annual, in which he takes the lead, with G3FIJ (Colchester) right on his tail. It seems that G3EDD's least profitable band is four metres—Brian says the lobe off his 4-ele Yagi must be cocked up into the air. However, he is able to report that the intolerable local noise from which he had been suffering has now been put right—it was due to a badly-made cable joint on the 400 kV overhead. (Your A.J.D. can understand, having for years been afflicted by a persistent noise that only became evident in windy weather, finally traced to a dirty connection on the near-by 33 kV line.)

G3TLB (Tunbridge Wells) says that thanks to G2CZM going out /P, he has now completed "all English counties worked on two metres." G3DY (Whittlesey, Northants.), leading the Two-Metre Annual, has no less than 215 different stations worked since September 1st. G3TPF (Birkenhead) is effective on two metres and getting ready for 70 cm—he reports that there is a lot of activity on the latter band in the neighbourhood of Merseyside.

Special note for those who may be interested in the prospect of real DX on four metres—and your A.J.D. can say that, in the summer months at least, it is entirely possible : VS9ABL (Aden) writes to say that he now has a ticket for our 70 mc band, and would like to co-operate with U.K. stations. He can "listen a lot at different times"—we would think that skeds from about May onwards would be worth arranging.

GC3OBM (Guernsey) says that the VHF bands are very quiet down his way, but he keeps open on four metres. On the other hand, G3LMT (Exeter) lists no less than twelve stations active on 4m. in the Exeter district, all operating between 70·16 mc (G3FHG) and 70·42 mc (G3EFY), with a great deal of Sunday-morning working, when G3HTA /P and G3TJW/P are also out on high ground, looking for contacts to the North and into the London area. Surely, this suggests a useful sked possibility with GC3OBM *(QTHR)*.

Pushing out a hefty signal on four metres is G3THC (Wolverton, Bucks.), with a 5-ele Yagi at 30ft. He is also on two metres, running 24w. with a 2/10-ele Yagi —a very gainy beam for two metres, if ever there was one— at a height of 52ft.; David is regularly active and is doing well in the tables. G3RDQ (Cheam, Sy.) has got to 25C in Four-Metre Counties, and EI6AS (Dublin) says that during the last month or so conditions have been very poor on the VHF bands, only one new scoring QSO having been made—with EI4BC/M, for Co. Dublin.

On p.669, down at the bottom, there is a note that we hope may interest the VHF/SWL's who follow this piece. It is in the nature of a "Set Listening Period," as invented many years ago in our old *Short Wave Listener* for the HF bands. No prize is offered—but we hope to see some good clean logs that can be quoted in this space.

Till February 4th, then, *Cheerio*. To get all your news and views, ideas, complaints, corrections and suggestions into that issue, please let us have your reaction by **Friday, January 21,** to : "VHF Bands," SHORT WAVE MAGAZINE, Buckingham. All the very best for the New Year—*de A.J.D.*

THREE-BAND ANNUAL VHF TABLE
September 1965 to August 1966

Station	FOUR METRES Counties	FOUR METRES Countries	TWO METRES Counties	TWO METRES Countries	70 CENTIMETRES Counties	70 CENTIMETRES Countries	TOTAL pts.
G3EDD	16	1	48	17	14	3	99
G3FIJ	17	2	36	12	19	3	89
G3HRH	15	2	44	12	8	2	83
G3TLB	8	1	50	13	—	—	72
G3AHB	—	—	32	10	19	3	64
G5UM	15	1	22	6	16	2	62
G2CIW	—	—	14	9	32	6	61
G3OWA	15	2	22	6	13	1	59
EI6AS	9	5	29	7	4	3	57
G3KQF	—	—	18	7	20	2	47
G3FNM	2	1	33	8	—	—	44
G2AXI	10	2	22	4	3	1	42
G3UCS	—	—	34	5	—	—	39
G3UFQ	—	—	28	8	—	—	36
G5KF	13	2	6	1	7	1	30
G3UFA	—	—	22	4	—	—	26
G3EKP	2	2	6	3	5	2	20
G3HWR	7	1	7	4	3	1	20

Scores are since September 1st, 1965, and will accrue until August 31st next 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. From time to time, multipliers will be announced (with at least one month's notice) to give a loading in favour of some particular band. Points so earned will be taken into the aggregate and carried right through till the end of the VHF year. Claims should be sent in as often as possible to keep the Table up-to-date.

IMPROVING THE EDDYSTONE S.640 RECEIVER

IDEAS AND SUGGESTIONS FOR GETTING BETTER RESULTS

F. G. RAYER, Assoc. I.E.R.E. (G3OGR)

The S.640, by Stratton & Co. Ltd., was an immediate post-war design, intended for efficient short-wave reception, both general coverage and amateur band, for which several necessary refinements were included. However, in the flood of much cheaper surplus and ex-Govt. receivers released after the war, the real merits of the S.640 were hardly recognised, mainly because of the price differential. Nevertheless, over the years a large number of S.640's have come into use, and now its second-hand value makes it competitive with the surplus types. In fact, the S.640 is a much better proposition than most of them, if in good mechanical and electrical condition. This article discusses some of the possibilities.—Editor.

THE Eddystone S.640 is available fairly regularly second-hand at moderate prices and it is thought that these notes might be useful to other owners or prospective purchasers. The Rx has three short-wave bands—32-12·6 mc, 12·6-4·5 mc, and 4·5-1·7 mc. The usual valves are: RF, EF39; frequency changer, ECH35 (or 6K8GT); 1st IF, EF39; 2nd IF, EF39; detector-AVC-audio amplifier, 6Q7GT; output, 6V6GT; BFO, EF39; noise limiter, EB34; and rectifier 6X5GT. All these are common types, readily available, so replacements are no problem.

The IF is 1600 kc (plus or minus 2 kc to suit crystal tolerance) and 2nd-channel rejection is 45 dB at 30 mc, 60 dB at 10 mc and 90 dB at 2·5 mc—which is greatly superior to the performance of many present-day receivers using 470 kc or some similar IF in that range. The first IF coupling has an optional crystal filter, with variable phasing by panel control, and it is upon this that most of the adjacent-channel selectivity depends. The selectivity without the crystal is 25 dB down at 10 kc.

Extremely smooth continuous electrical band-spreading is provided by a 3-gang 46 $\mu\mu$F capacitor bank. Bandsetting and normal general coverage is with a 3-gang 366 $\mu\mu$F capacitor. Coils are mounted in a sectional die-cast box and can be reached when its cover plate is removed. The band *setter* has three scales calibrated in megacycles, while the band *spreader* has a pointer on the same axis traversing a numbered scale. This scale reads 0-100, with 0-10 in red near zero capacity to allow for a degree of back tuning. Scale divisions for the amateur bands are about as follows:

28-29·7 mc, 35; 21-21·45 mc, 34; 14-14·35 mc, 60; 7-7·1 mc, 20; 3·5-3·8 mc, 58.

The 1·8-2 mc allocation cannot be covered from one position of the band setter. It can be tuned direct with this control, or divided into sections for band-spreading.

Frequency Resolution

Bandspread frequency indications can be read to a good degree of accuracy by visual setting of the bandset pointer—or to a very high accuracy by bandsetting to a crystal marker. Visual accuracy will do for most practical purposes. Quite critical re-setting is possible by noting the bandsetting pointer position against the outer numbered scale. Then write down bandspread pointer readings at 100 kc intervals by using a 100 kc crystal marker. For example, 14·0, 14·1, 14·2, 14·3 and 14·4 mc for 20 metres, then divide these by interpolation. Frequency readings can then be kept in the form of a graph, or may be carefully written on a thin card scale, placed over the receiver scale. The card should have a semi-circle cut out so that the original scales are not covered.

If a 100 kc crystal marker is not yet available—it is a very necessary adjunct to any efficient station—one can be wired to the circuit in Fig. 1. The trimmer allows it to be adjusted to zero beat with the BBC 200 kc transmission, or MSF on 2·5 mc. Current can be drawn from the S.640 octal outlet, as Fig. 5, p.674.

For bandsetting with a crystal marker, adjust the bandspread pointer on one 0·1 mc mark, and adjust the bandsetting knob fractionally, as needed. This avoids the extremely small errors of visual bandsetting. For regular use in this way, a 3·5 mc or 3·55 mc crystal is to be preferred because the 100 kc crystal marker beats are close together and weak on the 21 mc band, and particularly so on 28 mc. A round-figure crystal in the transmitter will serve the same purpose. The method is to place the bandspread pointer on the frequency (or its multiple) and adjust the bandset control (if necessary) by the crystal, then carry out all tuning with the bandspread control, against the prepared scale.

Aerial Input

The designed input of the S.640 is to match 400 ohms, twin or single feeder. For a single feeder, one terminal is returned to the chassis. Random aerials (varying impedances) are found to work well; also 75-ohm dipoles. But for maximum sensitivity, a better match is preferable. Folded dipoles with 300-ohm ribbon line work well with the S.640.

With an end-connected aerial, results will probably be found satisfactory. With noise and QRM what it is, no benefit was found by correct matching on the 3·5 or 1·8 mc bands. On the HF bands, with extremely weak signals, a tuner or Z-match helps a little. One for an aerial that is a multiple of $\frac{1}{2}$-waves is shown in Fig. 2. The tapping has to be moved for best results. The *pi* and L-section matching circuits give similar results.

IF Alignment

It may be well worth checking that the IFT's are spot on the crystal. A signal to do this can be taken from a generator covering around 1·6 mc, or by applying a stable signal (as from a crystal marker) to the aerial terminals. Output may be checked by use of an audio indicator. This can be improvised by placing a crystal diode in series with a sensitive DC voltmeter, or by using an AC meter operational at audio frequency. Audio is read at the speaker terminals. Alternatively, use one of the tuning meter circuits given later. This allows a CW (non-modulated) signal to be applied and avoids troubles with sidebands.

With the crystal switched in and the phasing control adjusted to half capacity (check knob position) tune in the stable signal, or adjust the generator for best receiver output. All the IFT's are then peaked with great care, with special attention to the crystal IFT. Check that the tuning of the receiver (or generator) is the same with the crystal switched in or out.

If the generator (or receiver) is tuned very carefully a symmetrical response should be observed on the tuning meter (or output meter) with the crystal in. If not, again check phasing control setting and the IFT cores.

It should now be observed whether the crystal rejection notch can be moved across the passband. A non-modulated signal is tuned in, with the phasing control at its central position. Carefully de-tune the generator (or receiver) until the tuning or output meter shows about one-fifth to one-tenth its original reading. By carefully adjusting the panel phasing control, the signal should now be reduced effectively to zero. If so, tune in the signal again, then adjust the generator (or receiver) in the opposite direction, and repeat. The phasing control should again eliminate the off-tune signal, this time being turned in the opposite direction from its middle position. In use, the phasing control is centrally placed for maximum selectivity, or moved one way or the other to place an interfering heterodyne signal in the rejection notch.

BFO Setting and SSB Reception

To check the BFO, place its tuning condenser half closed, noting the panel knob position, if necessary (it should be central). Switch the BFO on, place the crystal in, with central phasing, and either tune in a CW generator signal to the receiver IF, or select a stable signal with the receiver tuning. The BFO box core is then adjusted for zero audio beat.

Resolving SSB takes a little practice, as with many older receivers not intended for this mode. It is probably best to try first on 80 metres. Tune in the signal for maximum response, with the BFO off. This corresponds to upward peaks on the S-meter. Then switch in the BFO and adjust the "carrier" it provides to the frequency which gives best intelligibility. If resolution seems impossible, place the BFO tuning the other side of zero. The crystal is normally switched in. The bandspread control gives fine adjustment. If results are poor, the SSB signal is probably too strong, so reduce RF gain, increasing AF gain if required. RF gain needs to be low for strong SSB signals, but is naturally turned up for weak signals. The factor here is the level of BFO injection, which on most receivers is too low for strong SSB signals.

RF Alignment

If necessary, this is checked after IF alignment,

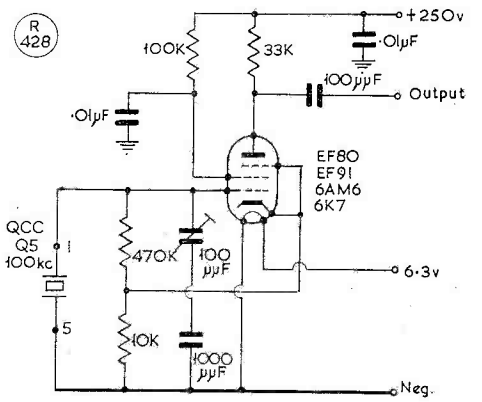


Fig. 1 100kc CRYSTAL CALIBRATOR

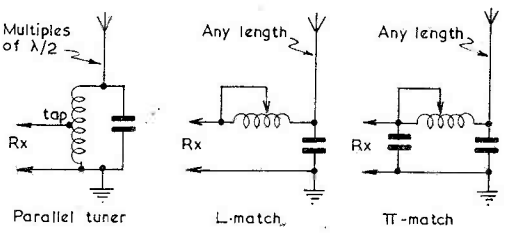


Fig. 2 MATCHING END-FED AERIALS TO S.640

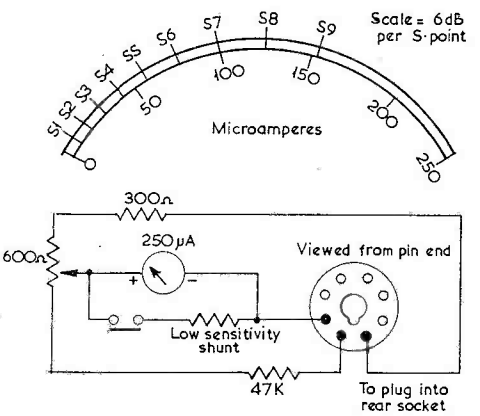


Fig. 3. S-METER FOR S.640

but naturally before bandspread calibration. Normal frequencies for adjustments are: *Range 1,* trimmers at 30 mc and cores at 13 mc; *Range 2,* trimmers at 12 mc and cores at 5 mc; *Range 3,* trimmers at 4 mc and cores at 2 mc.

It is helpful to use a crystal in the transmitter exciter, or a crystal marker, to check an ordinary type of signal generator. It is possible to align with a crystal and its harmonics, using the 14 mc and 28 mc bands for *Range 1,* and 1·8 mc and 3·5 mc bands for *Range 3.*

With the bandspread pointer at zero, the oscillator trimmers and cores are adjusted for agreement with the tuning scale. Afterwards, adjust aerial and RF trimmers and cores for best results.

Put a 400-ohm carbon resistor between the generator lead and aerial socket. Adjust the trimmers at the high frequencies quoted, and the cores at the low frequencies. Repeat until there is no more improvement. Results should be observed on a tuning or other meter. After replacing the coil box cover, final touching up of the trimmers can be done through the holes. Oscillator adjustments govern the tuning. Aerial circuit adjustments are a little flat, but mixer grid circuits tune sharply. The correct type of insulated tools should be used.

Tuning Meter

A plug-in S meter is available, or can be made. A recommended circuit is in Fig. 3, p.673. Construction or meter size will not influence results, and the meter can be accommodated in a small case to stand on or near the receiver.

In this circuit, the S-meter diode provided in the receiver is employed to avoid back current when the RF gain is manually reduced. As the diode characteristics damp out response at near zero current, set the meter mechanical zero control so that the pointer is a little below zero with the receiver off. Then adjust the 600-ohm potentiometer so that the meter reads zero with the receiver on and aerial input shorted to chassis.

Unfortunately this circuit appears to be too sensitive when using the S-meter to tune a transmitter VFO to the receiver frequency. So for netting a push-switch and shunt become necessary, reducing sensitivity.

After some use of the receiver with a transmitter, it was decided to employ the meter circuit in Fig. 4. This gives much less indication at low signal levels, but is never blanketed completely by the usual transmitter adjustments. It is merely a resonance dip meter, operated by the IF stage anode current. HT positive is already available at socket 1 of the S-meter octal holder, and the adjoining resistor is disconnected from the HT line, and taken to spare tag 3. The meter is then connected by flex to pins 1 and 3 of an octal plug (or old valve base). If the meter is removed later, insert a spare plug having pins 1 and 3 bridged. Any meter shunted to read around 8 mA full-scale is suitable. Adjust the shunt R for full-scale with the RF gain at maximum and aerial input shorted.

