

The SHORT WAVE Magazine

VOL. XXI

FEBRUARY, 1964

NUMBER 12

HAMMARLUND

(Established 1910)

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The **HAMMARLUND HX-50** SSB transmitter
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Top left (opposite):

HQ145X. Double conversion super. General coverage and Bandsread, 11 tubes, **£110.**

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Bottom left:

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Bottom right:

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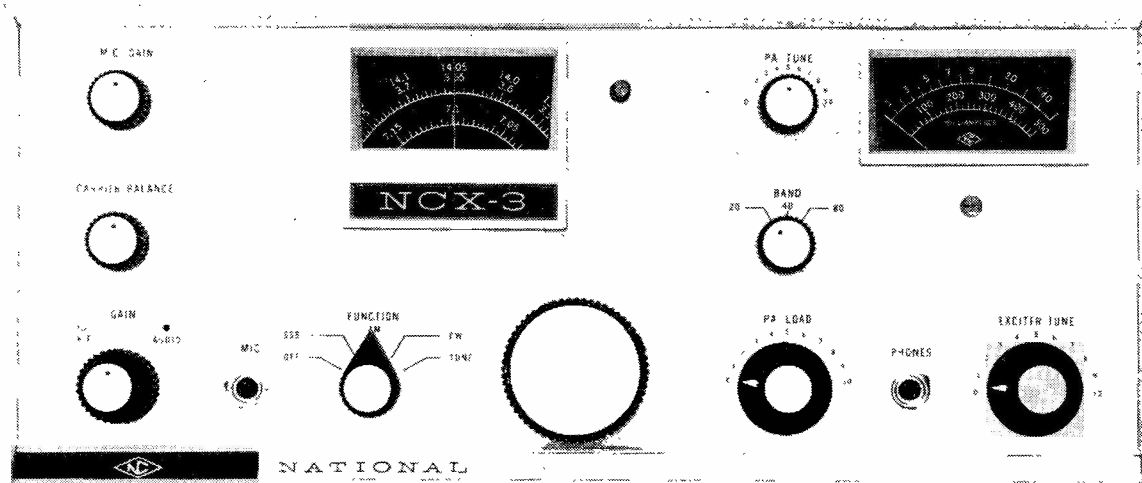
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Phone: DARTFORD 25574

National NCX-3

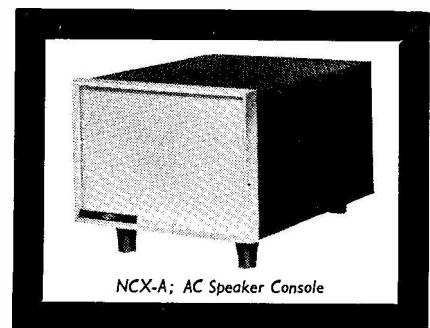
TRI-BAND SSB TRANSCEIVER

The National Radio Company, America's oldest and most highly respected manufacturers of superior amateur equipment is now marketing their complete line of amateur and short wave equipment in the U.K. Of particular interest to British amateurs is the new National NCX-3 transceiver which incorporates a remarkable number of features usually found in only the very highest-priced equipment.



PRICE £148·8·4 NCX-A; AC Speaker Console £46·7·1
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Complete coverage of the 80, 40 and 20 metre phone and cw bands (3480-4020 KC, 6980-7310 KC, 13880-14420 KC) · 200 watts PEP on SSB, 200 watts cw, 100 watts AM · VOX and PTT with adjustable delay · AM Detector for compatible AM operation · GRID-block break-in cw Keying with adjustable delay · Smooth fast-attack, slow decay SSB/cw ABC · S-meter/PA current meter · Adjustable PI-network output with separate loading control · Receiver sensitivity 1.0 μ v for 20 db. S/N · 18 Tubes, 26 tube functions, 6 diodes · Matching NCX-A power supply/Speaker console operates from 115/230v. A.C. 50/60 cycle mains · NCX-D transistorised 12v. D.C. power supply operates with either positive or negative earth, and includes both reverse polarity and short-circuit protection · One-year Guarantee against component failure.



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NATIONAL NC105. 550 kcs. to 30 mcs. bandspread ...	44	0	0
HALLICRAFTERS SX101A. Amateur bands	125	0	0

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GREEN & DAVIS. 2 metre Falcon, 12 volt DC	30	0	0
LABGEAR TOPBANDER. As new ...	17	0	0
PANDA PR120. In excellent order ...	49	0	0
HALLICRAFTERS HT32A. SSB 80 to 10	160	0	0

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NATIONAL NCX3. SSB transceiver, 80, 40, 20—200 watts ...	148	8	4
NATIONAL NCX/A. AC Speaker Console P.S.U. ...	46	7	1
NATIONAL NCX/D. DC P.S.U. ...	50	8	11
EDDYSTONE 870A ...	34	5	8
EDDYSTONE 840C ...	62	0	0
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EDDYSTONE 960. Transistor ...	135	0	0
EDDYSTONE EC 10. New transistor receiver early delivery ...	48	0	0
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MOSLEY CM 1. Amateur bands ...	86	0	0

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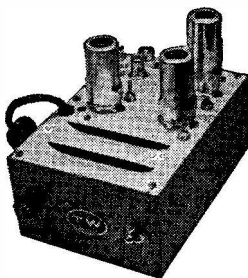
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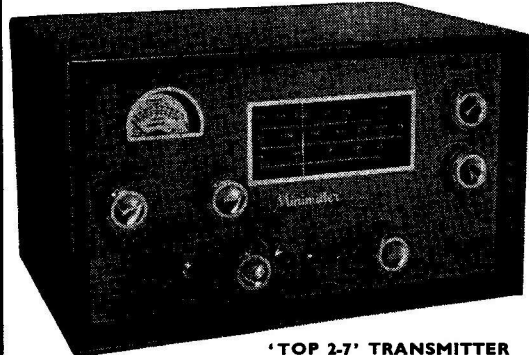
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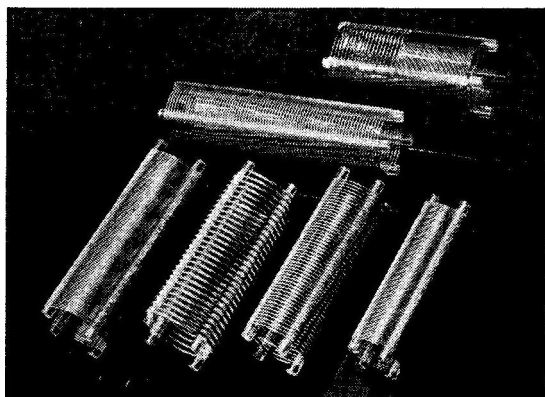
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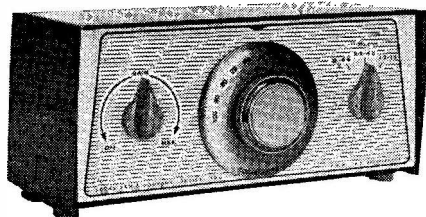
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Frequency range 1.5–30 Mc/s.

Substantially improves the performance of any superhet receiver



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You are to be congratulated on turning out a very fine piece of equipment. Several of the Coventry "gang" have heard the P.R.30 in use and all have expressed their amazement at the gain obtained and the absence of background noise . . . You may use any remarks I have made in this letter as I am so delighted with the Unit.

G3RIA writes . . .

The results in conjunction with my Eddystone 888 are amazing. Signals are twice as strong with much higher signal/noise ratio. A first class product well worth the money.

G3ADZ writes . . .

I feel I must congratulate you upon your P.R.30 Preselector. It is more than refreshing to find — Equipment well up to stated specification and performance . . . very well made and finished . . . at a fair price for Amateur . . . and care in packing.

G4HZ writes . . .

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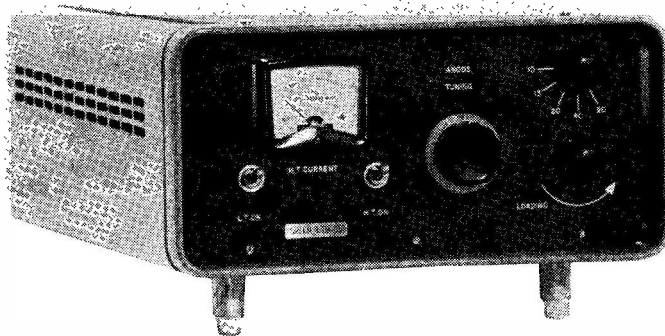
G3HGQ