A tuned pre-amplifier having a single high gain

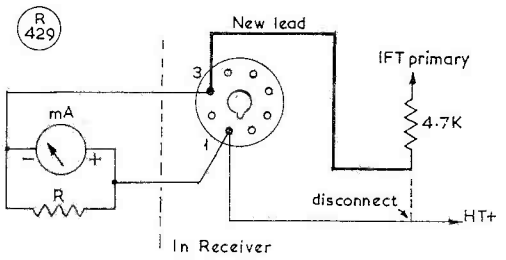


Fig. 4. IF STAGE ANODE CURRENT RESONANCE DIP METER

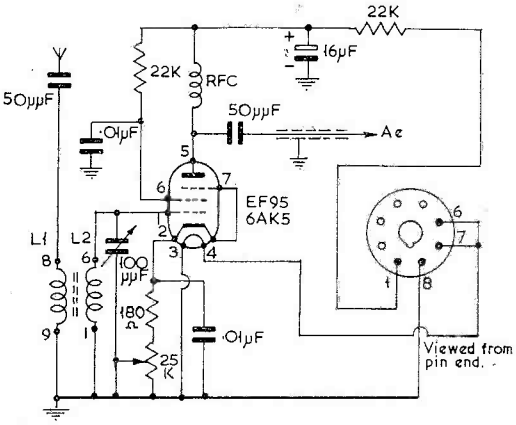


Fig. 5. PRE-AMPLIFIER CIRCUIT FOR S.640

valve has been used successfully with the receiver, and this can be run from the power socket at the right of the receiver (viewed from behind). Fig. 5 shows the circuit used. Construction is straightforward, on a small chassis, with short coil and valve leads. Coils used are *Denco* Blue Range for L1, L2. A cable made from flex and equipped with an octal-type plug draws heater and HT supplies. (The large smoothing capacitor is required because the HT supply is directly from the rectifier cathode). A short screened lead (low-loss coax) goes from the amplifier to the receiver aerial socket.

This pre-amplifier increases signal strength readings considerably, but it should be said that it is only of practical use in terms of improved copying with the signals which are very weak indeed in a reasonably quiet band. Reception on the 10, 15 and 20m. bands can occasionally be improved by adding it, but no need for it has been experienced on the LF bands.

There is a rear selector panel for 200-250v. AC mains, and its setting may need checking. The speaker should be 2·5 to 3 ohms, so the usual 2/3 ohms model is satisfactory. Headphones (preferably 2000-4000 ohms) can be plugged into the panel jack. This silences the speaker, the phones being fed through a condenser-resistance network from the 6V6 output stage.

SWL • • • • • •

THAT FIRST SLP—MORE DX/TV RESULTS —LF-BAND ACTIVITY—SOME TEN-METRE OPENINGS—READERS' OPINIONS AND IDEAS

BETTER conditions always produce a bigger post-bag, but this time there's more than one listener writing to the effect that better conditions don't mean better listening . . . the QRM increases, says one of them, as the square of the sunspot number. Well, which would you sooner do—fight for a few interesting stations to listen to, or take your pick from hundreds of them (four or five deep)? The only way to make things easier is to arrange for superb conditions and, at the same time, for nearly everyone to go off the air!

Incidentally, there is, of course, a good reason why the QRM *should* seem to increase out of all proportion to the sunspot number . . . not only do the good conditions bring in many more stations that otherwise would not be audible, but they induce various people who have been hibernating, or at least hiding, to come back on the air. Never mind—it will get worse all the time, and the only cure for it is selective receivers *and* selective eardrums. (The latter can't be bought in the junk shops, but it's possible to grow them at home.)

That SLP

Oh dear, oh dear! We handed over the sorting out of the SLP logs to a colleague who has had many, many years experience of short wave listening, and the story he tells is indeed a sad one. We had better go over to him and hear it direct:

"Whatever has happened to our SWL's? I have never come across such a collection of garbled callsigns in all my life. Had it not been for personal listening during the period, and some helpful logs from a few 'old reliables,' it would have been impossible to tell what was really going on.

"True, the conditions happened to be very poor, and nothing really exotic or unusual was heard by anyone. But what are you to make of it when, for instance, *5N2JRM* was logged as 5N2JR *and* 5N2RM; *5N2KOB* as 2KOD; *YV7AV* as 7AEV, 7IAV and 7AVK; *VP9FJ* as 9SJ and 9HA; *MP4BCC* as ZD4BCC, MP4BBC and AP4BCC; *PY7YS* as 7YF; *HI8RSD* as 8RAC; *KP4BKP* as 4CKC, 4BKD and 4BAP; *K9EWR* as 9EWL . . . but why go on? There were very few lists that did *not* contain garbled callsigns, suggesting that SWL's don't take the care that they used to." (And, incidentally, giving a good reason why some of them complain about a poor QSL return!)

"The stations logged, correctly, by someone or other included all the above (the *first* one in each case!) as well as CR6EC, HP1ME, VP5RB, VP5GU, VP6KL, EL3C, EL2F, 5Z4GT, 9Q5YL and a mass of YV's, PY's, a few ZS's and a lot of Canadians who crept through the net." (We excluded W's on the East Coast but forgot to mention the VE's, who were therefore logged in some numbers!)

"There was no single log in particular that was vastly better than others, in terms of DX heard, but some were notably accurate, while others were . . . well, just plain awful. Better luck next time!"

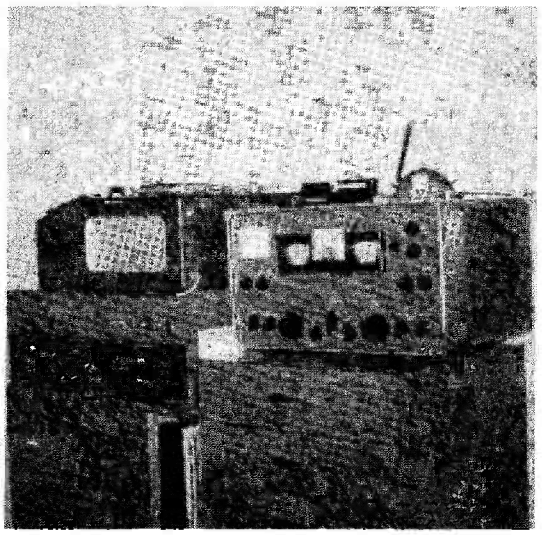
So that's the verdict on the first SLP, and we shall think seriously about setting the next. But thanks to all those who sent in their logs—especially the accurate ones!

YL Becomes XYL

Quite a few readers have been intrigued by the quiet appearance of the name of *Miss Janet Martin* on the HPX Ladder. But no more—for she has written to explain that she is now *Mrs. Janet Davis* . . . furthermore that her husband is G3MGL, who is the son of G3MER and G3MSK. We send her our very best wishes and hope to see a fourth call-sign in the family, one of these days soon.

Colin Squires (Saltash) joins the HPX Ladder with the remark "although I am nearly twice the age of the majority of your correspondents, amazingly (it now seems) I had never realised the fascination of Amateur Radio until about a year ago." (How? Well, he found some locals on his radiogram, medium wave—and it was that which was at fault, not the amateurs. In fact, the old, old story leading to an enquiry and—we hope—a long and enjoyable experience of a new hobby.)

He uses an HE-30 and a Codar preselector, with a 14ft. whip on a 30ft. mast. And in the small hours the receiver is by the bedside, comfort being an important consideration. Odd comments—the



Neat station of SWL C. Harrington, 91 Brabazon Road, Hounslow, Middlesex, who has an HQ-170A, with which he has heard 565 prefixes on CW only, this being his favourite mode. But the HQ-170A is found to be pretty good at resolving SSB, so that his phone score has increased significantly. SWL Harrington recently had a visit from Roger Western, now G3SXW, who at one time was our leading SWL on CW.

occasional 10-metre opening is worth checking, and there is DX a-plenty on Eighty between 2200 and 0800z, mostly on SSB.

Mike Whitaker (Halifax) has been G3IGW for many years, but before he acquired that call he used to be an enthusiastic follower of our old *Short Wave Listener*. To remind himself of those days he sent in an SLP log (in which there were *no* incorrect call-signs, which goes to prove something or other).

Two readers, *C. Freeman (Nuthall)* and *P. D. G. Milloy (Doncaster)* implore us not to set the next SLP on a Saturday, as some people have to work on that day "to reinforce the funds." All right—it's going to be a Sunday for the next one, when we've recovered from the shock of the last.

Wilfred Smith (West Bromwich) is involved in R.A.E., but says "I am an SWL at heart, so don't think that you will be losing me!" He wants a different HPX Ladder for each band, and also SLP's every month, "but not on CW, please, as this would simply drive people away from listening." (That, we rather doubt—it might even encourage a bit of CW listening.)

A. W. Nielson (Glasgow) has sent an analysis of his loggings in the *CQ* Worldwide Contest each year since 1959, and this year's effort shows that conditions were substantially up on last year on *all bands* —meaning more Zones *and* Countries heard all round. As against 25Z and 64C heard last year, this year's figure is 27Z and 82C. But at the moment he has a trying receiver fault, which prevented him from covering the SLP.

DX/TV

The Television DX-ers may not be numerous, but, goodness, they are keen! On p. you can see the set-up used by *Steve Birkill* (G8AKQ and G6ABK/T)—more complex than that of very many transmitting DX'ers. Since 1960, when he first began (at the age of 14) he has identified 199 TV stations in 23 countries, and now says that any of our readers who have discovered the delights of tropospheric reception on Band III should get themselves a UHF tuner and move to bands IV and V. (The same tuners also cover 70 cm., which opens the door to reception of amateur TV as well.) He has three receivers in use, and can tune continuously from 40-220 mc and 400-860 mc, on all standards. He would be pleased to make tests with anyone in the Yorkshire area who can receive 70 cms., or to give help with the 70-cm. conversion of TV receivers. *(QTHR.)*

Dennis Boniface (Ripon) reports a "fantastic opening" on Band III, October 23, when he logged nine European TV stations (Denmark, Sweden, Norway, Netherlands and Germany). He now hopes to go for the UHF bands and to improve his present score of 71 stations in 21 countries.

Frank Smales (Pontefract) has already "gone UHF" with an 18-element array at 35ft. Between October 10 and 25 he logged fourteen stations on Band IV, from Channel 21 to Channel 62. Over the same period Band III gave him much European DX. He uses a Bush TV62 with a UHF tuner fed into the aerial socket—no preamplifiers or other gadgetry.

The foregoing three reports on DX/TV all come from Yorkshire . . . any special significance, we wonder?

The LF Bands

For some time, now, the HF bands have packed up by the time most listeners get home from work, and this has sent a few of the keener ones in search of "something to do in the long winter evenings." Such as chasing DX CW on the Top Band, like *Vic Lindgren (Hull)*. He has heard W1BB every Sunday since the end of August, to say nothing of 15 other W's, two VO's, two VE's and ZB2AM. As a matter of interest, we could add that other DX'ers active on the band include KV4CI, HI8XAL, VE8ZZ, 6Y5FH, 9J2VB, 9M4LP, 9M6BM and ZE3JO—so there's plenty of difficult stuff to search for.

David Douglas (Dundee) reports lots of DX heard on both 160 and 80 metres, and apart from the "real stuff" he logs GDX, over 350 or 450 miles, between 1530 and 1700, or even sometimes at midday. *Bill Felton (Lincoln)* sticks more to Eighty, where he has logged MP4, VS9, OX3, UW9, ZB2, CN8, VP9, and, during the *CQ* Contest, YV9AA,

HPX LADDER

(Starting January 1, 1960)

Qualifying Score 200

SWL	PREFIXES
PHONE ONLY	
T. R. Popham (Exeter)	892
D. Douglas (Dundee)	842
P. A. Cayless (Exeter)	812
A. W. Nielson (Glasgow)	724
S. Foster (Lincoln)	652
R. G. Preston (Norwich)	552
A. Huggett (Lamberhurst)	517
D. Poulter (Morden)	513
M. Woollin (Leeds)	485
K. C. Staddon (Stroud)	483
P. J. Lennard (Wartling)	473
E. R. Chilvers (Lydney)	470
J. E. Hart (Leeds)	468
P. Baxter (Winchester)	456
G. Wylie (Elderslie)	452
I. A. Mackay (Dingwall)	450
J. P. Fitzgerald (Great Missenden)	437
D. Rollitt (Navenby)	433
C. S. Taylor (Wolverhampton)	432
C. Pedder (Preston)	432
B. Dale (Congleton)	423
W. Moncrieff (Hampton)	421
W. Smith (West Bromwich)	418
A. Niblock (Ilkeston)	401
S. W. Edwards (Warwick)	389
A. Parker (Chesham)	382
P. D. G. Milloy (Doncaster)	369
D. G. Evans (Neath)	368
S. Hardisty (Accrington)	367
A. G. Scott (Liverpool)	363
J. Butler (Bargoed)	363
W. Felton (Lincoln)	362
W. Chaffer (Edgware)	360
D. H. Foster (Rainham)	350
D. C. Parker (Redditch)	349
C. Squires (Saltash)	346
P. Crust (Loughborough)	343
P. J. Williams (Doncaster)	342
D. E. Fitzgerald (Dublin)	333
A. D. Jones (Chertsey)	331
S. Wilson (Ossett)	331
R. Hooper (London, N.16)	314
H. M. Graham (Harefield)	311
B. J. Turner (Westcliff)	308
A. Papworth (Over)	303
C. Warburton (Sale)	295
G. Christie (Gainsborough)	294
C. Freeman (Nuthall)	290
A. Hardwick (Burton-on-Trent)	278
M. Silverstein (London, N.W.7)	277
R. J. Basford (Nottingham)	275
J. Dixon (Barrow-in-Furness)	271
L. Case (Widnes)	258
A. J. Hayter (Plymouth)	254
D. Edwards (Coalville)	252
C. G. H. Ivermee (Reading)	252
P. F. Elgar (Woking)	251
Mrs. Janet I. Davis (Strood)	250
R. Coates (Scotforth)	241
W. C. Torode (London, W.C.1)	230
D. Thomson (Hamilton)	223
P. Freeman (Chessington)	221
R. T. Sutton (Birmingham)	219
G. Beesley (Worcester)	215
T. Pinch (Plymouth)	214
G. P. Mortimer (Stourbridge)	211
S. Shaw (Stockport)	209
K. Walker (Halifax)	208
CW ONLY	
C. Harrington (Hounslow)	565
P. J. Lennard (Wartling)	550
D. Douglas (Dundee)	407
R. De Buis (Felixstowe)	373
S. Wilson (Ossett)	362
D. H. Foster (Rainham)	356
M. Woollin (Leeds)	336
P. Etheridge (Hull)	303

(NOTE: *Listings include only recent claims. Failure to report for two consecutive issues of "SWL" will entail removal from the table. Next list, March 1966 issue—deadline January 28.*)

7X2AH and OA8V.—(All on Phone, as far as we know.)

David Rollitt (Navenby) also logged MP4TBO, VS9AFR and ZL2BCG on 80-metre Phone . . . *James Brown (Cardiff),* who says Eighty is his favourite band, has heard VS6AJ, MP4, VS9, YV5BTQ, VP7NS, VK2AVA and KX6BQ (all Phone, again). He has accounted for 170 prefixes on Eighty, and hopes to join the HPX Ladder by that band alone.

Receiver Changes

It was quite a coincidence that two consecutive letters from the postbag made reference to that old war-horse, the BC-348. *Richard de Buis (Felixstowe)* acquired a BC-348L and is "delighted with the performance on all modes. It's amazing how these old timers of some 20 years ago seem to perform with such efficiency after all this time." Next comes *Steve Wilson (Ossett),* who bought "a BC-348R, a real beauty which works well but has a rocky VFO which makes CW and SSB difficult on Twenty, but only on that band, which seems odd." But as he intends to have a real go at the LF bands this winter, he isn't unduly worried. A couple of nights as "logger" in MCC for his local Club was very interesting, and brought him in touch with some local amateurs—who, he says, turned out to be human beings after all!

Don't Forget Ten!

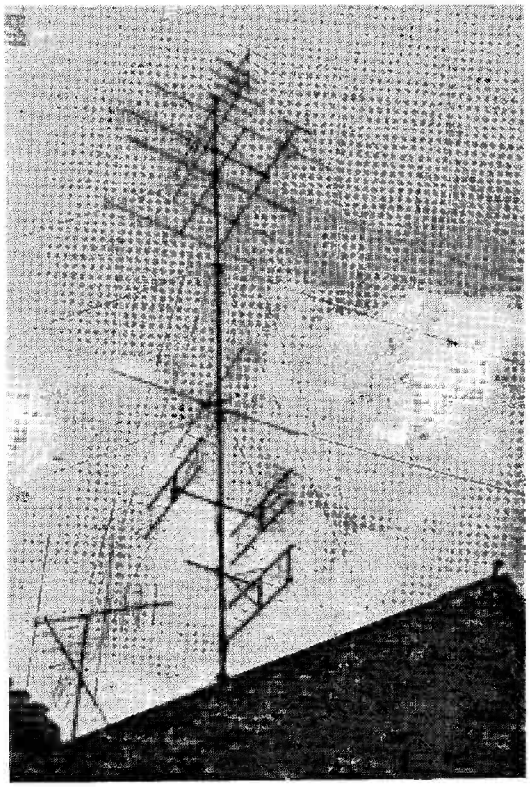
Quite a number of readers are extolling the virtues of Ten Metres. *H. M. Graham (Harefield)* comments that CR7FM has been a strong signal on the band, and that ZE2JA is the most consistent. ZS1JE is also very good, CR6HH prominent, and EL2AK and CR6BC a useful pair.

David Rollitt (Navenby) caught only one 10-metre opening, but heard 5A2, 3 and 4, LA, ZS, ZE2JA and a solitary W—W1BW. *Terry Popham (Exeter)* says "Don't neglect this band—it can spring pleasant surprises." And *R. Coates (Lancaster)* caught one of the rare (as yet) East-West openings and logged W1JAE, K1YZW, PY7AKW and 9J2DT. (He asks, by the way, for confirmation of the call 5VZ8CM. Quite OK, and our friend Gus Browning, W4BPD, operating from Togo, but why the strange call we don't know. Perhaps to balance out JY74, one of his previous ones!)

John Roze (Penrith) writes to say how he agrees with the preamble to the last issue of "SWL" (about Listening *versus* Hearing), and says that now, when tuning across the band, he usually ignores strong signals and investigates the weaker ones. *R. J. Basford (Nottingham)* has joined the local club after meeting G3SRX, and is already enrolled for R.A.E.

Stephen Shaw (Stockport) tells of a W station who operates /Skindiver! The rig is on the boat, but the mike goes down with him; he hopes to have the whole thing under water soon . . . As SWL Shaw was writing, he managed to hear "two famous stations"—NS1A and 4U1ITU—on Top Band.

(But see comment on "NS1A" on p.694 !)



The elaborate aerial array for DX/TV reception (and amateur TV transmission) at G8AKQ-G6BAK/T — owned by S. J. Birkhill, 31 Stanhope Gardens, Barnsley, Yorks.— is assembled on a 60-feet mast. Bottom, 9/9 transmitting aerial for 70 cm., and above it two 9/9's for reception in the 430 mc band. Above again, dipoles for Bands I and II; then, proceeding upwards, a 4-ele Band I horizontal; a 15-ele Band IV; a 14-ele Band III vertical; and a 28-ele Band III horizontal. Nearly 200 TV stations in 23 countries have been identified by G6BAK/T.

In Brief

"Let's have an SLP at 0900-1100 on Twenty, when the VK's and KR6's and the like come roaring in" *(R. Coates, Scotforth)* . . . "My receiver is driving me up the wall with a burping sound, but all I have to do is 'belt it one' and it goes" *(Terry Popham, Exeter)* . . . "I have found that 20ft. of wire in the form of a rectangle (on wall of room) with an ATU will load up well on Top Band. Eighty is also in fine form, with all Europe, W's and VK's around" *(D. G. Evans, Neath).*

"Suggest that for next SLP's you choose either 160 or 10 metres, and set the mode as either CW only, or mixed" *(D. H. Foster, Rainham)* . . . "I

Next appearance of this feature—March 1966. All correspondence and photographs (of SWL stations and equipment) by January 28, addressed to Editorial Department, Short Wave Magazine, Buckingham, England. Head the letter "SWL."

covered the SLP and do all my listening on a one-valve receiver. No S-meter, so no RS reports! I have 'progressed' from a Minimitter converter and transistor BC set to the 'Globe King' one-valver, which works very well, particularly on 20 metres, and I have no difficulty in resolving SSB on it" *(Kevin Walker, Halifax).*

"G3EPL and Co. have a net every day at about 1330 GMT on 3740 kc. The range of subjects they natter about is fantastic—well worth listening to" *(David Fitzgerald, Dublin)* . . . "Managed to listen for 26 hours during the *CQ* Phone Contest, and I logged 700 stations, 102 countries, 31 Zones. Using the official system, my score was 341,460 points. Listening time now cut down by University commitments" *(Stewart Foster, Lincoln).*

Identification

Those who queried the call 4X4QG/H will be grateful to G3NWG, who sends the following information: "4X4QG/H was a Special-Activity station commemorating the 50th anniversary of the city of Herzlia. There were others, and if four stations signing /H were heard or worked, a special certificate was issued." (Thanks, G3NWG.)

Trevor Pinch (Plymouth), a newcomer to these columns, is fourteen and has been keenly interested since last April. He is a member of the Saltash club, and his Ferguson BC receiver has been replaced by a borrowed S.640, which has improved his score sufficiently to put him on the HPX Ladder (at 214).

Stephen Beal (London, N.10) also says he will be joining it very soon, with his all-band TRF receiver (6BA6 RF and buffer, EF91 detector and ECL80 audio). Even with a poor aerial this pulls in the VK's and ZL's on SSB, Twenty and Fifteen—in fact 90 per cent of the listening is to SSB.

P. J. Lennard (Wartling) asks how one joins the "Secret Society for DX," which obviously exists. He refers to the odd transmissions (no callsigns given) on the lines of "Any news of so-and-so?" . . . "Yes, he's at so-and-so." A lot of this goes on, mostly across the Pond, but even more of it takes place on VHF, where a lot of the top DX'ers have an alerting net of their own (sometimes even an auto-calling device with it). Yes, they take their DX seriously over there.

Martin Warburton (Sale) complains that whenever good DX is coming through on AM Phone, it is swamped by W's using "the Ton." Two remedies here: Listen at times when the W's aren't coming through (there *are* such times!); or transfer to SSB, where the QRM is not so devastating because of the absence of carrier-waves.

G. Haynes (Hythe) has a much-modified S.888A which, he says, might cause a few raised eyebrows. However, it is fixed with (i) a silicon diode power supply; (ii) filter to mains transformer primary; (iii) stabiliser-valve "unloader" (to divert current from V11 and reduce heat); (iv) cascode front end with an ECC85. We hope to give a few more details of these mods. in due course, as they may be of general interest. (SWL Haynes, by the way, started listening in 1922, continued until 1925 and was then inactive until June 1964, when he started again with an S.38, then a Heathkit RA-1, and now the "triple-eight-A.")

And so to 1966!

So much for 1965 . . . and now on to the New Year and whatever it has to offer the likes of ourselves. We should like to thank all our regular followers for their contributions to this feature during the past year. Acknowledgments and thanks to the following, who supported the SLP :—G3OGR (Upton-on-Severn), J. Margolis (Ilford), G. Haynes (Hythe), K. Walker (Halifax), L. Allwood (Horsham), G3IDG (Basingstoke), K. R. Denman (Hayling Island), W. Puffatt (Upstreet), R. Coates (Scotforth), J. E. Hart (Leeds), G. S. Taylor (Wolverhampton), A. G. Scott (Liverpool), A. Niblock (Ilkeston), W. E. Bachell (Southend), P. Crust (Loughborough), J. Butler (Bargoed), S. W. Edwards (Warwick), G. Christie (Gainsborough), G3IGW (Halifax), C. Squires (Saltash), and a few others referred to in the text.

In the next "SWL" we will announce another **SLP.** Meanwhile, please note that the deadline is **Friday, January 28,** with no latitude whatever! May all the bands stay open, and may all SWL's look forward to a Happy New Year.

One of the few pictures we have ever published of a Russian amateur — this is UA3TZ, who is the D/F champion of the USSR for 1965. The print is from an interesting article by G3KPT on Amateur Radio in Russia, which will appear in an early issue of "Short Wave Magazine."

THE TWENTIETH MCC

The Magazine Top-Band Club Contest
November 13-14, 1965

ONCE again the time came round for more than a hundred clubs to do battle over two four-hour periods, and on the nights of November 13 and 14 last the casual users of Top Band must have marvelled at the sudden invasion. It is reliably stated that more than 135 clubs were actually on during the whole or a part of the contest period; but, as always, there are some who prefer key-pushing to pen-pushing or typewriter-bashing, and by the due date we had received 103 logs. Though this is four less than last year's figure it is still a highly satisfactory entry for a specialised single-band contest like MCC.

The Southern region triumphed this year, and in the shape of a brand-new entry into the MCC arena—the **Racal Amateur Radio Society, G3RAC.** We are delighted to welcome them to the Roll of Honour.

1st: Racal *(Southern),*	**G3RAC**	**625**
2nd: Maidstone YMCA *(Southern),*	**G3TRF**	**612**
3rd: Sheffield "B" *(Northern),*	**G3RCM**	**568**

The runners-up, **Maidstone YMCA (G3TRF)** are no newcomers to the business, having achieved 11th place last year. This year an extra 90 points or so brought them up to second. Third and fourth were two of our Northern Clubs: **Sheffield "B" (G3RCM)** and **Spen Valley (G3SVG),** with very close final scores of 568 and 562. Only just below them, in fifth place, was the **Radio Club of Scotland (GM3RCS)** with 556 points, and in sixth place a well-known Southern contestant, **Reigate "B" (G3FM)** with 554.

Gravesend (G3GRS) and **Grafton (G3AFT),** who were fourth and fifth last year, were again creditably placed in the sixth and seventh positions. And **Ash Green (G3KMO)** and **Kings Norton (G3GVA),** who were last year's sixth and seventh, changed places to become respectively tenth and ninth this time.

So much for the Top Ten, and hearty congratulations to them all. In fact, a special word of praise for all stations down to the fourteenth position, since they all scored more than 500 points, exactly as happened in the 1964 Contest.

Scoring at the very top end was slower than last year, and this we find a little difficult to account for, because the general impression is that the operating was a lot faster than in previous MCC's. Certainly there was a collection of very competent operators on the air those two nights, and hardly a single

To win MCC is a distinction indeed — and to do it at the first attempt is even more remarkable. The Racal team making 625 points to put them into first place were G3SSF and G3KLH (left). Their Rx was a home-built all-band CW-only job, and their Tx, also home-built, has pre-tuned PA tank and output circuits, incorporating full BK using electronic switching. This fine rig works with a Top Band dipole 50ft. high, coupled through a tuned feeder line. The keys they used were a semi-automatic and an el-bug.

Celebrating their success in achieving second place in MCC — one of the hardest-fought contests on the amateur bands, for which any Club must be efficient and well trained to get into the first twenty in a field of 100 or more, this is G3TRF of the Maidstone YMCA Amateur Radio Society. As shown, they kept to beer (taken "for medicinal purposes only") and left to right are: G3ORH, G3ORP, G3LXO and G3REM. The Rx was a Hammarlund HQ-170A and their Tx a 6CW4 Tesla VFO into EF183 isolator, with a keyed EL84 driving a neutralised 2E26 PA, with fixed bias; the driver stage was keyed through a wave-shaping filter and gave absolutely smooth and clickless keying. The aerial was a dipole in inverted-V form, 50ft. high at the centre, with balun and matching stub, showing an SWR of 1.06 : 1 at 1830 kc.

complaint about the standard of operating.

What They Used

The winner, *Racal,* worked from G3KLH's station, with G3KLH and G3SSF sharing the operating. The transmitter was a four-stage affair with an 807 PA, fitted for full break-in; their Rx a 15-valve double superhet with a 200-cycle filter; and the aerial a dipole 50ft. high, fed through tuned line.

The runners-up, *Maidstone,* also had a four-stage Tx, with a 2E26 in the PA; their receiver was an HQ-170A, and the aerial an inverted-Vee dipole, with the centre at 50ft. and the ends at about 20ft., fed through some 350ft. of coax. G3ORH was the operator, with G3ORP logging.

The *Sheffield "B"* station who achieved third place was a one-man effort run by G3PHO, using a home-brew Tx with an 807; an Eddystone 888A; and a 260ft. end-fed aerial, 40ft. high at the current antinode, and with four bends in it! (It was G3PHO's last MCC, as he went off to New Zealand on January 1st and hopes to renew old acquaintances through a ZL2 callsign in due course.)

Several stations were running KW-2000 transceivers, and the highest scorer of these was *Spen Valley,* in fourth place, using theirs with a folded dipole. Likewise the fifth—*Radio Club of Scotland*—who had *two* KW-2000's available!

How the Scoring Went

We do not propose to discuss the scoring system, which was unchanged from last year, except to say that MCC has now hit a formula which pleases at least 90 per cent of the entrants. There are still some regular gripes and hard-luck cases, but wherever you draw boundaries you are bound to have *someone* immediately on the wrong side. Otherwise, it is always found that those with complaints get beaten by someone else in their own region, who saw no reason to complain!

Last year the three leading stations were in three different regions. This year the Midlands were not so lucky, and Southern and Northern shared the

honours, with the GM region claiming a very creditable fifth place.

The distribution of stations around the regions was much the same as last year, with 50 from Southern, 23 from Midland, 15 from Northern, 7 from GM, 4 from GW, 2 from GI/GD and 1 from South-Western. GI6YM (Belfast) was known to be active, but no entry was received.

The multiple-station entry increased further, with three stations put in by *Reigate* and *Moray Firth*, and two from *Crawley, Sheffield, Isle of Man, Lymington, Stevenage* and *Bury St. Edmunds.*

The actual number of Club contacts was smaller, because of the slightly lower activity, but the average rate of scoring remained about the same, and the four-hour period was only barely enough. Non-club entries for a point a time were rather more numerous than last year.

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TABLE I

Positions and Scores, Twentieth MCC

	CLUB	REGION	POINTS
1.	Racal (Wokingham), G3RAC	S	625
2.	Maidstone Y.M.C.A., G3TRF	S	612
3.	Sheffield "B," G3RCM	N	568
4.	Spen Valley, G3SVC	N	562
5.	Radio Club of Scotland, GM3RCS	GM	556
6.	Reigate "B," G3FM	S	554
7.	Gravesend, G3GRS	S	549
8.	Grafton, G3AFT	S	540
9.	King's Norton, G3GVA	M	538
10.	Ash Green, G3KMO	S	532
11.	Burslem, G3UOK	M	531
12.	Derby, G3ERD	M	524
13.	Kirkcaldy, GM3PFQ/A	GM	515
14.	South Manchester, G3FVA/A	N	501
15.	Forfar, GM3GBZ	GM	499
16.	Liverpool, G3AHD/A	N	497
17.	Chorley and Leyland, G3GGS	N	495
18.	University of Newcastle, G3OWM	N	487
19.	Crawley "B," G3TR	S	480
20.	Crawley "A," G3TIR	S	474
21.	Leven, GM3OBC	GM	472
	Moray Firth "A," GM3TKV	GM	472
23.	Verulam, G3STA	S	463
24.	Govt. Comms. A.R.C. (Cheltenham), G3SSO	S	462
	Wakefield, G3HGD/A	N	462
26.	East Worcs., G3RZI	M	454
27.	City and Guilds, G5YC	S	451
	Cardiff R.C.C., GW3OAY	GW	451
29.	Sheffield "A," G4JW	N	442
30.	Wolverton, G3LCS	S	439
31.	Burnham-on-Sea, G3NZA	S	436
32.	R.A.F. Sealand, GW3ITZ	GW	433
33.	Stroud, G3SDR	S	430
34.	Ainsdale, G2CUZ	N	424
35.	A.E.R.E., Harwell, G3PIA	S	417
36.	Cannock Chase, G3ABG	M	414
37.	Liverpool University, G3OUL/A	N	412
38.	Cheltenham, G5BK	S	403
39.	Coventry, G2ASF	M	397
40.	North Manchester, G3RTU	N	393
41.	Hull, G3AMW	N	391
42.	Midland, G3MAR	M	385
43.	Clifton, G3GHN	S	373
	Henley-in-Arden, G3SIA	M	373
45.	Isle of Man "A," GD3FBS	GI/GD	372
46.	Stoke-on-Trent, G3GBU	M	369
47.	Worcester, G3GJL	M	368
	Nottingham, G3EKW	M	368
49.	B.B.C., Evesham, G3PPG	M	355
50.	Bristol, G3TAD/A	S	344
51.	East Cheam, G3MEH	S	334
52.	Surrey (Croydon), G3SRC	S	327
	Dursley, G3ILO	S	327
54.	Echelford, G3UES	S	322
55.	Bath Spa, G3IVL	S	321
56.	Reigate "A," G3REI	S	305
	Acton, Brentford and Chiswick, G3IIU	S	305
58.	Purley, G3SJX	S	303
59.	Macclesfield, G3LDT/A	M	302
60.	Bury and Rossendale, G3BRS/A	N	295
61.	Greenford, G3UQD	S	286
62.	Newark, G3UEB	M	279
63.	Stevenage "A," G3SAD	S	264
64.	Leicester, G3LRS	M	259
65.	Worthing, G3KXF	S	256
66.	Burnham Beeches, G2AMX/A	S	255
67.	Yeovil, G3CMH	S	252
68.	Loughborough, G3RAL/A	M	247
	South Shields, G3DDI	N	247
	Lymington "A," G3RBZ	S	247
71.	Northern Polytechnic, G3HNR	S	242
72.	Cray Valley, G3RCV	S	223
73.	Lymington "B," G2DC	S	220
74.	Sole Bay, Suffolk, G3LPT	M	207
75.	South Birmingham, G3OHM/A	M	203
76.	Grimsby, G4XC/A	M	196
77.	Conway Valley, GW3HGL	GW	195
78.	Silverthorn, G3SRA	S	192
79.	Chester, G3TZO	M	184
80.	Salisbury, G3FKF	S	180
81.	Moray Firth "B," GM3NCS	GM	176
82.	Leeswood, GW3TMP	GW	175
83.	Guildford, G3TLM	S	174
	Plymouth, G3PRC	SW	174
85.	Isle of Man "B," GD3HQR	GI/GD	172
86.	Sutton and Cheam, G3DCZ	S	167
87.	Loughton, G3NKX	S	164
88.	Harrow, G3EFX	S	162
89.	No. 1 M.H.U., Northwood, G3RVH	S	160
90.	235 Sqdn., A.T.S., G3JGE/A	M	157
91.	G.E.C. Research, G5FK	S	154
92.	Moray Firth "C," GM3UKG	GM	150
93.	Bury St. Edmunds "B," G3PHW	M	147
94.	Edgware, G3ASR	S	136
95.	Basingstoke, G3TCR	S	133
96.	Wimbledon, G6QN/A	S	130
97.	Blackpool, G3NJN/A	N	125
98.	Wessex, G3FVU	S	119
99.	Reigate "C," G3OVL	S	115
100.	Stevenage "B," G3CEU	S	107
101.	Bury St. Edmunds "A," G3IRM	M	102
	North Kent, G3ENT/A	S	102
103.	Chesham, G3MDG	S	66

Club Comments

We will use most of the remaining space to allow the entrants to make their own comments. (We ask for them, so it's only fair that they should be made public—when they warrant it.)