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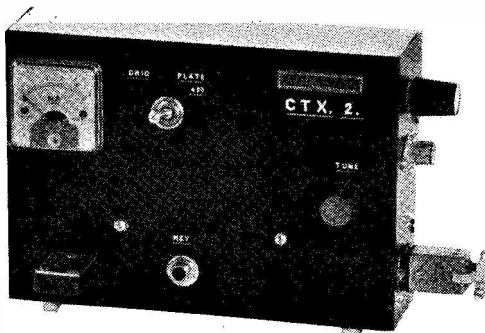
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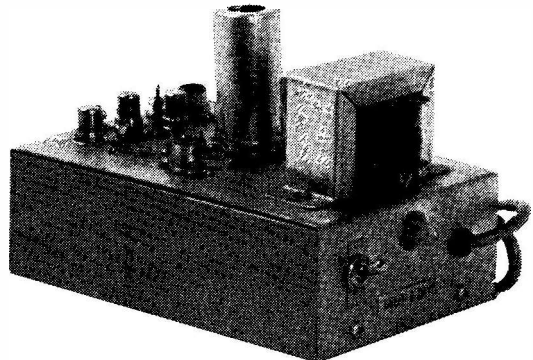
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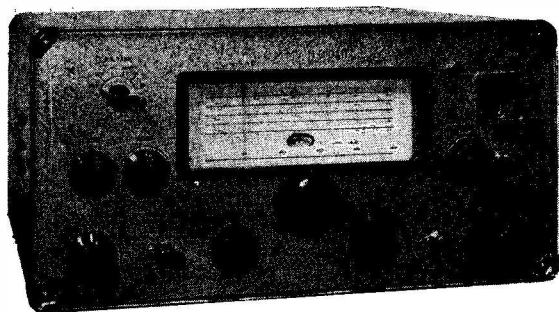
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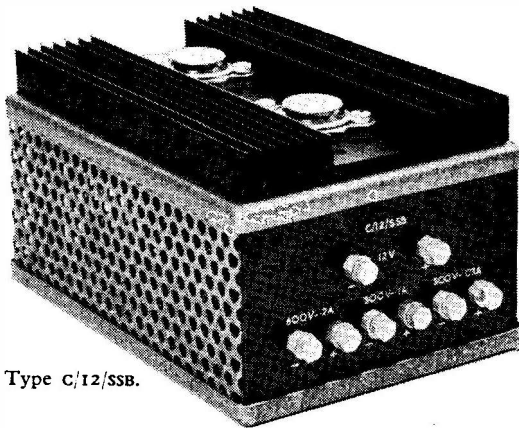
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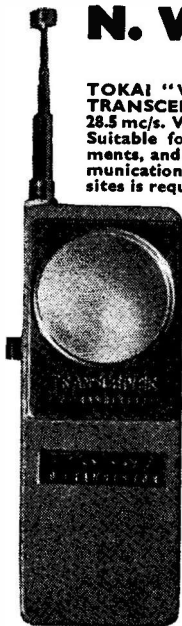
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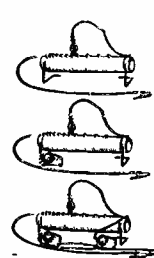
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The SHORT-WAVE Magazine

EDITORIAL

Contests At this period of the winter DX season, we have coming upon us contests of various kinds, in which a large number of amateur transmitters are interested, and many of our readers will be going over their equipment in preparation for the strenuous days ahead.

To our mind, there is much to be said both for and against contests. On the one hand, a healthy competitive spirit is aroused, serious entrants put their stations to a severe test—and only those who go in for the American DX competition know just how severe it can be, both on man and material—and there is much interest, excitement and even experimental value attached to the whole business, for in these days it really is something to get only a moderately high place in a DX Contest open to the world.

But there is another aspect, and not the obvious one of “pot-hunting.” Rules which are watertight for unscrupulous entrants are difficult to formulate, it is hard to avoid giving some part of the world or a particular group an advantage over all others, and above all there is the incentive to go to almost any lengths in order to win. Selfish operation breaks out like a rash, power limits are forgotten, and friction arises between competing operators and those who wish to use the bands in the ordinary way.

For not all amateur transmitters—and actually only a comparatively small percentage—are interested in DX Contests as they are staged at present. Admittedly, the difficulty is to make them equally fair and attractive to everyone, though in this respect the ARRL DX Contest (where entrants compete only with others in their own country in working American and Canadian stations) is quite the best one open for world-wide participation.

But apart from the British Empire and America, there are other countries also interested in contests, who naturally want to organise their own. The result is that about this time of year there is one contest after another coming in this or that category, with needless duplication, intense band-occupancy (though this is not much that we should worry about) and even condemnation in print of one country running a telephony party while another is organised for CW!

It seems to us that something should be done about all this through the International Amateur Radio Union—but can it? The answer is No. And so we shall probably see the Contest Scramble going on till amateurs themselves weary of the situation or demand one annual effort, and one only, organised for world participation.

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The foregoing, by the present writer, appeared just 25 years ago, in the February 1939 issue of SHORT WAVE MAGAZINE. It is as generally true now as it was then—the question is, have we made any progress?

Austin Forsyth,
G6FO.

TWO-METRE TRANSCEIVER FOR PORTABLE/MOBILE OPERATION

MEDIUM-POWER
TRANSISTORISED EQUIPMENT,
USING PRINTED CIRCUITRY

Part I

C. BOWDEN (G3OCB)

This article is of particular interest in that it not only describes an efficient VHF transceiver, but its design and construction in unit form. This means that each section is virtually self-contained, and the units can be built separately—for other purposes, if needs be. That is to say, our contributor's version of a transistorised two-metre receiver, with printed circuitry at IF/AF, (though intended by him for portable

THE author had been interested in going mobile for some time, but it was not until after becoming keenly interested in VHF that the need to be able to operate mobile and /P more or less forced the issue, the home QTH being screened in some directions.

Due to the remoteness of the location, away from main centres of VHF activity and also because of the hilly terrain of Cornwall, it was considered necessary to build high-performance equipment with a good "DX potential" if worthwhile results were to be expected.

In order to do this without excessive drain on the car battery, it was decided to utilise transistors where possible. It would remain necessary to use valves in the transmitter as VHF power transistors are still not readily available.

After considering the power problem, and the modulator components that could be used, it was apparent that a 25-watt plate-and-screen modulated transmitter was a possibility, with quite good economy.

A neat metal cabinet was already available, which had originally housed a war-time IFF set, size 14½ in. wide, 7 in. high and 7 in. deep, so it was going to be a problem to fit everything in. In fact, the power supply and aerial change-over relay were eventually positioned externally to the transmitter/receiver. It might have been possible to fit the relay inside by using an open DPCO type or one of the commercial coaxial types, but the high loss of the former and cost of the latter were not acceptable. Since they are separate, however, it would be possible to use the PSU and relay with other equipment if

operation) could equally well be the basis of a fixed-station converter for anyone interested in experimental work with transistors at VHF. Similarly, the IF/AF unit and the speech amplifier-modulator, all transistorised, can be regarded as separate items adaptable for other purposes. The second part of this article—dealing with the transmitter, change-over system for transistor protection, the power supply and other relevant sections of the assembly as a whole—will appear in a later issue.—Editor.

desired, so the extra bulk was considered not to be too great a drawback.

In order adequately to protect the RF transistors in the receiver, a special change-over system was developed. This necessitated two auxiliary relays in the equipment, as well as the aerial relay, and is designed to ensure that the receiver input is earthed before the Tx is energised and not unearthed until the Tx is dead. (A fuller description is given later.) The circuit works well in practice and no damage to the transistors has occurred.

In order to keep down cost (and to give as much satisfaction as possible) as much of the equipment as reasonably could be was home constructed,

Table of Values

Fig. 1. Circuit of the Two-Metre Transistor Converter

C1 = 1.8 μ F min. (Henrys)	C22 = 8 μ F, cer.
C2 = 15 μ F	R1, R12 = 6,800 ohms
C3, C5, C8, C10, C14, C15, C19, C20, C21, C23, C24, C26, C27, C28,	R2, R3, R6, R8, R15, R17 = 1,000 ohms
C29 = .001 μ F solder feed-thru	R4, R7 = 1,500 ohms
C4, C9, C25 = 0.5-3 μ F cer. trimmers	R5, R9 = 10,000 ohms
C6 = 2-3 μ F cer.	R10 = 4,700 ohms
C7 = 0.5-3 μ F var. (Henrys)	R11 = 2,200 ohms
C11, C17 = 100 μ F, s/m	R13 = 3,800 ohms
C12 = 47 μ F, s/m	R14 = 3,300 ohms
C13 = .001 μ F, cer.	R16, R19 = 190 ohms
C16 = 220 μ F, s/m	R18 = 150 ohms
C18 = 15 μ F, var.	RFC = 1.5 mH min. RF choke (Henrys)
	Xtal = 35 mc min. 3rd overtone type (Henrys)
	TR1 = 2N2398 (Philco)
	TR2 = 2N1743 (Philco)
	TR3,
	TR5 = OC171 (Mullard)
	TR4 = OC170 (Mullard)

Notes: All components except transistors, crystal and RFC are mounted within the diecast box. All resistors are miniatures, rated 1/16th watt. Alternatives 2N1743, AFZ12 or AF139 may be substituted for TR1, with slight circuit changes. Coax sockets are used for SK1 and SK2.

TABLE OF COIL DATA

L1	— 5½ turns 20g. silver-plated wound to ¼-in. diam. over ¾-in. length, with tap half-turn from earthy end, and single-turn link.
L2	— 8½ turns 26g. wound to ¼-in. diam. over ½-in. length, with tap 4 turns from C7.
L3	— Coil wound as L1, without tap.
L4, L5	— Approximately 50 turns 36g. enam. close-wound on ¼-in. diam. former with dust-core. Link 8 turns at cold end.
L6	— 12 turns 30g. enam. close-wound on ¼-in. former with dust-core. Links two turns each at cold end.
L7	— 5½ turns 24g. on p.t.f.e. sleeve, ¾-in. long, with dust-core. Link one turn at cold end. Tap 2 turns from C25.