Racal, the winners, say "Our only criticism is that one has no idea of other competitors' rates of scoring. However, possibly this is a good thing.' (It didn't seem to worry *them,* judging by the result.) "At one time, sweeping the band, we couldn't hear any station that we hadn't already worked . . . stations often called us up to 4 kc off frequency, and it was more by luck than judgment that we heard them" *(Maidstone YMCA).*

"Most QSO's made by calling CQ, and we worked them at one-a-minute for long periods" *(Sheffield "B")* . . . "Very enjoyable contest with good conditions" *(Spen Valley)* . . . "Transceiver operation was very beneficial—one-knob control with full break-in" *(Radio Club of Scotland).*

"Would like to see a GM group win by about 400 points—it would perhaps have some repercussion on the handicapping" *(Gravesend)* . . . "Operating was at a higher standard than before" *(Grafton)* . . . "If we had a bonus of 250 points for working ZB2AM through all the QRM, we might have won it this time!" *(Kings Norton).*

"Conditions seemed fair, but a lot of clubs were not heard on *both* days—maybe one-day contest men?" *(Ash Green)* . . . "Some competitors appear to know not of 'TIM' *(Derby)* . . . "Arrived at QTH and found antenna guys down, then missed the first 80 minutes with a faulty PA" *(Kirkcaldy)* . . . "The boys considered the contest enjoyable, exciting, and with better team work improved on last year" *(South Manchester).*

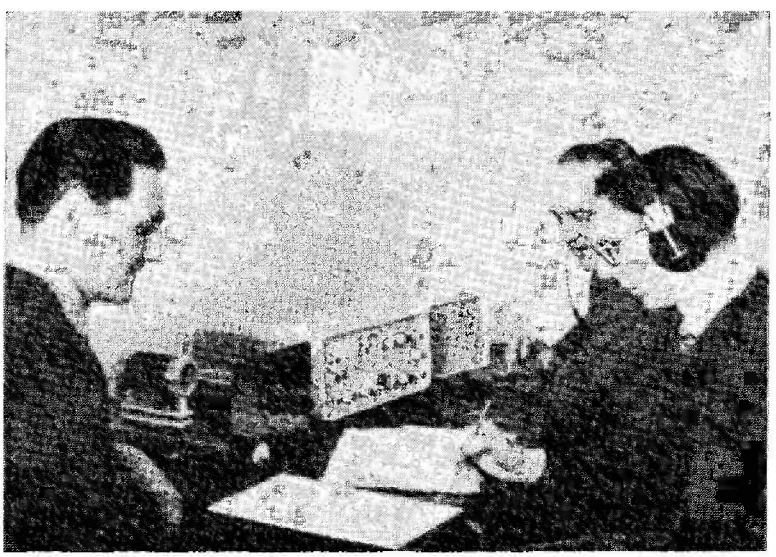
"There is now no incentive to work the Southern stations, who used to be worth 10 points" *(Forfar)* . . . "Don't forget to penalise the sharks with the rubber clocks" *(Liverpool)* . . . "Except for one local, the nearest active G club must have been 100 miles away" *(University of Newcastle)* . . . "It has all been said before—the usual clustering in one part of the band, careless use of 'BK' with no callsigns, and so on" *(Crawley).*

"Most of our points had to be collected the hard way—by making ourselves heard through the G QRM" *(Leven)* . . . "Thought there was some first-class operating. Some calls had super-sounding signals. So it *is* possible, after all, for some newcomers to become really good operators. Hope for the CW fraternity after all!" *(Wolverton)* . . . "The standard of operating was superb, and you can take that from three professionals . . . we know good operating when we hear it" *(Burnham-on-Sea).*

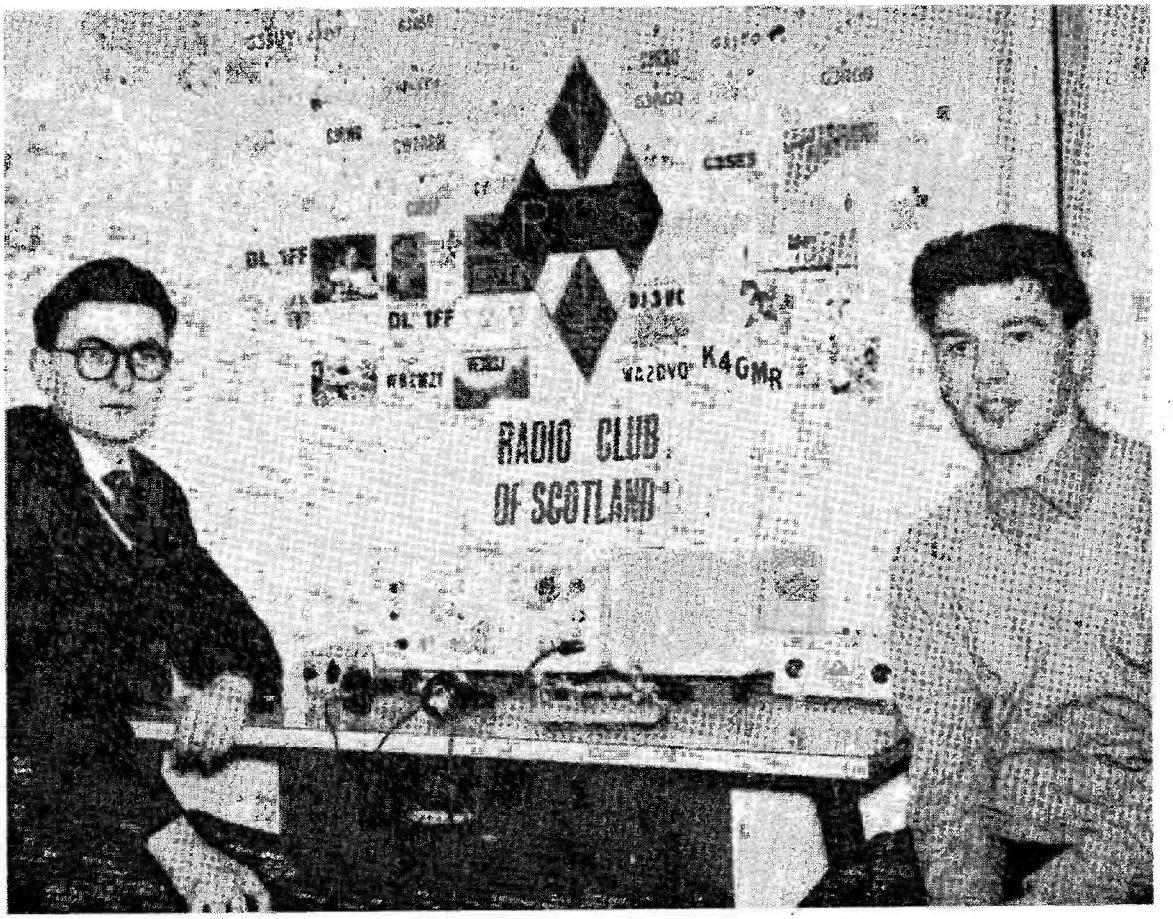
TABLE II

Top Scorers in the Regions

	Southern	
1.	Racal (Wokingham), G3RAC	625
2.	Maidstone YMCA, G3TRF	612
6.	Reigate "B," G3FM	554
	(*50 entries*)	
	Northern	
3.	Sheffield "B," G3RCM	568
4.	Spen Valley, G3SVC	562
14.	South Manchester, G3FVA/A	501
	(*15 entries*)	
	Scotland	
5.	Radio Club of Scotland, GM3RCS	556
15.	Forfar, GM3GBZ	499
	(*7 entries*)	
	Midland	
9.	Kings Norton, G3GVA	538
11.	Burslem, G3UOK	531
12.	Derby, G3ERD	524
	(*23 entries*)	
	Wales	
27.	Cardiff R.C.C., GW3OAY	451
32.	R.A.F. Sealand, GW3ITZ	433
	(*4 entries*)	



Running into a highly-creditable fourth place in the 1965 MCC came Spen Valley Amateur Radio Society, with 562 points knocked up using a KW-2000 operated by G8NF (far right), G3PXF at left, and G3HPD, who was logging at the time this picture was taken.



Operators on the Radio Club of Scotland's station GM3RCS were GM3SAN and GM3SSB (left). They used the KW-2000 belonging to GM3SAN and were fortunate enough to have another one, loaned by GM3SSB (!), as stand-by; but it was not needed. They found transceiver operation extremely beneficial in such a fast contest, and their score of 556 put them into 5th place, the leading position for GM.

Oddments

Verulam operated from Nell Gwynne's Cottage, Salisbury Hall, London Colney, where they were surrounded by a moat! They attached a piece of clean zinc to a wire and threw it in—and they say it made a fantastic difference both to aerial current and reports.

Wakefield consider that their aerial (a half-wave of thin transformer wire) was *too good*, all their S9 reports coming from the South Coast. Next year they plan to use a quarter-wave with a good number of radials. (One of the non-club stations they worked did not possess a key, but a QSO was achieved by tapping the aerial on and off the transmitter. . . .)

G2CUZ, operating for *Ainsdale*, made MCC the opening session from his new shack, all the gear having been off the air for four months. "It certainly got well christened," he says.

Hull used a half-wave aerial more than 100ft. high, slung between buildings, but found the high static level a disadvantage. *Henley-in-Arden* (bless them!) write "We have no criticism of either the rules or the scoring system."

Stoke-on-Trent bring up a point we have often tried to make, by saying "We were competing against two other local clubs, which made things much more exciting" . . . *Nottingham* admit that had they taken more care over the ATU, their results would have been better.

The Non-Club Entries

Quite a number of non-Club stations were operating throughout the period, as can be told from the logs of the club entrants. Not many of them have bothered to send in logs, however. The three best came from *G3JEQ (Great Bookham)*, who had 99 club contacts; from *G3RRJ (Hillingdon)*, who had 86; and from *G3SKC (West Drayton)* with 37.

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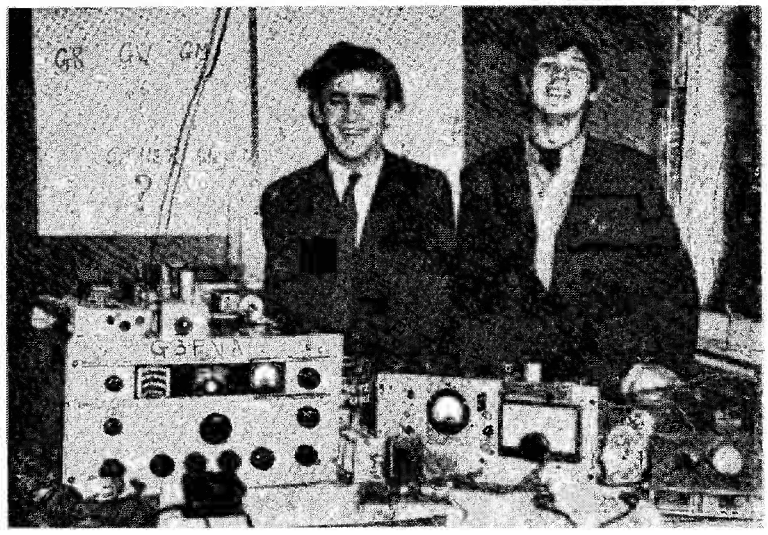


A successful Club station in the 20th Magazine Club Contest was South Manchester, G3FVA/A, with 501 points to put them into 14th place in a field of more than 100 actually sending in Contest logs. The boys look happy with this result.

The winner of the Editor's "small prize" *(see* p.543, *November),* is therefore **G3JEQ**, to whom we send our thanks and congratulations.

Very useful check logs came from the same two SWL's as last year : *D. L. A. Law (Leicester)* and *P. J. Lennard (Wartling).* The log from SWL Law has become quite an institution and is a masterpiece in its way, containing a lot of useful information other than the bare callsigns and reports. His opinion was that operating and procedure were very good, but *netting* still not up to standard. And his reckoning was that no fewer than 153 club stations were on the band at one time or another.

SWL Lennard thought that Rule 3 (concerning CQ's and calling procedure) was broken several times, and also noted one or two chirpy notes, but thought the overall standard was very high. Our thanks to these two SWL's for their time and trouble in preparing such excellent logs.

DX Contacts

It is, in a way, a pity that the rules allow only one point for really DX contacts, especially as the QRM from all the club stations makes them even more difficult than usual to work. Several QSO's were made with OK/OL stations, with the occasional DJ/DL, with 4U1ITU (who obligingly showed up on the 13th) and even with ZB2AM. Perhaps we should make it possible for *Overseas Clubs* to participate next year, with a fairly handsome points loading.

Finally, we must comment on the fact that not all clubs were going all out for victory, but rather to enjoy themselves and give their newer and less-experienced members a chance to get the atmosphere of contest operating. *Chesham,* for instance, say "It was our first attempt at a contest, and after switching on at 1700 on the 13th we just sat back and gave up, for a few minutes—just listened, amazed!" Well, they know now, and we wish them better fortune next year.

Many clubs suffered from troubles which, one would think, could have been traced beforehand. *Greenford,* where both operators were new to contest work, thought the manners were good on the whole, but some "frequency pinching" went on. Also, they suggest, certain stations were operating "beyond their capable speed."

Stevenage suggest that a transceiver is almost a necessity, as they wasted so much time netting. *Loughborough* thought the time too short . . . others said it was too long.

Final

A last word of thanks from the judges to the scribes. All logs were very good, some were excellent. There were no disqualifications, but next year it might well be decided that QSO's outside the time limits will merit harsher treatment than the mere deduction of points.

TABLE III

Club Contacts made by the Top Ten

Racal, G3RAC	197
Maidstone YMCA, G3TRF	189
Sheffield "B," G3RCM	148
Spen Valley, G3SVC	147
Scotland, GM3RCS	91
Reigate "B," G3FM	174
Gravesend, G3GRS	171
Grafton, G3AFT	166
Kings Norton, G3GVA	157
Ash Green, G3KMO	168

From the traditionally "smoky district of the Potteries"—whence the best china is exported all over the world — the Burslem Amateur Radio Society went in for the 20th MCC, to gain 11th place with a fine score of 531 points. Signing G3UOK, the team consisted of, left to right, standing: G3SAJ, G3HVI, old-timer G8IX, and G3COY (who is doing so much for Amateur Radio in the Stoke-on-Trent district). Seated at the key is G8QD, with SWL Delahunt at right keeping the log. As you can see, their gear was pretty effective for the job in hand — a KW-2000, with a Drake 2B — and it was this, plus of course the operating, that put them into such a good place.

And so into 1966, and the **Twenty-First** birthday of **MCC!** For this, we must be sure of a bumper entry.

Finally, for Club Secretaries: Activity Reports for the February issue must be with us by **Friday, January 14.** Address them to "Club Secretary," Editorial Dept., SHORT WAVE MAGAZINE, Buckingham.

And now a Happy New Year to everyone within the Club movement—secretaries, other officers and members alike. May their clubs prosper in 1966, may they continue to send us all the news, and may they be lucky when November and **MCC-21** comes round.

IF YOU WANT TO BE SURE

Of getting a fair price in quick time for that odd piece of unwanted gear, you cannot do better than try the Small Advertisement pages of SHORT WAVE MAGAZINE—through which each month a great variety of equipment is offered for sale or exchange. Indeed, it is through our Small Advertisement section that, over the years, the resale or secondhand value of all branded amateur-band apparatus has been established. There is a very active and buoyant market for all good radio gear, as a glance through the Small Advertisement columns on pp.696-702 of this issue will show. For private advertising, either Sale, Exchange or Wanted, the rate is but 3d. a word, with a minimum of 5s. Draft your advertisement carefully, using the accepted abbreviations, and send it with remittance to: Advertising Department, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. And don't leave it too late, as we have a large carry-over from month to month.

NOTE FOR BOOK BUYERS

We can supply, at the published list price, any technical book produced by Macmillan's, on any subject. When ordering, please quote "Macmillan book," with title and author. Orders, with remittance, to: Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

LICENCE CONDITIONS AND THEIR ENFORCEMENT

(A representative of the G.P.O. Engineering branch recently visited Echelford Amateur Radio Society. The following is a brief account of some of his answers to questions, as reported in their "Newsletter" for November 1965.)

THE G.P.O. controls all radio communications in the British Isles, up to the three-mile limit, and, with the exception of shipping, the amateur service has the most flexible frequency control allowed. Other services are crystal controlled on fixed frequencies, and are used by unskilled operators, but ship's operators have to hold the P.M.G. Certificate because of the greater flexibility of control that they enjoy.

SSB Regulations

Methods of measuring the power of an SSB transmission have been clearly laid down (*see* p.599, December 1965 issue, SHORT WAVE MAGAZINE) but the G.P.O. is obliged to carry out power output measurement of an amateur's equipment, if so requested by the amateur.

Harmonic Content and TVI

As the licence states, "No undue interference shall be caused," but no figures for maximum harmonic content are published, and the word "undue" is difficult to interpret, each case being treated individually. But, *in a case of IF breakthrough, the amateur would not have to shut down.*

On 21 mc, it is suggested, the harmonic level should be 60 dB down, or the amateur may have to restrict his operating.

In cases where the complainant will not co-operate with the G.P.O., the situation is treated as "no complaint."

Since the G.P.O. control only radio transmissions which convey intelligence, they cannot take action in the case of, say, an oscillator in a receiver which causes TVI.

General Interference

Action is taken only when normal local broadcast frequencies are affected. An amateur transmission in the London area which jammed out, say, the Scottish Home Service but not the local station, would not be accepted as a justifiable complaint.

Interference to the domestic telephone service is dealt with by the G.P.O. telephone engineers, who fit a suppressor to the instrument. Interference *from* local sources, such as electric motors, can only be investigated when it affects broadcast or TV reception.

Frequency Checking

A crystal-controlled oscillator in the amateur station is essential for reference purposes (and a built-in crystal calibrator is considered satisfactory), but there *must* also be an absorption wavemeter available for checking, for instance, that the correct harmonic is being used. (Cases have been known in which an amateur supposing himself to be on Top Band has been on—or out of—the 80-metre band.)

Miscellaneous Points

Mobiles should not transmit while in docks or on piers—or on ferries, particularly the Woolwich Ferry. A mobile operator should always give his location when transmitting, likewise a station working at an alternative location.

Amateurs should do nothing which would cause one of the monitoring stations to take special note of him . . . once noticed, a station is likely to receive the attention of the monitors for any possible contravention of regulations. (And a considerable amount of monitoring *is* carried out on the amateur bands.)

When working cross-band, re-radiation of the incoming signals should be avoided. On shared bands, long transmissions should not be made without a break to check the frequency.

It is in order for a holder of the new Sound Licence "B" (G8 + three) to operate a Sound "A" station, under the supervision of the licence holder.

Finally, the G.P.O. representative made a plea to all amateurs "please to insert their callsigns *now and again*" during long QSO's!

CLUB SECRETARIES TO NOTE!

The regular "Month With The Clubs" feature will be resumed with the next (February) issue. Accordingly, all club reports should reach us by Friday, January 14, latest, addressed: Club Secretary, SHORT WAVE MAGAZINE, Buckingham.

FURTHER NOTE ON THE S.640

In the article by G3OGR, concluding on p.674 of this issue, it should be added that operation from batteries is possible by inserting a suitable plug in the rear octal socket. The heaters then require 2·5A from a 6v. accumulator, HT current being 60 mA at 200-250v. from a vibrator unit. Pins are: 1, HT positive; 7, heaters; 8, heaters and HT negative.

Panel controls are: RF Gain, BFO Pitch, Bandset, Bandswitch, Bandspread, Crystal Phasing, Crystal In/Out, AF Gain, AC On, HT On, BFO, Noise Limiter, AVC On/Off.

OBITUARY NOTICES

It is with great regret that we have to record the recent deaths of the following:

—James Nuttall, G3PYT, of Blackpool, Lancs., on December 1, at the early age of 44 years.

—Tom Franklin, G2ARN, of Upper Nazeing, Essex, on December 10, at the age of 64. A retired electrical engineer, he had originally held the call G5HO for the now-defunct Hoddesdon & District Radio Society. A well known and much respected member of the very active Harlow Club, he used to MC their regular lunch-time Top Band net. Equipped for all bands 160-2m., he had an extensive aerial farm, comprising some 20 different antennae, and could operate by remote control from several positions round his house and garden.

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.

DL5XM, M. L. Creighton (*G3NBM, ex-DL2AL/ZC4MC/5B4MC/9M2MC*), 36 Hy. A.D. Regt., R.A., B.F.P.O., 34.

EI2BB, J. R. Bartlett, Jr., Chickamauga, Deans Grange, Black Rock, Co. Dublin.

GI3NM, S. R. Pountney, Sydeil, Newtownards Road, Donaghadee, Co. Down.

G3TWX, D. Woodhouse, 52A Barnby Gate, Newark, Notts.

G3UBY, A. M. Clark, Sans Souci, Fairmead Road, Burraton, Saltash, Cornwall.

G3UNZ, D. Wenlock, 48 Newhall Street, Cannock, Staffs.

G3UOS, University of Sheffield Amateur Radio Society, Hicks Building, The University, Sheffield, 10.

G3UQD, R. W. Whittington, 18A Botwell Lane, Hayes, Middlesex.

G3URZ, B. M. E. Smith, 3 Kings Road, Chandlers Ford, Eastleigh, Hants.

G3USQ, Amateur Radio Society, R.A.F. Station, Carlisle, Cumberland.

G3UTK, L. Critchley, 63 Rachael Gardens, Park Hill, Wednesbury, Staffs.

G3UUA, J. E. Whittaker, 237 Coal Clough Lane, Burnley, Lancs.

GW3UUS, G. B. Packer, 3 Robertson Way, Newport, Mon. (*Tel. Newport 65572.*)

G3UUX, E. W. Hibbert, 126 West End Avenue, Harrogate, Yorkshire. (*Tel. Harrogate 5404.*)

G3UUY, D. W. Wright, Sunny View, Bramfield, Halesworth, Suffolk.

GW3UUZ, H. Bluer, Nash Point Lighthouse, Llantwit Major, Glam.

G3UVC, Amateur Radio Club, Southampton College of Technology, Students Union Buildings, St. Mary Street, Southampton, Hants.

GW3UVG, J. Gorman, 7 St. Anthony Road, Cardiff, Glam. (*Tel. Cardiff 63705.*)

GM3UVL, W. Bourke, 33 Victoria Street, Rutherglen, Glasgow.

G3UVM, M. R. G. Simpson, 17 Egerton Road, Streetly, Sutton Coldfield, Warks.

G3UVN, C. Morris, 72 Storrington Avenue, Liverpool, 11.

G3UVR, D. Jones, Lyndale Farm, Chester High Road, Neston, Wirral, Cheshire. (*Tel. Neston 415.*)

G3UVZ, P. A. Holliday, Ethel Villa, Stanley Road, Mapperley, Nottingham. (*Tel. Nottingham 53190.*)

G8ADH, C. G. Slingsby, Holmehurst Cottage, Bisterne Close, Burley, Ringwood, Hants.

G8ALC, T. C. Challis, 5 Burgess Wood Road South, Beaconsfield, Bucks.

G8ALY, R. H. Perrin, 30 Franchise Street, Kidderminster, Worcs.

CHANGE OF ADDRESS

EI3Z, P. J. Conway, Dunamase, Moydrum, Athlone, Co. Westmeath.

G3AGD, A. L. Drakeford, 25 Coombe Road, Dartmouth, Devon.

G3CO, J. B. Kay, Little Bakers, Middle Green, Wakes Colne, Colchester, Essex.

G3COJ, A. H. B. Bower, Lindisfarne, Chapel Road, Flackwell Heath, High Wycombe, Bucks.

G3COV, G. B. Woffinden (*ex-GM3COV*), 1 Kingsbere Crescent, Dorchester, Dorset.

G3ESR, J. A. Woolley, 331 Wigan Lane, Wigan, Lancs.

G3HQH, H. Froggatt, Moncrieff, Hague Bar Road, New Mills, Stockport, Cheshire.

G3IQM, R. I. Sills, 31 Heath Croft Road, Four Oaks, Sutton Coldfield, Warks.

GW3IYI, W. J. Squires, 53 Penllwyngwyn, Bryn, Llanelly, Carms. (*Tel. Llangennech 215.*)

G3KTP, E. E. West, 79 St. Wilfrids Road, West Hallam, Derby.

G3KZC, R. F. Harknett, 28 Woodyleaze Drive, Hanham, Bristol. (*Tel. Bristol 673026.*)

G3LCK, D. J. Bradford, Highfield, Long Hill, Old Wives Lees, Chilham, Canterbury, Kent.

GM3LWS, E. H. Ross (*ex-G3LWS/VP8CZ/ZC4CZ/5B4CZ*), The Bungalow, Low Road, Auchtermuchty, Fife.

G3LWY, Mrs. F. E. Woolley, 331 Wigan Lane, Wigan, Lancs.

G3MCK, G. P. Stancey, 6 Baileys Close, Monica Drive, Widnes, Lancs. (*Tel. Widnes 6250.*)

G3MER, Mrs. J. D. Davis, 16 Newmarket Road, Furnace Green, Crawley, Sussex.

G3MGL, A. V. H. Davis, 112 Weston Road, Strood, Rochester, Kent.

G3MSK, V. H. C. Davis, 16 Newmarket Road, Furnace Green, Crawley, Sussex.

G3OLH, A. A. Remsbury, 2 Alexandra Court, Kent Drive, Teddington, Middlesex.

G3ORY, R. G. Titterington, 31 Finsbury Avenue, Lytham, Lancs.

G3OXP, M. H. M. Chamberlain, 25 Lower Village Road, Sunninghill, Ascot, Berks. (*Tel. Ascot 22338.*)

G3SHS, R. W. Perrin, 5 Waylands Close, Knockholt, Kent.

G3SZX, L. Pollack, 11 Paul Street, Corsham, Wilts.

GW3TLP, I. Jones, 17 Pen Lon, Menai Bridge, Anglesey.

G3TUL, J. M. Copson, 51 Ellers Drive, Bessacarr, Doncaster, Yorkshire. (*Tel. Doncaster 55357.*)

G3UEP, R. P. V. Plimmer, 33 Abbey Road, Great Malvern, Worcs.

GM3UU, A. S. McNicol, 60 Morningfield Road, Aberdeen.

G8QM, V. J. Flowers, 5 Heathbell Road, Newmarket, Suffolk. (*Tel. Newmarket 3610.*)

AMENDMENTS

G3CBE, R. H. Hill, 23 Dene Path, South Ockendon, Essex.

G3KKF, J. Court, 2 Martin Dale Crescent, Martin Mill, Dover, Kent.

COMMUNICATION and DX NEWS

L. H. Thomas (G6QB)

A HAPPY New Year to all our readers. May 1966 bring forth everything you wish for, and not too much of the things you don't want! For all users of our bands it is going to be a big year, and chiefly, of course, for the hardened DX types, who have never stopped straining at the leash through the lean years of sunspots.

The thought that must be occurring to everyone, just now, is—"Will a few years of *easy* DX be beneficial to us?" Will they cause the number of stations on the DX bands to multiply like microbes? And will they eliminate some of the short-skip embarrassments that we still have to put up with?

Well, your guess is as good as ours, but after emerging from a weekend's battle with the QRM, one feels that one will have to change into a nocturnal animal if one wants comfortable operating any more. *Forty* and *Eighty* are quite bearable at 4 a.m. *One-Sixty* is very comfortable at 6 a.m. (except on Sunday mornings, when the crowding is noticeable). And, of course, as the longer days come round, even *Twenty* will be good for the stay-up-lates and the rise-earlies.

Perhaps we should ask a few searching questions about the use of our bands to the best effect. (Grouse-haters, don't switch off . . . this is a spell of thinking aloud rather than complaining.) One or two innocent queries, to start with:

Why does everyone behave as if Forty is only 10 kc wide? (Meaning, of course, 7000-7010 kc, even when sharing those ten kc with a new pirate broadcaster, a high-powered teletype and some strange gurgly noises.) Surely a little more occupancy of 7010-7030 kc is highly desirable?

Why does no one appear to use the lower 20 kc of Top Band during the week? The 1800-1820 kc sector seems to be deserted—possibly because reflexes have been conditioned to leaving it for the Americans in the early mornings. All the DX-happy crowd seem to congregate around 1820 kc; from 1830 kc upwards you will find the casuals who don't mind who they work as long as they get a QSO; and from 1880 kc upwards, Phone holds sway. We repeat—why don't the CW types spread themselves a little, leaving just the band-edge for the very occasional spot of DX? (Except, of course, during the real DX hours.)

Eighty suffers from the same sort of habit-treatment. Time was when the CW band was 3500-3600 kc, but that all went by the board long ago, and numerous Phones are now found right down to 3550 kc. But why don't the CW fraternity use the 50 kc that has been left to them, instead of making absolute bedlam of the bottom 10 kc? The whole lot, of course, is crammed with "other services," some of which sound as though their service is still in the Napoleonic Wars, but everyone has got hardened to dodging these things and working in the cracks.

Twenty and Fifteen, our "exclusive" bands, seem to be very sensibly used, on the whole, with the Phone and CW exponents respecting each other's territory. On these bands the chief menace is, without doubt, the Blind CO'er . . . perhaps more so on CW than on Phone. Of course, these islands of ours may be crammed with blind CQ'ers of whom we know not, because they are too weak to interfere seriously. But at times it seems that the entire continent of Europe is populated with types who drop on the weak DX station that *you* are working, and call a long "CQ DX." Judging by the way some of them drift, they have only just switched on and are indulging in a nice long CQ while the receiver warms up. (This is often their saving grace . . . they start up on the station you are working, but soon creep off towards the next band.)

Finally, brethren, The Preachers! Taking a mike in the hand seems to bring out some kind of urge to talk, and go on talking, even with such refinements as Vox and Push-to-Talk obligingly supplied by the manufacturers. (We actually heard someone, a few days ago, admitting that Vox made him talk all the more, because he couldn't stand the sound of those relays dropping out. We wondered at the time just what he imagined they were for!)

Day after day we come across them, racking their brains for something else to say (even if irrelevant) rather than let that switch go. In one over (even on SSB) they ask so many questions without pausing for answers that no one can remember them all. So they are not answered, and it doesn't even seem to matter. This is a shocking waste of band space.

End of sermon . . . surely if *everyone* did his little bit to improve his technique in such matters, an improvement would be noted? But, as so often, we are probably preaching to the converted, and everyone who reads this is a wonderful operator and a model of behaviour at all times.

Around the Bands

Although it has been a wonderful month, with DX a-plenty on all bands at some time or other, the bulk of the mail seems to concern *One-Sixty*. Something to do with the long winter evenings, no doubt. The weary amateur gets home from the salt-mines, finds Ten, Fifteen and Twenty quite dead; looks at Forty, shudders, and looks in the other direction; takes a quick check of Eighty, finds the CW end a dogfight and the Phone end full of DL's and Central Europeans, with very few G's to be heard on account of the skip.

So, what's left? VHF and One-Sixty! Or the One-Eyed Monster, or the Hi-Fi, or another hobby.

The only one of these that concerns us is One-Sixty, so let's make merry with that.

Top Band Topics

Sometimes one gets the impression that One-Sixty doesn't really *belong* to the present day and age. It's so different from all our other bands, and yet so frightfully British and traditional. Old Timers were using it, 'way back in the 1920's, with gear not so far removed from some of the present-day equipment, except that it was built on the kitchen table, and the builder was a carpenter rather than a metal-worker. And 10 watts gave out to about the same effect as 10 watts does today, except that some of the watts weren't quite so elastic-sided as they seem to be nowadays.

The big developments have all been in receivers and aerials—on the transmitting side, it's not possible to get much more output from 10 watts input than it was forty years ago (and even then, crystal control gave a 1966 standard of stability !)

Hence various cracks about "Grandad's Band" and "Old Timers' Paradise" and so on—but still the stream of newcomers pours into the band, and a surprising number of them seem to *stay there*. It must satisfy some long-felt want, or something. And the intrusion of DX, together with rat-race methods of chasing it, seems at times to be almost indecent.

Hence you can find G3---working 9M4-- literally underneath a couple of G's nattering at one another, completely oblivious to what's going on. Possibly they wouldn't even know where 9M4 was, and certainly wouldn't dream of trying to work one. But that's what happens, and we find it a difficult band to report fairly on.