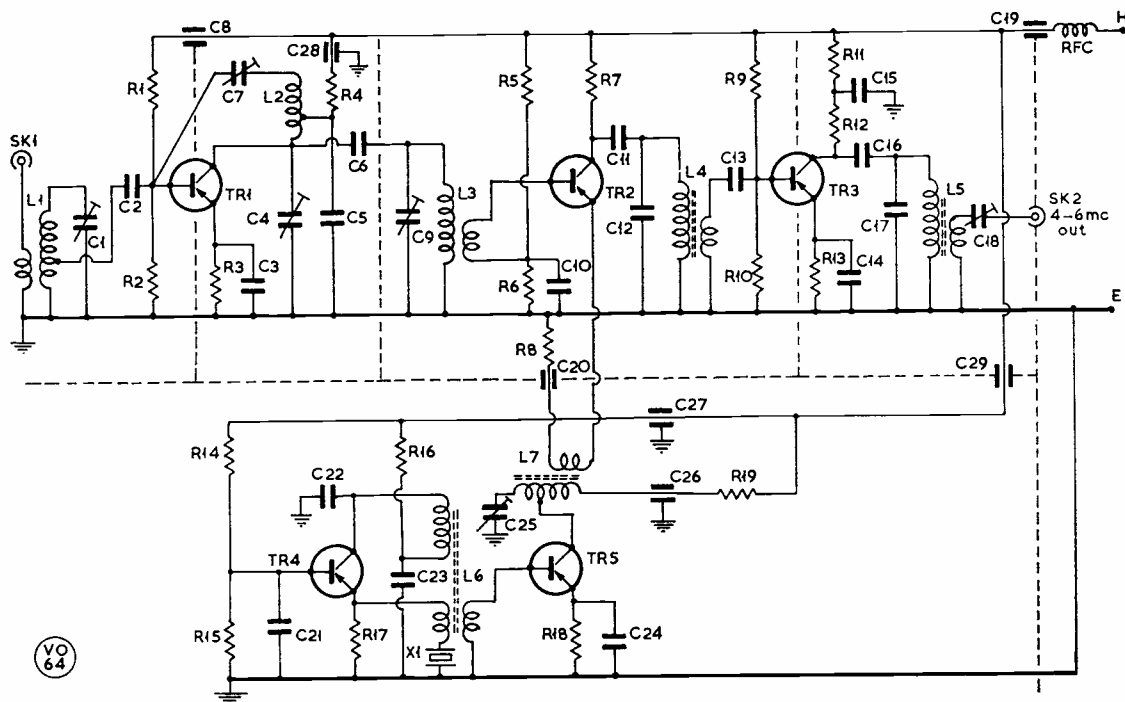


Fig. 1. Circuit of the transistorised two-metre converter designed by G3OCB, for which all values are given in the table. The RF stage TR1 is neutralised, and the output from the IF stage TR3 is for 4-6 mc tunable. The oscillator-multiplier chain is TR4-TR5, with a 35 mc third-overtone type crystal in the emitter of TR4, which is an OC170. By suitable choice of crystal and the values for L6, L7 other injection frequencies can be used. Construction is in compartments, with careful inter-stage screening, and feed-through condensers are fitted to all input leads.

using tools and test equipment normally available to the average amateur.

The modulation and driver transformers were excluded, however. Although it is possible to make these on the bench, the work involved in winding on several thousand turns of wire did not seem exciting! It is doubtful if a home-made item could have been made small enough, considering the difficulties of hand winding. Consequently commercial transformers were obtained from Gardners; these items are beautifully made. A fault in the modulator resulted in the transformer being subject to a current of some 12 amps, for quite some time (normal rating 2.5A). The fuse failed to blow. The transformer was too hot to hold after this treatment. It was returned to the factory and passed all tests satisfactorily and has since given six months of trouble-free operation. A cheaper or home-made item would surely have failed. (It is now possible to get transformers for transistor modulators made by other suppliers.)

The question of home construction or commercial is more easily settled in favour of the former when one considers DC/DC converters; such items are easily built at home at quite considerable saving in cost. By using a larger toroid than usual, winding is easy; the 500 or so secondary turns can be wound in an hour or two and, due to the large core, the toroid can be used at much higher inputs than the present equipment calls for, simply by putting in

suitably rated transistors and primary winding wire size. Despite the large core, efficiency is over 80 per cent when the unit is supplying 50-60 watts. There is, of course, no reason why a vibrator or rotary power supply should not be used if the extra power drain is acceptable.

The difficulty with such a limited front panel area was to find room for a suitable dial after the meter, speaker and control knobs had been taken into account. A Jackson Bros. SL16 dial was eventually chosen; this was the largest that could be fitted and provides a reasonable amount of bandwidth. The tuning rate is rather fast, but allows SSB to be tuned while static. Due to voltage variation with engine speed (Zener diodes are not perfect and the converter crystal oscillator is in any case not stabilised), and also because of the tuning rate, reception of SSB while mobile is difficult. It was necessary to cut holes in the dial plate for the two dial bulbs.

Chassis Details and General Construction

The complete transmitter/receiver is built up from a number of individual sub-units. The reasons for this are various.

- (1) Unit construction allows easy servicing of circuits and permits quite radical changes without necessitating a complete rebuild,

[over

- (2) Screening and mechanical stability are much better, with excellent isolation between circuits,
- (3) "One-level" construction would have made it impossible to fit the equipment into the desired cabinet.

No RF feedback has been experienced despite the fact that no precautions have been taken against this. The screened microphone head amplifier does, however, give a measure of protection in itself.

Printed circuitry has been used in the modulator and also in the receiver IF, AF and S-meter stages, but normal techniques were used in the converter, tunable IF strip and in the transmitter.

The heart of the assembly is an Eddystone diecast box, which houses the receiver IF, AF and S-meter stages. The converter and tunable IF stages are both built in the smallest-size diecast boxes, which are then fitted on a spare lid from a larger box. This is so mounted that two screws release the complete converter/tunable IF assembly from the rest of the equipment. Tuning is by means of RF27 type condensers.

A narrow chassis mounted along the rear of the main diecast box supports the two control relays and the transmitter crystal oscillator and its associated bank of crystals. Either side of this area, a dividing partition of aluminium screens off the modulator on the one side and the transmitter on the other. The screen between the modulator and centre is also used as a heat sink for the modulator transistors which are insulated from the chassis by mica washers—see general layout diagrams (Part II).

The modulator chassis is only one inch high so as to keep the overall height, including transformers, to less than 7ins. This leaves just enough room to mount the printed circuit board and potentiometers beneath. The driver and modulation transformers are fitted above chassis, with the driver transistor using a portion of the chassis as heat sink. (This is not strictly necessary, however,

due to the low level at which this stage operates.) The transistor must again be insulated from chassis by a mica washer.

The transmitter unit is built on a chassis with a sloping portion, in order to get the PA valve anode pins close to the tank circuit.

Transistors

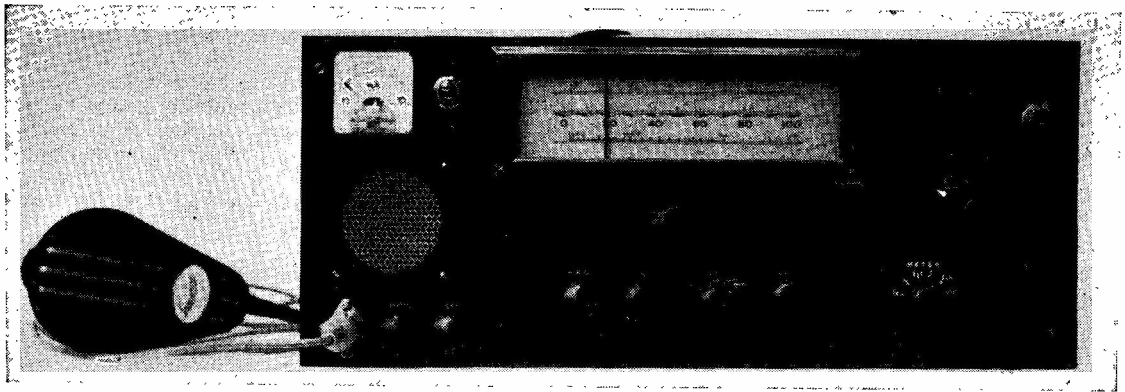
It should be noted that prior to building this equipment the author had not previously played with transistors. Despite the pessimists who make transistors appear very difficult to work with due to the variation in characteristics and their fragility, the very opposite has been found to be true! Admittedly, care is needed in handling transistors and a heat shunt *must* be used when soldering. It is very easy to damage a transistor electrically—one 2N1743 suffered a change in characteristics when, while trying to measure the emitter voltage, the meter was inadvertently left on the current range, shorting the emitter resistor and leading to an excessive collector current. Such things often happen in an unguarded moment. By using the potentiometer base-bias system and reasonably high collector and emitter resistors, little trouble should be experienced with change of transistor or momentary faults, e.g. with a 12v. supply and 1K emitter and collector resistors, the collector current cannot exceed 6 mA even with heavy base-bias. If the base-bias potentiometer is made up using fairly high resistors, the base current is similarly limited under fault conditions.

These techniques are used where possible to limit the maximum currents that can flow to a safe value.

Modulator

Originally a pair of XC142's had been tried, as they were available and reputed to be equivalent to the NKT404 specified in a similar circuit—they did not in fact stand up to the treatment in the manner expected.

A matched pair of OC35's was then substituted, these transistors being much more suitably rated,



Panel appearance of two-metre transceiver described in the article by G3OCB. It is suitable for fixed-station, mobile or portable use, on CW or phone with p-and-s control by a transistor modulator, and is self-contained for power, running off a 12v. DC supply. Full details are given in the text.

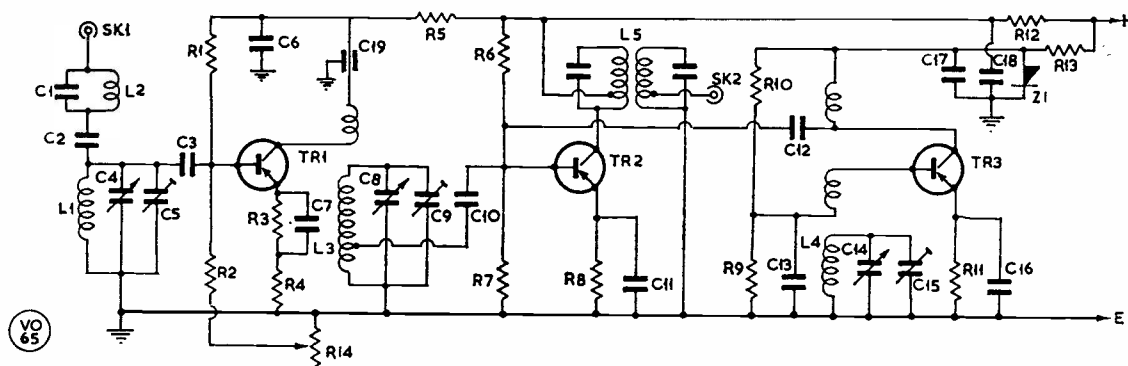


Fig. 2. The tunable IF amplifier section of the G3OCB two-metre receiver is built as a separate unit. The input arrangement at L1 for TR1 was found to be necessary to ensure the stability of this stage — see text. The oscillator TR3 produces an IF output at 465 kc, which is taken from the mixer TR2 at Sk2 into the three-stage IF amplifier shown in Fig. 3. Condensers C4, C8, C14 are ganged (75 $\mu\mu\text{F}$, ex-RF27), and R14 functions as a "de-sensitise control" against strong local signals.

and trouble-free operation has been obtained since.