Top-Band DX

For the DX-chasers, this season seems even better than last. G3IGW (Halifax) found conditions very good from November onwards, and worked 16 countries on the band during the *CQ* Worldwide Contest, his best DX being WØVXO on November 28. Equally thrilling to him was working W1 at 2130 and W2 at 2145z . . . unheard of a few years back. Other DX heard, or known to be around, during the contest included YVØAA, VP9EU, HK4EB, ZC4GC, KV4CI and EP2IW.

G3PLQ is bound for U.S.A. at last, having escaped from the West African beat. He hopes to visit many of the Top Band boys up and down the East Coast, from Norfolk, Va., to Halifax, N.S. On the first Trans-Atlantic Test (December 5), he was at Abidjan (Ivory Coast) and logged many G's as well as W, VE, 6Y5XG, ZB2AM, 4U1ITU, and the band was wide open until long after sunrise.

W1BB, reporting on the same test, says they hit exceptionally good conditions. Many G's got across for the first time, and signals were pouring in there from EI9J, DL1FF, EP2IW, PAØPN, KV4CI, HK4EB and ZB2AM. Other news from Stew: American Military personnel in Japan are now authorised to use a spot frequency of 1910 kc, with 200 watts. And he adds that Europeans, including G's, are often heard ragchewing with each other and oblivious to calls from across the Pond. (He recently overheard three G's, as late as 0810 GMT, working each other with signals up to 589, but not listening for DX . . . what did we say earlier ?)

6Y5FH has worked a few W's and heard stacks of them, but the only European logged so far is DL1FF. He finds the band open as early as 0230, but his main trouble is (or has been) QRN. Maybe it's better by now.

9M4LP says the band is already much better than last season. He has often heard DL1FF at S8, and G3FPQ peaked at S9 on one occasion. Outstanding signals have been logged from G2PL,

ZB2AO, Flat 6, 36 Main Street, Gibraltar, is GI3PLL when he's at home. His shack is only 6ft. by 4ft. and gets pretty warm—but he says he's lucky to have one at all, space being at a premium on The Rock. The gear consists of a Courier CTR-1 CW/SSB transceiver and activity is on 15-20-80m., with good DX being worked in the unscreened directions. ZB2AO is always on the look-out for U.K. stations, on 80-metre Sideband at weekends.

3RBP and 3RPB, and G3FPQ has been heard on SSB at S8, though no two-way SSB contact has yet materialised. At the time of his report (November 28) Bob said the band was peaking sharply at 2245-2250 GMT, and then dropping out completely a few minutes later.

W2EQS recently raised G3RBP at 2315 GMT, on his normal half-wave inverted-V, asked him to listen for signals on "another antenna" and was delighted when G3RBP gave him a 339 report on his Joystick, mounted vertically at 22ft. He has worked G, VP2, VP9, 6Y5 and most of W and VE on it to date.

Owing to the traditional delays at Christmas time, other Top-Band news (which we knew to be on the way) failed to reach us by the deadline. It will, of course, be covered next month, but it is a pity that it can't be given here. "Circumstances beyond our control" are responsible.

The "CQ" 160-Metre Contest

This popular event will be held once more at the end of January. Rules are unchanged from last year, and times are from 0200 GMT on Saturday, January 29, until 1400 GMT on Sunday, January 30. This is the one International Contest that attracts a large U.K. entry, and we have no doubt that the 1966 contest will be even brighter and better. Logs to *CQ* Magazine, or, if you prefer, direct to W2EQS, the Contest chairman.

DX Notes and News

1965 may well have been a record year for DX-peditions. Even Gus, W4BPD, stepped up the tempo during his last few weeks, and appeared in rapid succession as TY3ATB, 5T7H, XTØH and TZ5H. From all these places he seemed to be keeping up an average, at peak times, of 5 or 6 QSO's per minute!

His CW operating was, as always, a model of slickness, and well worth listening to. On one occasion we heard him say "Now QRT for ten mins." Nothing else, just that. Ten minutes later he reappeared on the same frequency, just sent "Agn" (nothing else) and was back in business at once. He has done more to educate the would-be DX chaser than anyone we know; in particular with his quick "Up 5" or "Dwn 5." At last the Europeans seem to be learning that calling on frequency is just a waste of time, and it is very largely Gus who has taught them that. After all, you can do a lot of educating in the course of 100,000 QSO's!

Other exotics have been at large, mostly around the Pacific area. W9WNV and K7LMU were active from ZM7 and then from VR2EW. Following that, the promised tour was to take in VK9 (Nauru), ZK2, ZK1, FW8 and possibly VKØ (Heard Is.), but at the time of writing we don't know what is happening.

Lloyd (W6KG) put in a long spell of operation from Ebon Atoll as KX6SZ/Ebon. Having resolved to make it a non-stop DX-pedition of ten years' duration, he is not in quite such a hurry as many of the other types.

Then one of the biggest pile-ups of all time was activated by W2SAW and his gang, when they appeared from Socorro Island (XF4). During December 10-13 they made a few thousand QSO's from that rare spot, so near the Californian mainland that one wonders how they ever got through that aluminium curtain.

9Y4DS and a couple of others were calls that caused some frantic chasing (you never know where these new prefixes pop up from!). They turned out to be some of the former VP4's. Then we had 9E3USA and 9E3USA (both really ET3's). GB2USA was publicised last month . . . not the first W operating from the U.K., but the Plymouth gang commemorating the voyage of the Pilgrim Fathers!

EA9IC was due in Ifni during mid-December . . . LU1ZC was on 14300 kc AM from the South

FIVE-BAND DX TABLE

Station	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries Worked
G2DC	112	169	312	289	170	325
G3DO	83	86	316	223	183	322
GI3IVJ	83	102	317	263	180	324
G3PEK	75	119	142	88	18	175
G6QB	67	119	302	211	145	323
G3IGW	67	115	153	129	123	189
G3KMQ	55	101	212	99	10	237
G3PQF	40	56	39	24	7	82
G3NOF	39	33	266	190	132	283
G3TJD	30	51	65	40	15	109
G3FTQ	27	58	118	91	46	144
G3UBI	23	8	67	18	10	89
GW3AHN	21	71	330	302	151	336
G3UML	20	31	168	84	31	182
G3UDR	18	4	90	41	17	122
G3IDG	17	27	54	70	60	101
VP8HJ	11	23	154	50	6	159
GM3RFR	11	37	83	53	7	102
G3MDW	8	8	51	46	43	82
G3RJB	2	50	113	26	11	120

Shetlands . . . PJ5BC was a DX-pedition to Bonaire by KØGZN and his XYL KØGZO.

These various DX-peditions make news, so it is our duty to report them, but it is seldom possible to give accurate details in advance, in a monthly publication. So we keep it brief, and pass on to other DX items of a less topical nature.

Hilton Hamfest

W9IOP and W8DUS passed through London on a business trip to Rome, which (by sheer coincidence!) happened to connect with the CW weekend of the *CQ* Contest, during which they operated HV1CN. With true enthusiasm and hospitality they organised a small gathering at the London Hilton, which brought together G2PL, G3JLB, G3POI, G3WP and G6QB. (All seven, incidentally, FOC members.)

One would like to report that DX discussions continued right through the night, but the G members of the party had various travel problems to solve and thus had to leave at a reasonable hour. Not, however, until everything wrong with our bands had been discussed, dissected, and decried. The meeting then dissolved, with a hearty vote of thanks to Larry and Al, two of the nicest DX'ers you could wish to meet.

G3FNF is now well established in St. Helena, and has managed to get the call ZD7RH, which he applied for (having operated from several other countries at various times with "RH" calls). He has a KW-2000 and a good assortment of aerials, and is sending his logs, periodically, to G2IO, who will handle his QSL's. Mails, however, are few and far between, so be patient. (Thanks to G2IO for this info.)

ZB2AO writes to say that he is very active on 80, 20 and 15 metres. Being on the west side of the Rock, he can't do much in the way of easterly DX, but gets out well to the North and West. He says "DX is not *chased*—just worked when available" . . . and there's no shortage. He's on the high end of Eighty at weekends, on SSB, and particularly looking for G's, and he promises some future Top Band operation, too. He QSL's only on receipt of a card—direct if an IRC is enclosed.

Reporting the HF Bands

General Chat

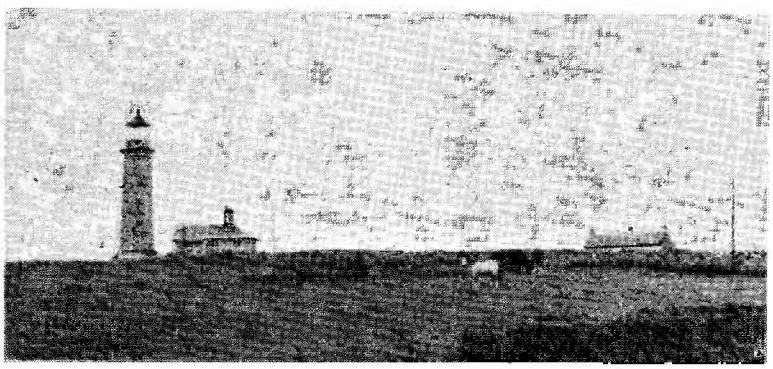
G8ON (Worksop) speaks out regarding QSL's, and says he will not, in future answer SWL reports on his 80-metre Phone. He says: "I get increasing numbers of such reports, but none have been in the least interesting or useful, and the proportion which are frankly stupid is growing fast. Half are not accurate . . . they are merely after my QSL card, and since it could not be of any help to them, I can only assume that those who will spend 8d. trying to get it are not right in the head!" Strong words, but of course he is right—a station getting S9 reports from all over the country doesn't need any reassurance from casual listeners who happen to hear him doing it. (Any SWL's who are irate at reading this might devote their energies towards reporting something more worth while than local stations.)

MP4BFK writes from Bahrain to say that he is on Twenty and Fifteen, mostly CW, with 25 watts, looking for G's. (W. L. Thompson, P.O. Box 144, Bahrain.)

EI3AY (Dublin) deals with the question of broadcast pirate stations in the amateur bands, and agrees with us that they are good parts of the band for tuning up on and testing. But he suggests also that "everyone should hold QSO's there". That's a bit hard, especially when they are S9+40. He quotes from the Radio Regulations of the ITU, Geneva (1959) as follows: "Considering that the sharing of frequency bands by amateur, fixed and broadcasting services is undesirable and should be avoided . . . and that the band 7000 to 7100 kc is allocated on a world-wide basis exclusively to the amateur service . . . the ITU resolves that the broadcasting service should be prohibited from the band 7000 to 7100 kc, and that broadcasting stations operating on frequencies in this band should cease operation."

Fair enough, but only *words*! What action is possible? No doubt the nations operating the pirate stations were not signatories to the convention in the first place.

[over

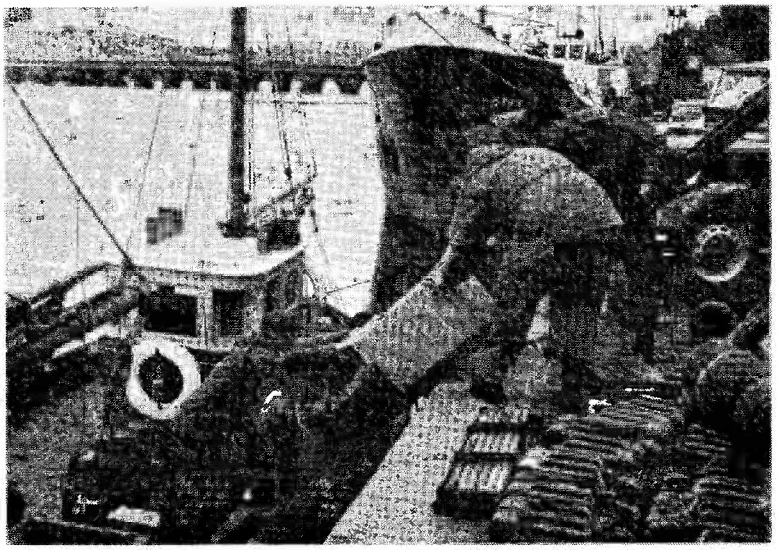


Not, as you may think, just a fill-up picture of a lighthouse with a couple of grazing ponies—but the location for the recent expedition by members of 14th Signal Regt. (Bampton, Oxon.), signing GB3LPC, to the romantic Island of Lundy, in the Bristol Channel fairway. Lundy has a chequered history—and even in quite recent times ships that failed to miss it in the fogs were considered fair game for anyone out of a North Devon port who could find the wreck before the insurance men got there! Lundy has been privately owned for many years and, like Sark in the Channel Islands, has some quaint laws and customs of its own. If you heard or worked GB3PLC, this is where they were.

G3IDG, commenting on G2DC's suggestions (last month) for reducing congestion on the bands, proposes to do his bit towards it. To start with, he will not call CQ or make a QSO just for the point of putting out a signal. He says: "A great many QSO's are ridiculously stereotyped and pointless, and only serve to clutter the air unnecessarily. A large number could be cut out without loss to anyone."

We agree, having heard hundreds of inter-European QSO's, on a wide-open DX band, which consist of QTH, name, signal report, and, of course, "Pse pse QSL QSL" and that's all. If they *must* be made, and as the operators concerned seem to think the more the merrier, surely they could consist of "589 Vlad QSL" and nothing else! They would be no more rubber-stampy than the present long drawn out affairs. (But who's going to tell Vlad, or make him understand, or get him to agree?)

G3IDG also proposes to reduce the pressure on QSL Bureaux by only answering those who specifically request his, and only initiating QSL's to new countries, States, prefixes or whatever. (And here we could commit another terrible heresy by stating that 90 per cent of the QSL traffic is pretty pointless, anyway. The days are long since past when one had to confirm that one had actually contacted a station by sending him a card to prove it . . . except in the case of the ultra-rare DX, in which case it's *you* that wants the card, not the other fellow, who probably has nightmares about drowning in a sea of them, anyway.)



Loading the GB3LPC expedition gear on to the "Lundy Gannett" from Bideford Quay. This small diesel auxiliary sailing vessel is the only connection between Lundy and the mainland and makes the trip in all but the worst weather. The chaps in this picture include G3LQC, G8ALD and G3UOU, with their SWL helpers. The box being lowered so carefully contained the Racal receiver used by GB3LPC.

TEN-METRE ACTIVITY TABLE

(Starting Date, June 1, 1964)

Station	U.K. Counties Worked	Countries Worked	Total
9J2DT	44	114	158
G3OHP	9	70	79
G2CDI	22	56	78
G3HCU	17	38	55
G3OAD	18	30	48
GM3SKX	27	19	46
G2DC	12	30	42
G3UML	6	31	37
G3IDG	5	24	29
G3EHL	8	9	17
G3SQX	2	2	4

9M4LP chides us gently for saying recently that nothing of note has happened on Ten. During the *CQ* World-wide Contest (Phone section) on October 23-24, he worked 72 stations in 34 countries on the band, including "a couple of S9-plus blockbusters from Europe (G3NMH and DL7AA)". He heard all continents and worked them all except North America, some of the best DX being KX6DR, KW6EJ, KG6APJ, 5J4RCA, ZD8AR, YV9AA, TL8SW, 7X2AH and ZC4MO. Ah, what a joy to live in the Tropical zone! We remember, last sunspot cycle, how the MP4's, 4X4's, 5Z4's and the like were all working super-DX on Ten, long before the first whiff of it reached us in the Temperate zone.

G2HKU (Sheerness) brings up a minor mystery about certain UM8 stations, who give their QTH as Jalalabad (or Djalal-Abad), which, by his maps, is in *Afghanistan*. Enquiries during the QSO's "got nowhere, fast". And he comments that it is only a few years ago that UM8's and UL7's were quite rare birds, but now they are pretty numerous.

And on the subject of making friends by regular skeds (which we commended last month as being better than hundreds of 10-second QSO's), G2HKU says that in 1948 he used to run a weekly sked with a couple of VK's . . . anyhow, the HKU's two-tier wedding-cake plus icing arrived safely as a gift from VK-land, which they have never forgotten.

Operating Hints

A long while ago—about the time when the G3E - - 's were the New Boys, a supposedly humorous piece was published in these columns, entitled "How Not to Work DX". It produced a startling reaction (actually a letter from one reader saying the advice was no good, as he had managed Not to Work DX for years without taking it).

However, DX being what it is

(and perhaps someone could tell us that), and conditions being what they are, and the standard of operating being anything between the superb and the amoebic, the subject keeps coming up again.

By far the easiest way to become a good DX operator is to learn what *not* to do, so we are happy to provide an improved, amended, modified version of the original masterpiece. Here we go, then, with the CW section of:

How Not to Work DX

(i) Make sure that your receiver has a nice broad bandwidth, enabling you to hear several stations at once. Then you have more to choose from,

(ii) Don't waste too much time listening. If you call CQ, and your rig is as good as you think it is, some nice piece of DX is certain to reply,

(iii) If, however, you are intent on calling one particular station, get on his frequency (or as near as your facilities will allow) and just *call* him. Keep on calling as long and as often as possible. Don't waste time listening, because how can he possibly hear you if you're *listening*? To *transmit* is the thing,

(iv) If he doesn't reply to several calls, stay on the same frequency and call CQ,

(v) If he is a really rare one, there will be a pile-up of stations calling him. This will probably be off his frequency, on one side or the other (surprising how few people know how to net !). Ignore this, of course, and call *on* his frequency. This will be the only clearish spot, so he's bound to hear you,

(vi) Make your call good and long—he's sure to be having a lot of QRM there,

(vii) Aim at a distinctive note —all these T9x signals are indistinguishable from one another. So introduce a ripple, a chirp, or both, and you will be an outstanding signal,

(viii) Try to send at a different speed from everyone else. If they are all calling fast and short (but don't waste too much time listening to find out), then you call slow and long. This, again, will make your signal outstanding,

(ix) Give him plenty of time to change over — some of these guys calling him are so snappy that their call has finished before he has had time to rearrange his crocodile clips. So start with the usual "dah-dit-dah-dit-dah" to give him time,

(x) Always remember rule *(iv)*. Keep trying, and if he hasn't replied to you in fifteen minutes or so, call CQ on his frequency. (Don't take any notice of any rude remarks that you may hear from other stations — they've always been a jealous lot),

(xi) If you hear a lot of nearby stations on the band, all calling "CQ DX", you can be sure there must be something good about. So join in the party—get right in among them and add your "CQ DX" to the chorus. Someone is sure to be waiting for just *your* signal, and will be pleased to give you a DX contact,

(xii) Finally, if you hear what sounds like a DX station calling CQ, and particularly "CQ Europe", don't be taken in. There are lots of practical jokers in Europe, and you will find that you have only landed on a UB5 or a

On the right G3RB (Whitley Bay, Northumberland) visiting G3ESP (Ackworth, Yorks.), who was taught Morse by G3RB when they both lived near Wakefield, back in 1948. Preferring CW to phone, G3RB has had only ten telephony QSO's in ten years!

GB3LPC (Lundy Island, Bristol Channel), as set up for RTTY operation, with G3LQC and G3INE (right) of 14th Signal Regt. The party consisted of eight members, with G3LQC in charge. Though they had a very good time, the first weekend was lost due to weather and that upset the RTTY plans somewhat. However, using all modes CW/SSB/AM/RTTY, 520 contacts were made with 70 countries on five bands in a total operating time of 136 hours, best DX being VK2AGW on SSB and FG7XT on radio teleprinter. On CW, the score was 45C on 20 metres. Their Tx was a Heathkit DX-100U and SB-10U adaptor for Sideband, with a Mosley TA-33, an El-Toro and a 3.5 mc dipole as antennae. This was the first-ever amateur expedition to work all bands and all modes from Lundy Island.

YU. *Real* DX stations don't call CQ—they just spend their time listening all over the band for an outstanding signal like yours. So go to it, son—even if you don't succeed in your object, you will have made lots of friends.

French Contest, 1965 and 1966

This contest attracted entries from seven G's and one GW, all on CW. G3EYN topped the scoring with 15,048 points, second and third being G3DYY and G6VC. The two top scorers in the whole event were UB5FG (31,374) and YU1BCD (27,399).

The 1966 event will be held as follows: *CW*, from 1400 on January 29 to 2100z on January 30. *Phone*, 1400 on February 26 to 2100z on February 27. Rules as before.

Tabular Stuff

The Top Band Ladder for G3S - - and G3T - - stations will make its final appearance next month. Will all stations concerned please send in their final score, up to December 31, in time for the deadline. After that we shall start a new table (as from January 1, 1966) for G3T - - and G3U - - stations only.

Sign-Off

Once more apologies for the non-appearance of various letters which were known to be in the post, but did not reach us after several days. This seems inevitable at the Christmas period, and there's simply nothing we can do about it. But we hope to be on an even keel next month, the deadline being first post on **Monday, January 17.** Address everything to "Communication and DX News", Editorial Department, SHORT WAVE MAGAZINE, Buckingham, England. Happy New Year—and may 1966 bring you successful communication on all the bands. 73 and—BCNU.

STOP PRESS — "NS1A"

With reference to the paragraph "That Man Again," p.611, December issue, we are officially informed by the G.P.O. that the "NS1" stations are illegal, and should be treated as such by U.K. licensed amateurs. The implications referred to about "NS1A" and the legal position were inaccurate, and this note is to clarify the matter for the information of all interested.

THANKS FOR GREETINGS

The Editor, management and staff of SHORT WAVE MAGAZINE, Ltd., would like to thank all those many readers who were good enough to think of us with cards and Season's Greetings this Christmas and New Year. They have been so numerous that it has not been possible to reply individually.

THE "NEW QTH" PAGE

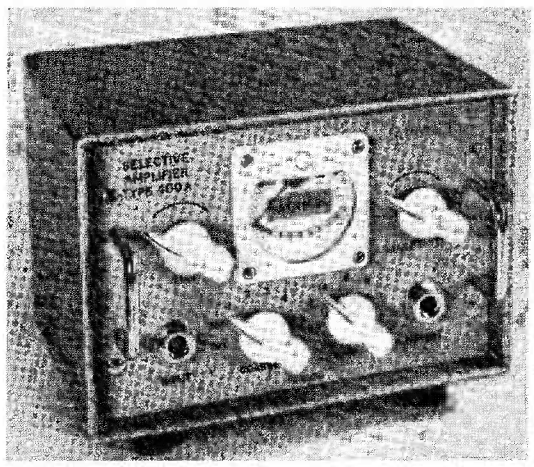
Though this is for the convenience of readers wishing to notify a new licence or a change of address of a station already licensed, it has another very important function—in that publication of a callsign/address in the "New QTH" page ensures its appearance in the quarterly issue of the *Radio Amateur Call Book* in preparation. *The Call Book* is the directory, and the only one extant, to the radio amateurs of the world. We are the agents for the U.K. and Europe, and we can supply any quarterly issue of the *Call Book*, as regularly advertised by our Publications Department.

"THE OTHER MAN'S STATION"

This has for many years been a regular, and very popular, *Magazine* feature. All we want is a good, clear photograph and a description of the equipment, results obtained, operating interests and such personal details as are permissible for publication. As we in any case tailor the story to fit the space, the descriptive material can be in "own words". Payment is made for the article, immediately on appearance.

USE THE CORRECT ADDRESS!

We are still getting a certain amount of Editorial correspondence addressed to our London office. Though, of course, such mail finds the right quarter eventually, it can be delayed several days, not only because of a weekend intervening, but due to the general slowness of postal deliveries in the London area. For *all* correspondence requiring Editorial attention, the correct QTH is simply: SHORT WAVE MAGAZINE, Buckingham. Anything else, *i.e.*, matters affecting circulation, subscriptions, advertising and the books department, should be addressed to: Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1, where we also give counter service during normal office hours from Monday to Friday each week.



This neat looking piece of apparatus is the "Avoncel" tunable selective amplifier, covering a range of 270-3700 cycles/sec. in four bands, with variable selectivity. Though the main application of such a device is in telecommunications networks operated in the audio ranges, it can also be used with D/F systems to give increased accuracy and reliability, especially under severe interference conditions, as the required signal can be selectively monitored.

SMALL ADVERTISEMENTS

(" SITUATIONS " AND " TRADE ")

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

SITUATIONS VACANT

TRAINEE DRAUGHTSMAN: An opportunity exists with this firm for a young man to train as a draughtsman; he will also be required to learn manufacturing methods. The minimum necessary qualification is G.C.E. O-Level: Engineering Drawing, Mathematics and English Language. The following subjects would also be an advantage: Applied Maths., Metalwork and Physics. Applications will be treated in strict confidence and should be sent to—The Managing Director, Green Electronic & Communication Equipment, Ltd., 79-91 Braemar Road, London, N.15.

EXPERIENCED SERVICE ENGINEER required for very interesting work on a wide range of communications equipment. Prefer licensed amateur. Applications, which will be treated confidentially, should give full details of qualifications and past experience (amateur and/or professional).—**Brian J. Ayers & Co., 21 Victoria Road, Surbiton, Surrey.**

TRADE

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

TV AND RADIO: A.M.I.E.R.E., City & Guilds, R.T.E.B. Certificate, etc., etc., on " Satisfaction or refund of fee " terms. Thousands of passes over the years.—For details of Examinations and home training courses (including practical apparatus) in all branches of Radio, TV and Electronics, write for free 156-page Handbook to: B.I.E.T., Dept. 18 OK, 29 Wrights Lane, London, W.8.

GOVERNMENT Surplus Electrical and Radio Equipment. Our new catalogue No. 16 ready now, 2s. 6d. post free. Cost refunded on first purchase of goods over £2 value.—Arthur Sallis Radio Control, Ltd., 93 North Road, Brighton, Sussex.

"TELECOMM" fully transistorised field strength indicators, with headphone output and giving 13 channels covering 3/BBC and 7/ITV, also modified for 28, 70 and 144 mc bands. Brand new and complete, normal price £45, limited quantity offered at £30. Send s.a.e. for details.—Radio Communications Co., 16 Abbey Street, Crewkerne, Somerset.

AMATEURS! Your QSL Cards at reasonable prices, 20s. per 100.—ACE (Dept. Q), 330 Wetmore Road, Burton-on-Trent, Staffs.

SILICON PLANAR TRANSISTORS: 18v., 200 mW, 100 mA max., beta = 150-300. Prices: n.p.n. @ 5s. 6d. each; p.n.p. @ 7s. each. All brand new, and by-return service.—Electrovalue, 6 Mansfield Place, Ascot, Berkshire.

SALE: Hallicrafters S.36 VHF AM/FM Communications Receiver, 28-144 mc, excellent condition, price £35 (carriage 40s.). Cossor Oscilloscopes Type 1035, £25, and 1049, £35 (carriage 35s.). American APN-4 receivers, new and boxed, 70s. (post 10s.). A/S 576 Valve Voltmeters, £7 10s. (post 15s.). TS-45APM3 X-band Test Sets, new, £5 10s. (carriage 10s.). Double carriage to Scotland or Ireland. Special rates overseas. Send s.a.e. for list. Mail Order Only.—WORTHING RADIO, 7 Coronation Buildings, Brougham Road, Worthing, Sussex.

NEW YEAR OFFER! Mullard AUY10 (120 mc, power) only 29s.; and OC170 (100 mc), only 5s. 6d. each. Post free from: EMSAC (S), Ltd., 73 Frenchgate, Richmond, Yorkshire.

SMALL ADVERTISEMENTS, TRADE—*continued*

URGENTLY Required: All types of commercial communications equipment. Spot cash payments made for all good gear brought in. (Midlands amateurs please note.)—AMATEUR ELECTRONICS, 240 Lichfield Road, Aston, Birmingham, 6. (Tel.: East 1497.)

FOR SALE: KW-2000 and PSU, in excellent condition, £165. AR88D, £32 10s. TCS-12 Tx, £12 10s. WANTED: All types of communication receivers, etc. Collected. Contact—Moecan Electronics, 11 Westbury Road, Leckhampton, Cheltenham (24217), Glos.

BRAND NEW and boxed in manufacturers' sealed cartons, valves QV1-150A/4CX150A, £5 each. AR88D, £45. AR88LF, £40. BRT-400, £65. Latest G.E. two-metre Converter, from stock, 14 gns. Twelve-volt 60w. DC-DC converter, output 300v. at 200 mA, from stock, £7 19s. 6d. Mosley 3-element beam, TR-33Jr., £15.—Green E.C.E., Ltd., 79-91 Braemar Road, London, N.15. (Tel. STAmford Hill 1387.)

FOUR-METRE Mobile! Hudson Type AM104A 12-volt 20-valve Transceivers, with handset and remote control unit; 6146 PA and push-pull 6BW6 modulator; Rx side is double conversion. With data but less crystals, £7 17s. 6d. carriage paid.—Radiomatics, 140 Oak Street, Norwich, Norfolk, NOR.83.K.

ENTIRELY New Preselector for SWL's. A tuned pentode amplifier with built-in aerial tuning, covering 1·8-32 mc. Tunes antenna and simultaneously amplifies signal; self-powered. Only £6 18s. Send s.a.e. for specification.—Hamgear Electronics, 29 Carlyle Road, Norwich, Norfolk.

READERS' ADVERTISEMENTS

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

WANTED: AR88D RF and converter front-end sub-chassis complete (namely 4-gang condenser, coil assembly and switchery) for direct replacement as unit. Must be guaranteed to be in new unmodified condition, alignment and calibration. Gear assembly and remainder of set not required, nor complete set (as import duty, which includes transport, too excessive). Also required complete set of new valves and two calibrated dials. Grateful if owner could extract assembly from otherwise defunct set lying idle and quote reasonable cost delivered to:—5Z4JW, Box 240, Kitale, Kenya.

WANTED: K.W. Vanguard. About £30 offered.—F. D. Nurse, G3RBI, 10 Wenwell Close, Buckland Wharf, Aston Clinton, Buckinghamshire.

WANTED: To buy or borrow, circuit and/or instruction manual for Panda ATU.—J. Sharratt, 12 Pebblemoor, Edlesborough, Dunstable, Beds. (Tel.: Eaton Bray 297.)

SALE: Six Creed Type 7B Teleprinters, 24-volt, look good but untested, £9 each, plus 35s. carriage in strong wooden case. 19 Set variometers, 15s. 6d. each, post free. PSU's, 12/24 volt input, vibrator and rotary, output 175v. and 500v., control by 3-position switch, as new, 50s., carriage paid.—J. French, 41 Main Street, Groomsport (242), Co. Down, N. Ireland.

EXCHANGE: Late model Eddystone 888A, trimmers still sealed, with S-meter, perfect, for AR88D in mint condition, with trimming tools and manual; cash adjustment: no rebuilt models entertained. Or sell 888A at £62.—Lewis, West Winds, Arbor Lane, Winnersh, Berkshire. (Tel. Wokingham 2698, after 7 p.m.).

SMALL ADVERTISEMENTS, READERS—*continued*

WANTED : Eddystone EC-10 Rx in EXCHANGE for Aya No. 3 12-bore Shot Gun, in excellent condition, complete with case.—K. Clark, One Harmony, Studland, near Swanage, Dorset.

FOR SALE : Heathkit RA-1 Rx, mint, £38. K.W. Valiant £20. PSU, giving 475v. 250 mA, 375v. 80 mA, 250v. 150 mA, £8. CR-100 Rx, with spares and manual, £17.—G3RHP, QTHR. (Tel. Berkhamsted 1741.)

SALE : Minimitter Mercury Tx, immaculate condition, for AM/FM/CW operation 10-80m., £40 o.n.o.?—**Box** No. 4209, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING : Eddystone 840C, as new, £42 if buyer collects.—Gates, 12 Mount Avenue, Wrenthorpe, Wakefield, Yorkshire.

WANTED : For my own use, QQV02-6 valves. Reasonable price paid for bottles in fair condition.—Slingsby, G8ADH, Burley, Ringwood, Hants.

WANTED : Codar PR-30X Preselector. SALE : Marconi VFO Bridge RB150/2, new and sealed, with instructions, £4 10s. Type R.107T S/W Rx, new, latest release, p.v.c. wired, £16.—Gratton, 244 Colley Road, Sheffield 5, Yorkshire.

WANTED : Heathkit SB-10U in mint condition, also Heathkit 'scope OS-1. EXCHANGE mint T.W. Twomobile Rx for either or both with cash adjustment.—Ridley, G5NN, Fir Tree Cottage, Singleborough, Bletchley, Bucks.

SALE : Hammarlund HQ-129X receiver, £30 ; Harvey-Wells Bandmaster Phone/CW Tx, £15 ; both complete with auto-transformers. HRO-5T, five GC coils, with PSU and manual, £15. Jennings vacuum variable condensers, 150 mmF and 700 mmF max., £10 each.—Box No. 4211, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE : In perfect condition, a Lafayette HE-80 receiver, covering HF bands and two metres, £45.—G3RGA, 46 Norfolk Road, New Barnet, Herts. (Tel. HAD 2084.)

SALE : B & R coax relays Type 004, £2. R.C.A. UHF signal generator, 370 mc-580 mc, like new, metered, internal modulation, £10 o.n.o. (carr. 20s.). SCR-522, like new, with cables, control unit, original mains power supply, all valves but no crystals, £10 o.n.o. (carr. 30s.). Valves, ex-equipment, tested, like new : 6J6, 6X4, 6AL5, EF91 @ 1s. each, 10s. doz.; 12AT7, 12AU7, 12AX7, 1s. 3d. each, 12s. doz.; 6CH6, EF80 @ 2s. each, 18s. doz.; 5R4GY, 5U4G, GL32, EL81, 2s. 6d. each, c.w.o. only.—Bos, 8 Barbrook Close, Tilehurst, Reading, Berks.