The driver stage still uses an XC142 as the power level is much lower at this stage, and the XC142 gives slightly more gain than the OC35. A three-stage RC amplifier provides the driving signal. The un-bypassed emitter resistors in the first and driver stages introduce some negative feedback. This is the only feedback employed in the complete unit; despite this, and the reputation of transistors for distortion, speech quality has been reported as quite good.

Originally a crystal microphone was employed, the first transistor having a very high series base resistor to make the input current fed. Due to the heat experienced in the car during summer and the fragility of crystal microphones, the latter was replaced by a *Lustraphone* dynamic type. This was modified, the transformer being removed from the microphone casing and a small transistor amplifier incorporated to improve the audio output level. The original cable was removed and a length of miniature screened 6-way cable substituted. The microphone switch which had originally been used to short the mike was re-wired to two of the cores and used to control the main relay. A 5-pin Continental type plug and socket connects the mike head amp-control switch assembly to the main unit.

The modulator speech amplifier (Fig. 5, p.664) is built on a printed circuit board. (Etch your own P.C. Kit). Gain is controlled by R6, wired between the head amplifier and the speech amplifier and mounted on the front apron of the modulator chassis. The modulator shown would probably supply as much as 20 watts of audio if suitable transformers were used.

Transmitter

The transmitter first stage—see Fig. 6, Part II—utilises a 6C4 as a fundamental oscillator, in order to permit alternative frequencies to be selected at will by a front panel switch. In this transmitter four frequencies are available. An extra control on the front panel is the "net" switch. The net switch

Table of Values

Fig. 2. Tunable IF section, 4-6 mc range

C1 = see L2	R1, R6 = 100,000 ohms
C2 = 8.2 $\mu\mu\text{F}$	R2, R12 = 1,200 ohms
C3, C6,	R3, R8 = 1,000 ohms
C7, C10,	R4 = 100 ohms
C11, C13,	R5 = 2,500 ohms
C16, C17 = .01 μF , min.	R7 = 4,700 ohms
C4, C8,	R9 = 2,200 ohms
C14 = 75 $\mu\mu\text{F}$, var. (ex-RF27, or similar)	R10 = 10,000 ohms
C5, C9,	R11 = 470 ohms
C15 = 3-30 $\mu\mu\text{F}$, Philips	R13 = 200 ohms
C12 = 10 $\mu\mu\text{F}$	R14 = 25,000 ohms, var.
C18 = .05 μF , min.	Z1 = OA2212, Zenner
C19 = .001 μF , feed-thru	TR1, TR2 = OC171 (Mullard)
	TR3 = OC170 (Mullard)

TABLE OF COIL DATA

- L1 — 45 turns 36g. enam. close-wound on $\frac{1}{4}$ -in. diam. former with dust-core.
- L2 — Wound to resonate at 35 mc with C1.
- L3 — 45 turns, as L1, with 6-turn link close-wound at cold end, and tap at 10th turn.
- L4 — 40 turns, as L1, with links 3 turns each at cold end.
- L5 — 465 kc. double-tuned IF transformer, any miniature type.

as it is enables one's channel to be more closely checked for QRM. The net switch merely supplies HT to the CO stage with the receiver still operating. Enough harmonic is available at 144 mc for net purposes.

The second stage is an EF91 tripler to 24 mc, and the third stage is a 6BW6 tripler to 72 mc, this output being finally doubled to 144 mc. Several EL85's were tried in the second tripler and final driver but operation was not satisfactory as there was insufficient 144 mc drive at all times and the 72 mc drive tended to be very variable. (This effect may have been due to the fact that the EL85's at hand were not in a good condition.) Even with the battery fully charged it was impossible to obtain the 2 mA minimum considered necessary. In order to rectify this and since some 6BW6's and 5763's were available it was decided to employ these instead. With the two latter types in use grid

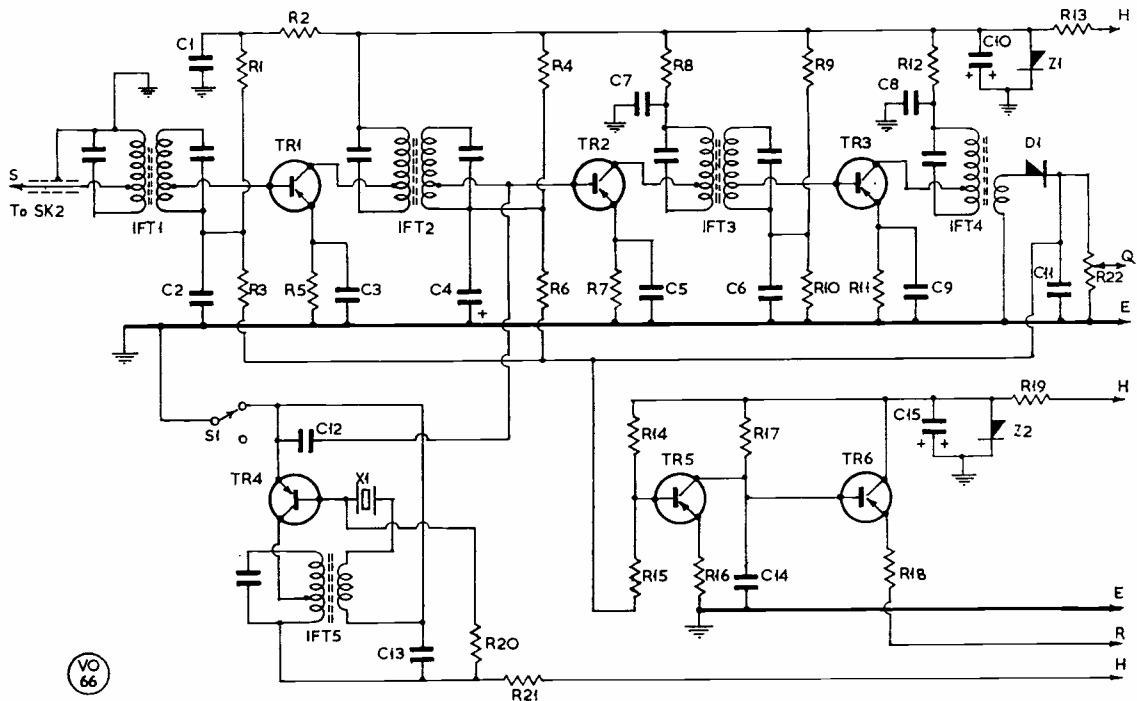


Fig. 3. The 465 kc IF amplifier, detector D1, and BFO TR4 circuits are built up as a single unit on a printed-circuit board, of which details are given in another diagram. Commercial IFT's are used throughout in this section — see table of values. S1 is the BFO switch and R22 the audio gain control, working into the AF amplifier at Fig. 4, p.664. TR5, TR6 comprise the S-meter unit.

current of over 2 mA is obtained even with a low battery, while the figure approaches 3 mA when the battery is fully charged. The -ve 12 volt battery supply is used to protect the frequency multipliers and driver stage against drive failure. This voltage is insufficient to protect the PA valve, however, so an EL85 is used as a clamp tube. The watt or so of heater drain of this valve is considered a reasonable price to pay to insure the PA valve.

The transmitter circuitry at Fig. 6 (Part II) is quite conventional except for a couple of points. One unusual feature is the type of crystal oscillator used. A fundamental type oscillator is necessary so that the various crystals may be switched and the actual circuit used permits this to be done without loss of output from crystal to crystal and is very easy to get going. The other point to mention is the use of feedthrough capacitors C9, C12 to decouple the grid current metering resistors R8, R12. These capacitors mount through the chassis and provide ready made clip-on metering points.

The output link is tuned by a miniature 50 μF variable condenser and this permits easy load alteration. The PA grid coil resonates, with grid circuit strays, at 144 mc. The coupling of the series-tuned driver anode coil L4 to the PA grid coil is fairly critical for maximum drive. Keying is effected by breaking the screen voltage of the 6BW6 multiplier. There is a very small output from the PA under these conditions due to leak-through of energy, but

Table of Values

Fig. 3. IF Amplifier, Detector, BFO and S-meter unit

C1, C3,	R9 = 27,000 ohms
C5, C6,	R10 = 6,800 ohms
C7, C8,	R13, R19 = 200 ohms
C9 = .05 μF , min.	R14 = 100,000 ohms
C2, C4,	R15 = 4,700 ohms
C15 = 8 μF , 15v. elect.	R16, R18 = 470 ohms
C10 = 30 μF , 155v. elect.	R20 = 220,000 ohms
C11 = .01 μF , min.	R22 = 5,000 ohms, var.
C12 = 2 μF	D1 = OA70
C13 = 1 μF , 15v. elect.	Z1 = OA2204, Zenner
C14 = 2 μF , 15v. elect.	Z2 = OA2212, Zenner
R1 = 50,000 ohms	Xtal = 465 kc
R2, R3,	TR1,
R6, R17 = 10,000 ohms	TR2,
R4 = 68,000 ohms	TR3 = AF117 (Mullard)
R5, R7,	TR4 = XA103 (AEI)
R11, R21 = 1,000 ohms	TR5 = S1 (GEC)
R8, R12 = 2,200 ohms	TR6 = OC81D (Mullard)

IF transformers IFT1, IFT2, IFT3 are type XT50, Repanco; IFT4 is type XT27, Repanco; and IFT5 is type P50/33C, Weymouth.

this output is so weak as to be negligible.

Receiver Section

Converter.—As stated this unit—shown in Fig. 1—is built into a miniature Eddystone diecast box and comprises RF stage, mixer, IF amplifier, overtone crystal oscillator and multiplier. See p.659.

There is not much room to spare, but by using tubular ceramic trimmers and miniature coils, resistors and capacitors, the converter has been

squeezed into the box. The crystal and transistors are external. Holes were drilled through the lid of the box to accept the RF stage and mixer and plug-in bases were used for the other stages. These little holders do not seem to have caught on generally but make excellent bases for easy transistor replacement, as well as providing tags to which other components can be soldered. The bases are not designed for mounting through a metal panel, but by cutting off the fixing lug and filing a small notch on either end, they can be made a nice press fit into a small slotted hole.

This facility has enabled several types of transistor to be plugged in directly to assess performance without fear of damage due to continual soldering. For example AFZ12, OC170, OC171 can all be directly interchanged, in many cases without a component change.

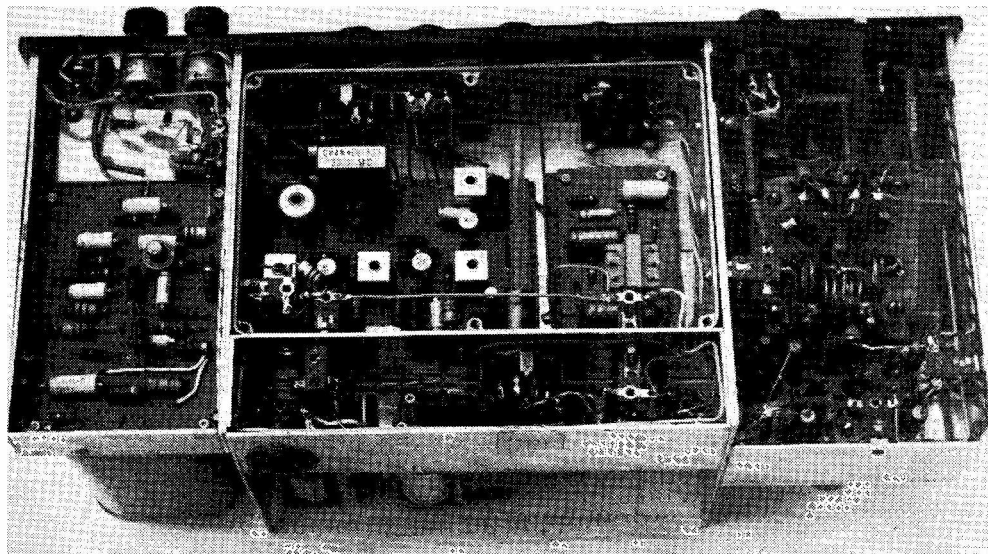
The RF stage uses a Philco type T2028 (2N2398) transistor (originally a 2N1742 gave very good performance in this position but the T2028 is noticeably superior in gain and noise factor). Neutralizing is by means of a split collector coil and adjustable capacitor (C7). The use of link coupling in the converter has been found to give best performance and easiest adjustment, as well as lower image and IF breakthrough.

The mixer stage is again conventional, using a 2N1743. The link coupling helps to provide a low base-to-ground impedance at the IF, which is impor-

tant with transistor mixers. The output coils of the mixer and IF amplifier (OC171) are both heavily damped to keep down gain and to make the response more level. The IF used by the author is 4-6 mc and the IF response is level to within 3-4 dB over this range. In some areas 4-6 mc may lead to serious image problems and it may be necessary to double-convert or to alter the tunable IF to a higher frequency. As an example, the crystal oscillator could be changed to 30 mc and the quadrupler would then come out at 120 mc; the first IF would be 24-26 mc, and by changing the OC171 IF amplifier into a mixer stage fed with 30 mc energy directly from the oscillator, an IF of 4-6 mc would again be available but now as a result of double-conversion.

The overtone stage uses an HC6U 35 mc type third-overtone crystal and the output from this stage is quadrupled in the OC171 zero bias multiplier stage. Sufficient output is available from this stage for efficient low-noise mixing.

Leads in the RF stage, mixer and multiplier should all be kept as short as possible in accordance with usual VHF wiring techniques. Due to the low circuit impedances found in transistor equipment, by-passing is usually more of a problem. Solder-in feed-through capacitors of .001 μ F capacity are used between compartments and also at all power leads entries; these are very effective at the frequencies in question. Screening inside the



Under-chassis view of the G3OCB two-metre transceiver assembly showing layout of the printed-circuit boards, with the transmitter chassis on the right. Some further drawings will appear in the second part of the article, with which this view can be related.

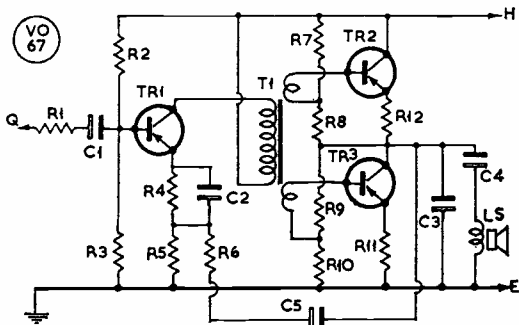


Fig. 4. The AF amplifier in G3OCB's receiver design, using standard parts throughout. The transistors TR2, TR3 in matched pair give plenty of audio output.

converter is made from thin tinned copper.

Reverse AGC is not applied to the RF stage as this tends to reduce rather than improve the signal-handling capacity of the stage. In areas where high signal strengths are common forward AGC may be employed and should provide about 20 dB of gain reduction in the RF stage alone as well as improving the signal-handling capability. (Transistor manufacturers can usually supply information on the best type of AGC to employ and any other relevant details.)

Table of Values

Fig. 4. Transistor AF amplifier and output stage

C1 = 8 μ F, 15v. elect.	R8, R10 = 100 ohms
C2, C5 = 50 μ F, 15v. elect.	R11, R12 = 3.9 ohms
C3 = 1 μ F, 15v. elect.	T1 = xformer LFDT4 (Weymouth)
C4 = 100 μ F, 15v. elect.	TR1 = XB103, or similar
R1, R6 = 470 ohms	TR2, TR3 = XC131, or similar (matched pair)
R2, R3 = 27,000 ohms	
R4 = 1,000 ohms	
R5 = 10 ohms	
R7, R9 = 3,300 ohms	

Tunable IF (3.5-6 mc)

This unit (apart from tuning condensers and trimmers) is as Fig. 2, p.661, and is constructed in a miniature size Eddystone diecast box and has three stages—an OC171 in the RF; OC171 mixer; and OC170 oscillator. Zenner diode stabilising is employed in the oscillator stage and is reasonably effective in keeping the frequency stable, although there is some slight change in frequency with extremes of battery voltage due to the shortcomings of Zenner diodes.

Plug-in transistor bases are used for the mixer and oscillator stages but the RF stage transistor is mounted within the box with a small screen of

Table of Values

Fig. 5. Speech Amplifier and Modulator

C1, C2, C9, C10 = 25 μ F, 15v. elect.	R24 = 150 ohms
C3, C4, C7, C8 = 8 μ F, 15v. elect.	R25 = 47 ohms
C5, C11, C13, C14 = 50 μ F, 15v. elect.	R26 = 100 ohms
C6, C12 = 100 μ F, 15v. elect.	R27 = 3.3 ohms
R1, R3, R4 = 3,800 ohms	R28 = 150 ohms, 1-w.
R2, R18 = 15,000 ohms	R29 = 33 ohms, 1-w.
R5, R8, R15, R17, R20, R21 = 1,000 ohms	S1 = Phone/CW toggle
R6 = 25,000 ohms, var.	T1 = xformer GR33445 (Gardners)
R7, R10 = 6,800 ohms	T2 = xformer GR33446 (Gardners)
R9 = 38,000 ohms	PT = press-to-talk switch
R11 = 22,000 ohms	TR1, TR2, TR3 = OC71 (Mullard)
R12, R16, R19, R22, R23 = 4,700 ohms	TR4 = XC101 (AEI) or similar
R13 = 47,000 ohms	TR5 = XC142 (AEI) or similar
R14 = 10,000 ohms	TR6, TR7 = OC35 (Mullard) matched pair

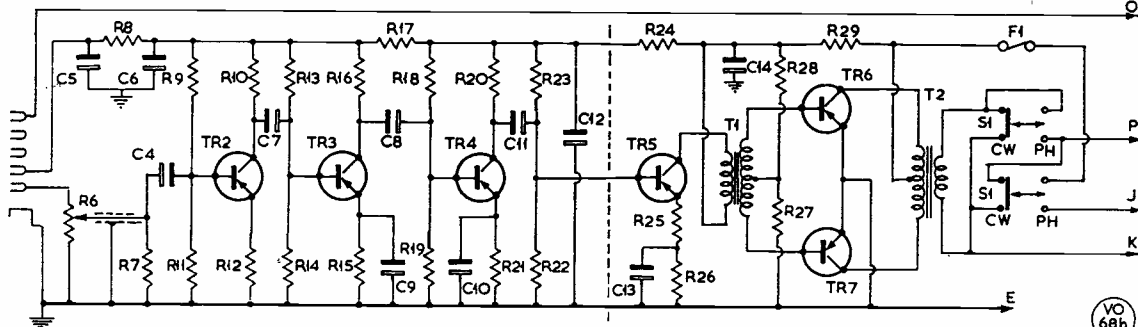
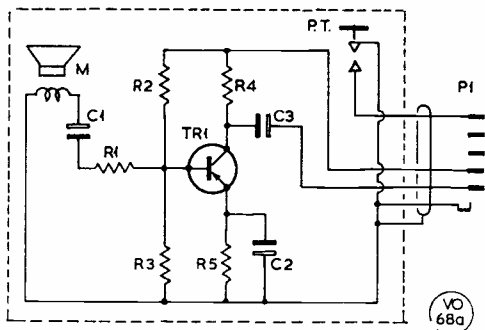


Fig. 5. The speech amplifier and modulator in the G3OCB design, with a matched pair of OC35's at TR6, TR7; they will give ample audio output for controlling the PA valve in the two-metre transmitter (to be shown in the second part of the article). This section of the main assembly is also built on a printed circuit-board, as shown in the sketch on p.665. The inter-connection is so arranged that the whole transceiver can be controlled on the press-to-talk switch PT, in the left-hand diagram above. In the circuits of Figs. 1-5, the lettering on each shows how the sections are related for final connection.

tinned copper fitted across the box so as to screen the RF mixer tuned circuits; it also screens the base and collector leads of the RF transistor from each other, to prevent instability.