SELLING : E.M.I. Vidicon Tube 1066 with base, line frame focus coils, all assembled complete on aluminium frame with target connector, clamp and screens. £15.—Fouracre, 11 Cannock Road, Burntwood, Staffs.

WANTED : Bandspread coils and Manual for HRO-M.—M. Kitchin, The Homestead, Kilsby Road, Barby, Rugby, Warwickshire.

FOR SALE : Complete station, comprising Panda Cub in blue/grey, very good condition, with crystal mike and key ; Hallicrafters SX-24, good condition ; also spare valves, etc. Price £40.—G3OZJ, QTHR. (Nantwich 64169.)

AMATEUR gone Professional wishes to dispose of station ; s.a.e. for list. Capital equipment includes : CR-100 Rx with S-meter and modified front-end, £14 : Cossor Type 1035 Mk. II Oscilloscope, £16 ; BC-221, £14 ; and endless components !—Box No. 4212, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING : HRO Senior, complete with PSU, speaker and bandspread coils 10-80m., plus Top Band/BC, in good condition, £19. — G3CYL, 39 Brookly Gardens, Fleet (1521), Hants.

FOR SALE : Heathkit DX-40U and VF-1U, both factory built, absolutely perfect and only 8 months old. Offers, please, to.—G3TQY, Ashar, Cross Road, Tadworth, Surrey.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: BC-221, with built-in PSU, charts and handbook, in good condition, £18.—Ginder, 222 Whetstone Lane, Aldridge, Staffs.

SHORT of Cash after Christmas? Turn your surplus relays into money; send s.a.e. for details.

SALE: 11-valve ex-R.A.F. receivers Type 3582A, as-new condition, £1 plus 12s. 6d. carriage.—G3LMR, 112 Groby Road, Glenfield, Leicester.

SALE: Rx Type R.107, with new PSU, S-meter, BFO calibrated USB/LSB, Cossor rejector, and manual, £14 10s. Rx Type 62H (R.1392) adapted with LC Osc., PSU Type 234A and manual, £7 10s. Crystal Calibrator No. 10, with manual, £3. RF-27 Unit, 20s.—Marsh, 232 Beverley Drive, Edgware, Middlesex.

WANTED: Six-volt power supply Type 2146 for Marconi HP112. Also any VHF mobile equipment.—GM3GUJ, 1 Thorfin Place, Thurso, Caithness, Scotland.

EXCHANGE: For CR-100 Rx, a BC-348R receiver, in good condition, with built-in mains PSU and circuit data. Prefer exchanger collects.—A. Blair, 13 The Chesters, Ebchester, Consett, Co. Durham.

EXCITING New Year: Old shipmates, contacts and SWL's, for 1966, de G8IX.

SALE: T.W. two-metre Nuvistor Converter, with built-in PSU, £10. T.W. Twomobile Rx, £18. T.W. Topmobile, £10.—Rowlands, Post Office, Meifod, Montgomeryshire.

FOR SALE: Giant power supplies, 19in. rack mounting: One gives 300v. 1 amp DC and various odd voltages, 50s. (carr. 40s.); matching low-voltage unit gives 6·3v., etc. at 15 amps, price 40s. (carr. 40s.). Either delivered free 40 miles. Must be sold!—G3PUR, QTHR. (Worthing 7416.)

SALE: National HRO-MX receiver, with nine coils and manual, £18. Geloso VFO Type G4/105, xtal controlled, as new, £17. HRO-MX with 80m. BS coil, £10.—Box No. 4213, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Olympic T.150 Tx, 10-80m. 150-watt AM/CW, with TT21 PA and 2/KT88 modulator, in excellent condition, complete with new spare PA and Mod. valves, £45. Minimitter MR44/II Rx, amateur bands only 10-160m., latest mods. fitted by makers include Electroniques coils, new tuning mechanism and new panel, complete with matching speaker, £35. Transport by arrangement.—G3MKH, 270 Spital Road, Bromborough (2313), Wirral, Ches.

EXCHANGE: Portass 3in. by 16in. Lathe, perfect, with many extras, worth £50, for a Heathkit DX-40U with VF-1U VFO, or similar.—Box No. 4214, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Hammarlund HQ-180 Rx, £100. HRO chassis, with tuning gang and dial, S-meter, IF transformers, xtal filter, nine GC coils, £5.—Box No. 4215, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MOBILE/BASE: K.W. Valiant and KW-77 all-band Tx/Rx, with 12v. transistorised PSU, mains supply unit, control box with S-monitor, send switch and push-to-talk socket, all screened cabling, neatly laid out with flexible mounts on tray for Mobile or Base station work, recent K.W. Electronics overhaul, 50 DX countries worked mobile, excellent all round, price £65 complete. Also two-metre equipment, Mohican Rx and other useful items going cheap to make room for Transceiver; send s.a.e. for list.—G3TJY, Jolly, 30 York Road, Broadstone (521), Dorset.

SALE: R.107 Rx, in good condition, £10. Perdio Town and Country Rx, covering LW/MW to 4·5 mc, continuous, £10.—G3RAD, 1 Approach Road, Broadstairs, Kent.

WANTED: Manual for G.E.C. BRT-402, or circuit and alignment procedure.—Puffett, Stanree, Island Road, Upstreet, Kent.

SMALL ADVERTISEMENTS, READERS—*continued*

OFFERING: The sum of £45 for a grey Eddystone 680X, and £60 for a 940, with matching speakers.

SELLING, on offer, a Hallicrafters SR-150 Transceiver, with handbook.—Box No. 4216, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Pre-war "Short Wave Magazines," Vols. I, II and III; also any copies of "Short Wave Listener."—G3OPP, 7 Standard Road, Downe, Orpington, Kent.

FOR SALE: KW-2000, with AC PSU, in excellent condition. Also home-brew 600-watt Linear using pair 4X150A's with 26BTM blower; separate PSU giving 1400v. at 600 mA, using silicon diodes. Can arrange to view in Ipswich. Offers to:—P. Smith, 24 High Street, Orford, Woodbridge, Suffolk.

SALE: New QP.166 LZ amateur bandspread Qoilpax, with valves, £10. New Eddystone 898 dial, £3. "Short Wave Magazine," January 1960 to December 1965, offers? Postage extra.—Kellow, St. Dominic, Callington, Cornwall.

SELLING: Hallicrafters SX-140 amateur-band Receiver, £25. Heathkit DX-40U transmitter, £20. Both in mint condition, with handbooks.—Box No. 4218, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Hammarlund HQ-180A receiver. Also HX-50, 75-S1 or KWM-2. Condition and price to:—G3LGL, QTHR.

FOR SALE: As new, little used Tiger TR.300 transmitter, really beautiful factory built AM rig, QY3-125 in PA, 805 modulators, with spare valves. Can be seen working. Best offer secures, as owner going 100% SSB, and wants the space. Buyer collects.—Box No. 4217, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Factory-built Vanguard Tx, and good BC-221, or similar.—Box No. 4221, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Heathkit DX-100U, as new, with power reduction for 160m., £55 o.n.o.? Carriage paid.—GI3SOO, 79 Prehen Park, Londonderry, N. Ireland.

WANTED: Panda 150 ATU; BC-221 with charts and PSU; AR-77 unmodified; Acos Mic.36 desk mike. Only gear in first-class mechanical and electrical condition of interest.—Knight, Homefield, Upper Nazeing, Nr. Waltham Abbey, Essex.

SELLING: Set of five crystals for Sideband Filter. £2. Crystal mike, 20s. WANTED: Transmitting variable condenser, 350 mmF.—133 Station Road, Cropston, Leicester.

WANTED: Mosley TR-33Jr. beam and rotator. FOR SALE: KW-160 Tx, £20.—GW3OSV, Park East, Clarbeston Road, Pembrokeshire, West Wales.

FOR SALE: Two CV-equivalent 4X150, with bases (not airflow), 20s. each. Small 28-volt DC blower, 10s. Coil and switch for "2DAF" Linear, 10s. Marconi power xformer, 510-0-510v. and 375-0-375v., 250 mA both, with several 5v. and 6·3v. windings, 30s. Pair field telephones, good condition, 40s. MCR-1 "Spy" Rx, needs attention, 20s. Pye "Reporter," partly modified Rx, £3. Command Tx type variable condensers, 2s. 6d.—G3OOQ, 14 Townsend Road, Tiddington, Stratford-on-Avon, Warwickshire.

WANTED: K.W. Viceroy Tx, in perfect working order.—Edgar, 10 Western Avenue, West Denton, Newcastle-on-Tyne, 5, Northumberland.

FOR SALE: Sphinx Tx, 20-80-160m., AM/CW/SSB, 70 watts p.e.p., plus Silplug rectifier and Delta control unit, £55 complete. Vanguard type AM Tx, 10-160m., 75-watt output, using Geloso VFO into 807 PA with 6V6 clamper, fully relay controlled, £20. G3RKK receiver, 10-160m. double superhet, Electroniques front end, Kokusai mechanical filter, Eddystone dial, Philpotts cabinet; FB condition, £20.—Lawrence, 9 Dunslade Road, Erdington, Birmingham, 23.

WANTED: The S-meter for an Eddystone 750 Rx.—Exelby, 14 Station Parade, Harrogate, Yorkshire. (Tel. Harrogate 84703, evenings.)

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Electroniques QP.166 coil pack, £8. Steel cabinets, hinged lids, 19½in. x 10⅜in. x 13½in., 30s.; another, grey hammer, 16½in. x 8⅜in. x 12¼in., 45s.—G3KGN, 126 Danescroft Drive, Leigh-on-Sea, Essex.

SELLING: An AR88LF, with S-meter, in nice condition, including manual, FB contacts all bands, £30 o.n.o.? Reasonable delivery.—437 Helmshore Road, Helmshore, Rossendale, Lancs.

WANTED: Coils for HRO.—GM3OWU, 9 Belmont Avenue, Juniper Green, Midlothian, Scotland.

SALE: As brand new, few weeks' use only, 4-element four-metre J-Beam; T.W. four-metre converter, 6DS4, 29 mc IF; B.44 thrown in (no PSU). The Lot £15.—Ring Abinger 215 or STReatham 4289.

WANTED: Latest Viceroy or similar Tx; also HQ-170A or equivalent Rx; must be in mint condition. Private buyer.—Box No. 4219, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: R.C.A. receiver AR-8516L, 18 valves, covers 80 kc to 30 mc in 18 bands, with seven crystal-controlled HF oscillator ranges, triple conversion, with 3 kc Collins mechanical filter, excellent on SSB, with handbook. Price £120.—G3ODT, 6 Water Street, Skipton, Yorkshire.

SALE: Turner Type 254X microphone, little used, £7 10s. Galaxy Compressor (made by WRL, U.S.A.), three months old, £7 10s.—J. Kelly, 140 Spring Road, Kempston, Beds.

WANTED: Eddystone 940 or late 680X, or similar. Must be perfect. Reachable London.—Box No. 4220, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Type PN-12B PSU, 19in. rack mounting. —Judge, Abbey Leigh, Minster Lane, Barrow-in-Furness (1596), Lancs.

ATTENTION SWL's: Spotless HE-30, new Dec. '64; professionally wired improvements include separate BFO, fast AVC, impedance detector, 3-watt output, 200 kc calibration bar; only needs internal Q-multiplier to complete; also 88 Set, 2-20 mc. Price £25 the pair.—Rowbottom, 29 Legion Street, South Milford, Nr. Leeds, Yorkshire.

SELLING: Sphinx SSB Tx, with control unit, £65. Heathkit RA-1 Rx, in excellent condition, no mods., £28. Top Band Tx/Rx, using Command Rx, with m/c mike, £5. Double-super transistor Rx, covering 1·6-30 mc, with S-meter and mains/battery PSU, £6.—G8BI, QTHR (or ring Welwyn Garden City 23676 after 6 p.m.).

WANTED: Woden mains transformer type MD89288; must be in good working order; state price.—Tory, 10 Park Road, Burgess Hill, Sussex.

FOR SALE: All in FB condition, AR88D, £30; K.W. Vanguard, £30; Top Band Tx £10; Joystick, £3; 150-watt Olympic coupler, £7. All as shown in "Other Man's Station," November issue.—G3RJB, 5 Powys Walk, Hereford.

SELLING: Tested valves, 5B254M, 6s.; 5763, 5s. 6d.; 12AT7, 3s.; 12AX7, 3s. 6d. Postage and packing included.—E. Reeve, G3JXZ, 284A Barking Road, East Ham, London, E.6.

SALE: NCX-3 and NCX-A, with PSU/speaker unit, 6146B's in PA, indistinguishable from new, sell £175 o.n.o.? Or consider Part EXCHANGE for factory-wired Heathkit DX-100U in mint condition.—G3MEF, QTHR. (Ring Barnstaple 2665 after 1630z.)

FOR SALE: Hallicrafters SX-117 triple-conversion Rx in mint condition, £150. Heathkit DX-100U Tx, £45. Send s.a.e. for list of other items.—G3PZX, 5 St. Hilda's Way, Gravesend, Kent.

WANTED: Urgently, circuit diagram, service notes or manual for PR-120V Transmitter; buy or borrow.—GW3GIN, 50 Romilly Road, Canton, Cardiff, South Wales.

SALE: AR88LF, in immaculate condition, with manual, price £30. Carriage extra over 30 miles.—G3RUH, Miller, Jenkins Farm, Hatfield Peverel, Chelmsford, Essex.

SMALL ADVERTISEMENTS, READERS—*continued*

MOBILEERS ! As new AC Alternator 45 amps., complete with 50-amp. ammeter, transistor control box, no relays, positive earth, £25.—GM3UCH, 46 Braemar Drive, Falkirk, Stirlingshire, Scotland.

SELLING : **Linear amplifier,** "2DAF" type, with QY3-125's, three new Taylor meters, Philpott's S-Line cabinet, separate 1500/2000v. PSU, £20. National **NC-46 Rx,** coverage 600 kc to 30 mc, AC/DC, with matching speaker, £5. Creed **3X Teleprinter,** with case, 150v. DC, £7. Type **6S Auto-Tx,** 24-volt DC, £5. PSU, 12/24v. 0·7 amp., £2. Two **No. 44 Perferators,** 240v. DC and 250v. AC, £3 and £5. WANTED : Cheap but stable general-coverage Rx. All offers considered ; prefer buyers inspect.—Thompson, Hillcrest, Leazes Lane, Hexham (3869), Northumberland.

WANTED : Good general-coverage Rx, such as AR88D, CR-100 or similar. Full details and price required to :—R. Whitbread, 108 Gascoigne Road, New Addington, Surrey.

G3PDW Shack Clearance: Command Rx, 1·5-3·0 mc, with AC/PSU, £6 5s. Ten-watt 160m. Tx/Rx, ideal mobile rig, size only 10in. x 6in. x 4½in. high, including mobile whip aerial, price £12 ; AC/PSU for same, in case 10in. x 7in. x 6in., £2. Auto-transformer, 110/250v. 100 watts, 15s. Choke, 20 Hy 80 mA, 7s. 6d. Three FT-243 xtals, 7·0, 7·15, 7·5 mc, 7s. 6d. New Acos 45 mic., 15s. Relays, some new, others ex-equipment ; P.O. 3000 type, 6s.; G.E.C. sealed, 7s. 6d.; Siemens sealed high-speed, 10s.; S.T.C. sealed, 7s. 6d.; Clare sealed, octal base fitting, 5s.; Siemens miniature sealed, 10s.; send s.a.e. for list or state requirements for relays. TU5B Unit, new, 25s. G3HSC Morse Course, two LP records, from 7 to 42 w.p.m., as new, £3. Amateur Radio Course, with answers, £3. Maxi-Q GDO-2, with all coils from 1·5 to 300 mc, as brand new, £12 10s. Many other items, all listed for s.a.e. All collect (Essex), or postage extra.—G3PDW, QTHR.

SALE : Eddystone B.34 communications Rx, with six coil ranges covering 150 kc to 4·8 mc, also 21 to 28 mc, price £5.—J. Roberts, 18 Buckley Street West, Wigan, Lancashire.

WANTED : Mohican GC-1U or Eddystone EC-10, in mint condition ; also BC-221.—VK3AVU, c/o 8 Yateley Court, Hayes Lane, Kenley, Surrey. (Phone UPLand 3878.)

SALE : Elizabethan 120-watt CW transmitter, self-contained. additional high-level modulator, £22 o.n.o.?—G3HLG, The Laurels, High Street, Collingham, Notts.

SELLING : **R.107,** with built-in speaker and PSU, new standard front-end, including manual, £10. Following **Handbooks Wanted :** Receivers, Bendix RA-1B ; R.C.A. AR-77 ; R.A.F. Type 53 Tx. Also selling **Stereo Record Changer,** transportable, complete, in very good condition, £15. **Stereo Headphones,** high impedance, £4.—Tel. BUCkhurst 7565.

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