The gain of the RF stage is variable from the front panel, and this control, R14, is most useful when there is a very strong signal on an adjacent channel.

The RF stage is a conventional grounded emitter circuit; the oscillator is capacity coupled into the base of the mixer *via* the mixer tuned circuit, in preference to the usual arrangement which uses a coil in series with the emitter lead. This unit proved to be the most difficult to get going, however. If input to the RF stage was by means of a tapping on the tuned circuit or by using a link coil there was severe trouble, resulting in a large number of spurious signals. The only way these could be prevented was by the adopted method of feeding the input to the hot end of the coil through the small capacitor, C2. The amount of feedback used in the oscillator is also somewhat critical, too much resulting in spurious modes of oscillation.

IF Amplifier (465 kc)

This is a three-stage amplifier, Fig. 3, p.662, using AF117 transistors to render neutralizing unnecessary. In order to improve selectivity double-tuned IF transformers are used. The detector takes an OA70 diode at D1 and a portion of the output from this stage is fed back as AGC control to two of the previous stages.

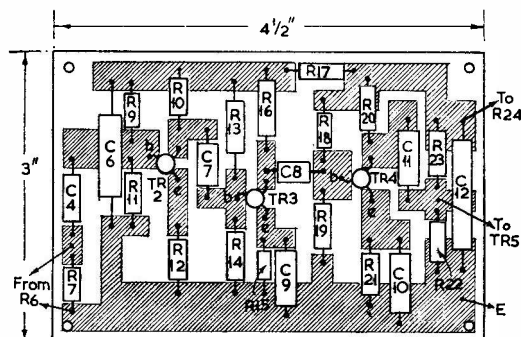
A crystal-controlled BFO is used for CW and SSB reception. Since virtually all SSB on 2m. is upper sideband and the frequency conversion processes convert this to LSB on 465 kc, any surplus HF crystal that comes within about 1-2 kc HF of 465 kc will produce acceptable results.

Due to the simple detection system employed it is virtually impossible to prevent BFO voltage from affecting the AGC line, so no effort was made to prevent this and in order to ensure ample BFO injection the latter is in fact coupled directly into the IF chain *via* a small capacitor, C12.

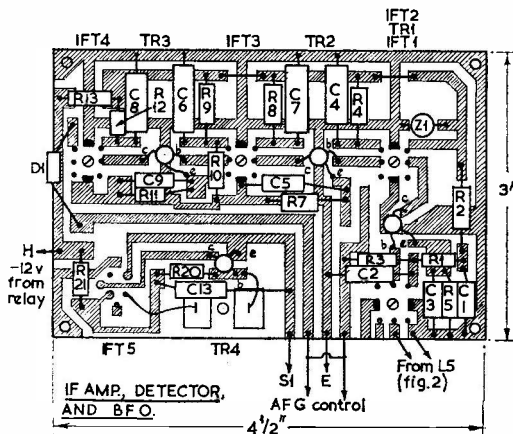
Printed circuitry is used in the construction of the IF amplifier detector and BFO stages, the whole unit measuring 4½in. x 3in. x 1in. high.

AF Strip

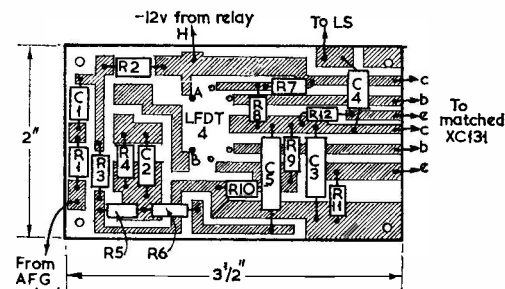
This stage utilizes an XB103 AF amplifier driving a matched pair of XC131 transistors *via* a *Weymouth* type LFDT4 driver transformer. The whole assembly measures no more than 3½in. x 2in. x 1in. high and is capable of up to 750 mW output. Due to the fact that a suitable 2½in. square load speaker of about 15-25 ohms could not be found at the time the unit was built, an 8-ohm speaker was obtained



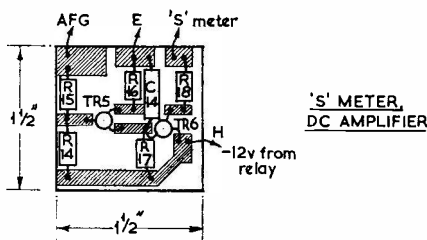
SPEECH AMPLIFIER



IF AMP, DETECTOR, AND BFO.



AF AMPLIFIER



'S' METER, DC AMPLIFIER

Fig. 6. Detail for the printed-circuit boards used for the various audio and low-frequency sections of G3OCB's VHF transceiver. Since these boards can be fitted together on screwed rod with spacers, pancake-fashion, a considerable saving of space is possible. If it is not intended to use printed-circuit boards, the circuits can, of course, be built up in the ordinary way. Another very suitable mounting would be "Veroboard."

and was wired in series with a 10-ohm $\frac{1}{2}$ -watt resistor in order to provide a suitable load to the output stage. This results in some loss of audio output but there is still more than enough for mobile use.

S-Meter

This circuit, also shown in Fig. 3, is merely a two-stage DC amplifier which steps up the very small

AGC control current to a sufficiently high value to drive the 5 mA meter. In the actual circuit used there is insufficient coupling completely to remove the audio component and the S-meter exhibits downward swings with speech. (Possibly this could be adapted as some sort of modulation percentage indicator.)

To be concluded

SSB TRANSLATOR FOR TOP BAND

SIDEBAND CONVERSION FROM 7 MC

T. P. DOUGLAS, M.B.E., Assoc.I.E.E. (G3BA)

Our contributor is very well known for his work on VHF transverters for SSB. Here he discusses a move in the other direction—how to get Sideband output on 160 metres—Editor.

DURING the Christmas holidays a strange impulse urged the writer to get on to Top Band again—in order to contact old friends whose interests did not extend to VHF. Being familiar with VHF transverter design for Sideband, all sorts of complicated circuits were sketched out using balanced mixers and isolator stages, as it would seem prudent to do things this way. The one great snag was that it was essential to get on to 160 metres with the least delay, and so the constructional work had to be cut to a minimum. Attention then turned to seeing what was the very simplest way to get on to Top Band from a higher frequency and cut out the rather complex frills which might not be entirely necessary.

One could not get anything simpler than an oscillator-mixer followed by an amplifier stage, so with this in mind, the junk box was investigated to see what was available. An ECF80 came to light, followed by an old 5B/254M, so this was what set the final design. The whole job of construction took just six hours and this included an ATU for resonating the "piece of wire" outside to the band.

Construction

The small translator was built on a standard aluminium chassis measuring 12ins. x 8ins. x 2ins. with the long side going from front to rear. The oscillator-mixer was to the rear and in-line construction followed with the amplifier valve next and the tuning coil and capacitor to the front. There was sufficient room for the ATU to be mounted beside the tank circuit had this been required, although for

the writer's particular layout it was more convenient to have it remote and feed the energy from the tank over co-axial cable to the ATU.

The output of a K.W. "Viceroy" Mark II SSB exciter was fed into the mixer on 7 mc and as this was using lower sideband and the crystal injection for the conversion frequency was also on the lower side, the lower sideband would appear on Top Band. Everything tuned up exactly after the GDO had set the coils; more than adequate drive was obtained from the mixer into the 5B/254M for AB1 operation—in fact, the grid meter could be run up to 4 mA with full carrier insertion and at this the output could be loaded to well beyond the limit. At 40w. p.e.p. input the linearity is excellent and well below the crushing level. Reports received have indicated that the signal is very clean and entirely acceptable in every way—so in view of the number of interested queries both over the air and by post it was thought that these details might be worth publishing.

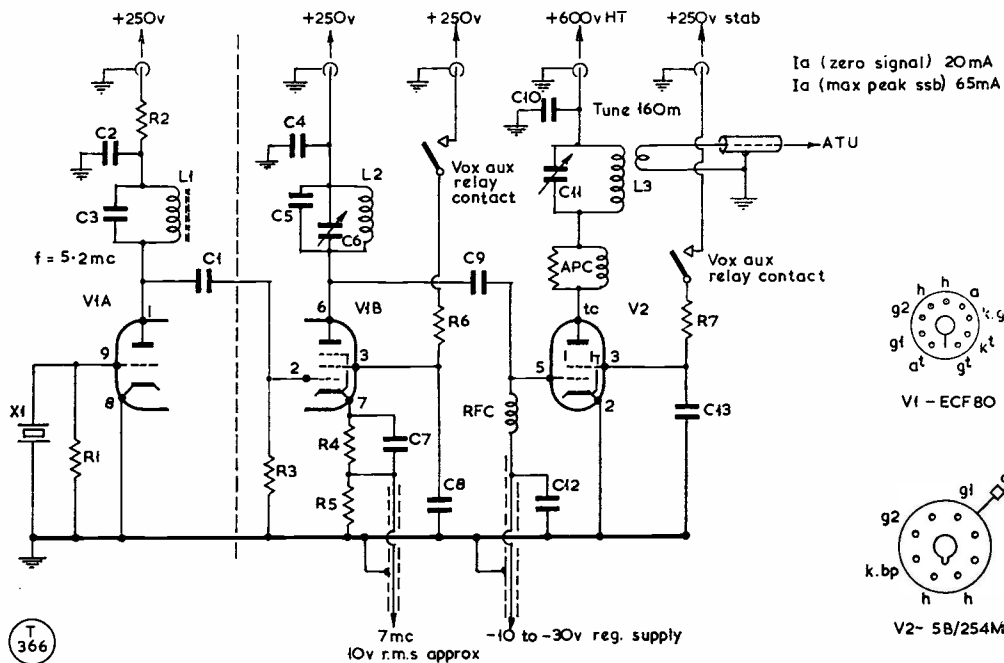
Alternatives

So straightforward is the circuit that it requires no explanation in detail, and it can be copied easily and with confidence as shown here. It might be useful, however, to comment on one or two alternatives which could be tried, as it is not everyone who has a 7 mc exciter with the correct sideband output at the right power level. Some SSB transmitters of older design had *upper* sideband on the 7 mc range and this would require a 9 mc crystal to be used in place of the 5.2 mc of the lower sideband set up. Again, if the SSB rig has only 14 mc output with upper sideband, then a 16 mc oscillator will do the trick quite nicely. A word about the signal frequency drive levels: Only about 10 volts RMS is required across the terminating resistor in the mixer

Table of Values

Sideband Translator circuit for Top Band

C1 = 2.7 $\mu\mu\text{F}$	R5 = 75 ohms, 1w.
C2 = .005 μF	R6 = 47,000 ohms, 1w.
C3 = 60 $\mu\mu\text{F}$	R7 = 1,000 ohms, $\frac{1}{2}$ w.
C4, C7,	RFC = 2.5 mH RF choke
C8, C10,	Xtal = 5.2 mc
C12, C13 = .01 μF	APC = 5t. spaced on
C5, C9 = 100 $\mu\mu\text{F}$	resistor body
C6 = 50 $\mu\mu\text{F}$	L1 = To tune 5.2 mc
C11 = 15-400 $\mu\mu\text{F}$	with C3
R1 = 47,000 ohms, $\frac{1}{2}$ w.	L2 = To tune 1.8 mc
R2 = 47,000 ohms, 2w.	L3 = To tune 1.8 mc
R3 = 100,000 ohms, $\frac{1}{2}$ w.	V1 = ECF80
R4 = 680 ohms, $\frac{1}{2}$ w.	V2 = 5B/254M



Circuit as used by G3BA to obtain SSB output on Top Band, from a 7 mc Sideband drive source. Mixing is in the ECF80, with the CO side on 5.2 mc; as mentioned in the text, other frequency combinations can be selected to produce the 1.8 mc LSB drive for the PA (which could be any other suitable type, such as an 807 or a 6146). Values and current readings to be expected are for the 5B/254M, which is a miniaturised version of the 807. If the 7 mc SSB drive is obtained from a Sideband transmitter, such as a "Viceroy," running straight, it is essential to keep the input to the mixer down to about 10v. r.m.s.—this can be done by feeding the SSB Tx output into a dummy load, and tapping off the required drive by a potentiometer network across the load.

cathode and this is just about right for most excitors using 6CL6's or the like as Class-A amplifiers. But if the output of the SSB transmitter is something like a pair of 6146's then perhaps the easiest way of doing things is to terminate the transmitter in its dummy load and then to reduce the RF voltage across this load to 10 volts or so by means of a series condenser between the "hot" end of the load and the 75-ohm mixer terminating resistor. This may not be economical in the sense of power consumption, but at least the main rig is not disturbed in any way and is operating under correct loading and output.

For the more adventurous, it will be obvious that a little drive can be filtered off before the linears of the HF rig and the linear PA disabled when Top

Band operation is desired. How the drive at 7 mc is derived is of little consequence as long as it does not exceed the 10 volts or so required. It is also wise not to have too much drive at the conversion frequency from the crystal and the 2.7 $\mu\mu\text{F}$ coupling capacitor C1 was found to be adequate for the HT used on the oscillator anode, measured as 100 volts. The fussy ones might like to stabilise this voltage, of course, and it would be a useful refinement for those whose mains are not too steady.

If this article has given some readers ideas about using the same sort of approach for VHF purposes, the writer would say—please do not try it. A very different type of design must be adopted for VHF to keep unwanted products down to a safe level.

PHOTOGRAPHS ALWAYS WANTED

Readers are reminded that we are always glad to have good photographs of Amateur Radio interest for general illustration in SHORT WAVE MAGAZINE. Though colour prints can sometimes be satisfactorily reproduced black-and-white, we much prefer the latter in the original. Except that we cannot conveniently make use of photographs that are either very small or very large, size is not of great importance as this is in any case determined to our requirements in the block-making process. What is important is that the picture should be clear and sharp, with fully descriptive notes — and this

description should *not* be written on the back of the print itself, but on a separate piece of paper lightly attached to the photograph. Payment is made for all pictures used, immediately on publication.

INDEX TO VOLUME XXI

The March issue of SHORT WAVE MAGAZINE starts a new Volume, and in it will be—as a free loose supplement of several pages—a complete Index to Vol. XXI, which closes with the present issue. As usual, this Index will be fully cross-referenced, with numerous subject headings.

MULTI-BAND WIRE V-BEAM SYSTEMS

DISCUSSION ON LAYOUT, FEEDING AND SOME COMPARATIVE RESULTS

F. G. RAYER, Assoc.Brit.I.R.E. (G30GR)

Our contributor has spent a good deal of time and taken some trouble to investigate and prove the worth of a V-beam—of the ordinary wire variety—as a practical system for multi-band working. Those who have the space available will find this article worth careful study—and those who are confined to what they thought could only be a one-HF-band system will find it gives much food for thought.—Editor.

A WIRE V-beam can provide useful gain over a dipole, but V-beams do not seem popular. This may be because it is often thought that the aerial is a one-band-only device, and may be of little use for general working on several bands in all directions. However, some practical experiments carried out with V-beams indicate that these limitations may not apply too severely.

A typical wire V-beam is shown in Fig. 1. The legs are driven out of phase and each leg is a multiple of $\frac{1}{2}$ -waves, and thus has the lobes of increased radiation normally associated with a long wire. The leg angle is so arranged that maximum lobes from Leg A combine with those from Leg B, giving a bi-directional gain as shown by the arrows. In a single band V-beam the total length of the aerial (Leg A plus Leg B) should be a multiple of $\frac{1}{2}$ -waves, and the leg angle is quite definite. Since the strongest radiation lobe angle of each leg depends on the multiple of $\frac{1}{2}$ -waves on the leg, the specified leg-angle can only be achieved on one band, even if the aerial is operated on several bands. However, the optimum leg-angle can be chosen with reference to maximum radiation at the best horizontal angle at which the lobes of each long-wire leg combine. If the leg-angle is twice the main lobe angle of a long wire, the lobes combine in a plane with the legs. If the frequency is lowered, the main lobe angle increases, so lobes tend to combine at a different angle to the horizontal. The radiation at this changed angle can still be useful, so that multi-band working is possible.

If a single-band V has legs each an odd multiple of $\frac{1}{4}$ -waves in length, current feed from a low-impedance feeder is possible. But if each leg is a multiple of $\frac{1}{2}$ -waves, voltage feed is necessary. Since the multiple of $\frac{1}{4}$ -waves changes with a change in band, an open wire tuned line has to be adopted for multi-band working.

Space Required

A V-aerial made only a single $\frac{1}{2}$ -wave overall, at the lowest operating frequency, actually requires less space than an ordinary dipole for that frequency, and it will be a multiple of $\frac{1}{2}$ -waves on harmonics. The space needed can be calculated, or found from a scale diagram.

In Fig. 2 one aerial has legs at right angles, each 68ft. long, and needs a space nearly 70ft. x 70ft.—allowing for insulators, etc., as at (A)—or about 100ft. x 50ft., according to the positions of the supports. It is a bent dipole needing reduced space on 3.5 mc. On 7 mc it is two $\frac{1}{2}$ -waves at right angles with virtually no directivity. On 14 mc it is a 90-degree V with one-wavelength legs, and about 3 dB gain. That is, signal power with a 75w. transmitter using the beam equals approximately that of a 150w. transmitter into a dipole. The other aerial (B) requires about 78ft. x 108ft., for 91 $\frac{1}{2}$ ft. legs at 70 degrees.

The aerial is driven at its apex, which is preferably near the transmitter to avoid a long open-wire feeder.

Leg Length

For a whole number of $\frac{1}{2}$ -waves, from the standard formula the length in feet can be:

$$(N - 0.05)492$$

mc.

Here, N is the number of $\frac{1}{2}$ -waves required. This can be given as follows: Length in feet = 1943/mc for four $\frac{1}{2}$ -waves, 2435/mc for five $\frac{1}{2}$ -waves, 2927/mc for six $\frac{1}{2}$ -waves, 3419/mc for seven $\frac{1}{2}$ -waves, and 3911/mc for eight $\frac{1}{2}$ -waves. The frequency in mc can be selected for about the middle of the band.

Some lengths provide an approximate number of $\frac{1}{2}$ -waves on all bands. An example is an aerial with 68ft. legs, or 136ft. in all. This is $\frac{1}{2}$ -wave on 80, two $\frac{1}{2}$ -waves on 40, four $\frac{1}{2}$ -waves on 20, six $\frac{1}{2}$ -waves on 15, and eight $\frac{1}{2}$ -waves on 10 metres. Doubling the length of each leg would double the number of $\frac{1}{2}$ -waves, and provide one $\frac{1}{2}$ -wave for Top Band!

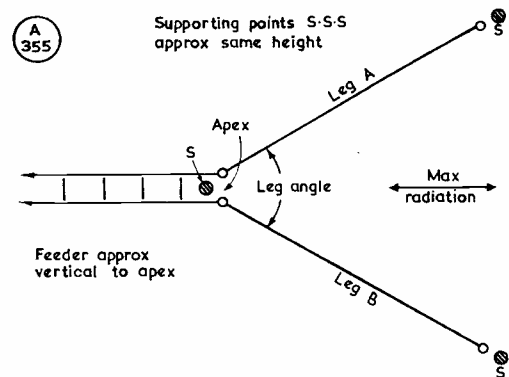


Fig. 1. The basic layout for a simple bi-directional V-beam, the advantages and characteristics of which are explained in the text.

Some lengths work out as multiples of $\frac{1}{2}$ -waves and $\frac{1}{4}$ -waves. As an example, 102ft. will be three $\frac{1}{2}$ -waves on 40, three $\frac{1}{4}$ -waves on 20, nine $\frac{1}{4}$ -waves on 15, and six $\frac{1}{2}$ -waves on ten metres. A system with 102ft. legs is thus a multiple of $\frac{1}{2}$ -waves on all bands except 80m., where the legs are somewhat over $\frac{3}{8}$ -wave each.

Due to the presence of a tuned line, most lengths can be fed successfully. In tests an aerial with 91 $\frac{1}{2}$ ft. legs (four $\frac{1}{2}$ -waves in the 21 mc band) was found satisfactory on the 14 mc band (three $\frac{1}{2}$ -waves would be 102ft.) as well as other bands.

Leg-Angle and Gain

It is only possible to indicate expected gain for a given band with the leg-angle for that band. This means that optimum results are achieved on one preferred band, and results fall off with other bands, but may still be better than with a dipole. On the lowest frequency band the legs may be only a $\frac{1}{4}$ -wave or $\frac{1}{2}$ -wave each, and the aerial is then practically without directivity.

Typical leg-angles for various leg lengths, with the approximate gain expected, are suggested in the Table herewith.

TABLE 1

Number $\frac{1}{2}$ -waves each leg	Leg-Angle degrees	Gain dB
2	90	3 dB
4	70	4 $\frac{1}{2}$ dB
6	55-58	5 $\frac{1}{2}$ dB
8	46-50	7 dB
10	40-44	8 dB

As 3 dB represent a doubling of power, it is apparent that useful gain is possible! The optional leg angles for six, eight and ten $\frac{1}{2}$ -waves are for anticipated wave angles of 0-15 degrees above the horizon. The main lobes wave angle cannot exceed the long wire main lobe angle, even if the leg-angle is completely incorrect. The long-wire main lobe angle is about 28 degrees for six $\frac{1}{2}$ -waves, 25 degrees for eight $\frac{1}{2}$ -waves, and 22 degrees for ten $\frac{1}{2}$ -waves. Assuming that the lobes of increased radiation surround each leg in the form of a cone, it is possible for lobes to combine at different angles when the frequency is changed, as already mentioned. Much of the radiation can be at relatively low angles, suitable for DX working in excess of 2500 miles or so.

Some dimensions have been given. Others include those in Table 2.

TABLE 2

Each Leg	Leg-Angle	Band and Approx. Gain
45 $\frac{1}{2}$ ft.	90 deg.	21 mc, 3 dB
68 $\frac{1}{2}$ ft.	80 "	14 mc, 3 dB
		21 mc, 4 $\frac{1}{2}$ dB
91 $\frac{1}{2}$ ft.	70 "	21 mc, 5 $\frac{1}{2}$ dB
136ft.	70 "	14 mc, 5 $\frac{1}{2}$ dB
	60 "	21 mc, 7 dB
	52 "	28 mc, 8 dB

Feeder

For all-band working, the tuned open-wire feeder must be used. Losses in such a feeder are extremely

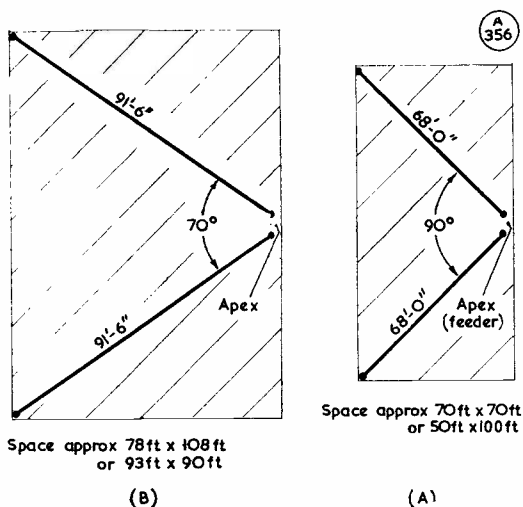


Fig. 2. The first consideration when contemplating a wire V-beam is to find out what space it requires in plan, what is available, and where the supports are to come.

small in normal circumstances, and efficient coupling to the aerial is possible even if the aerial length is somewhat incorrect.

The feeder wires were insulated 7/22 or 7/26 as sold for aeriels, with 6-in. spreaders. Ceramic spreaders were originally used, but were found to be heavy and were later replaced by paxolin strips. The latter were 6in. x $\frac{1}{2}$ in., cut from 1/16th inch paxolin, and drilled $\frac{1}{8}$ in. from each end. The strips were painted with shellac (obtained from decorators' stores as knotting) to keep out moisture. (Lucite strips treated with silicone to repel surface moisture would be excellent.)

Sufficient spreaders are needed to keep the two wires of the line at reasonably uniform spacing. They are fitted at about 30in. intervals, and fixed by short pieces of 20g. wire passed through the holes and twisted round the feeder lines. An unnecessarily large number of spreaders should not be used, and feeder losses are negligible in ordinary circumstances.

At the junction of aerial and feeder, two closely tied 3in. insulators were used, with a cord from one insulator to the support pole. Aerial legs were 14g. wire of usual type.

A tuner is required for coupling between feeder and transmitter, and the need for series or parallel tuning depends on aerial, feeder length, and band in use. The simple tuner in Fig. 3, p.670, was employed, and during all the tests carried out, no aerial or feeder length was encountered which could not be accommodated by this tuner. Tuning resembles that required with a straight top aerial centrally fed with tuned line. If the length of one leg, plus the feeder length, is near a number of $\frac{1}{2}$ -waves on the frequency in use, parallel tuning is expected. But if the length of one leg, plus feeder, is an uneven number of $\frac{1}{4}$ -waves, series tuning is tried. When the impedance

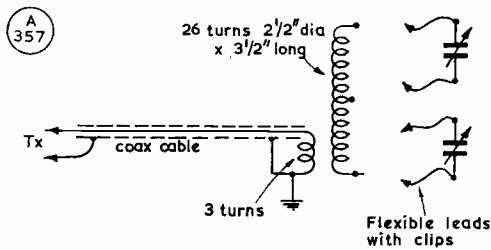


Fig. 3. A universal tuner devised by G3OGR to accommodate various feed systems over all bands 10-80 metres. The condensers are terminated on loose leads so that they can be used either in series or in parallel, depending upon the requirements as shown in Fig. 4.

at the tuner end of the line is some intermediate figure, the wires are clipped to the coil at points found to give satisfactory transmitter loading.

Tuner Details

The coil was on an Eddystone 2½ in. diameter by 5 in. long ceramic former wound with 26 turns of 18g. tinned copper wire, turns occupying about 3½ in. Three turns of well insulated wire are over-wound on the centre of the coil and gave suitable coupling on all bands from 3.5 mc to 28 mc (Fig. 3).

Two separate 150 μF wide-spaced variable condensers have short flexible leads and clips. They can be connected in series with the coil, or across it. The feeders also terminate in clips, and the tuner can be used in several ways.

For parallel tuning at high impedance, the circuit is as in Fig. 4A. If more capacity is wanted, both condensers are clipped in parallel. Fig. 4B is similar, but less likely to spark over. For the HF bands, clips are moved in equally towards the centre, Fig. 4C.

When the impedance to be fed is somewhat lower, the feeder clips are moved in equal amounts towards the centre of the coil, Fig. 4D. If the impedance of the tuner end of the feeder is not known, the clips can be moved out a turn at a time, from the centre, until satisfactory loading of the transmitter is achieved. For HF bands, only a part of the coil is used, as in Fig. 4C.

If difficulty arises in coupling with parallel tuning, clips are changed to series tuning, Fig. 4E. The capacitors are adjusted simultaneously, and can best be ganged with an insulated coupling. For series tuning on the HF bands, fewer turns are needed, as at 4F.

The capacitors need insulated extension spindles except for circuit 4B, where the spindles are earthed. With an aerial and feeder length calculated to be a multiple of ½-waves on all bands (one leg and feeder equalling 136ft.) circuit C was found suitable throughout, so only two clips had to be moved to change bands. Tags were eventually soldered on for tapping points for the HF bands. The number of turns in circuit were six for 15m. and 20m., 14 for 40m., and 26 for 80m. Subsequently, a 2-pole 4-way switch was added for bandchanging.

Results Obtained

It is not easy to make exact comparison of results, but attempts were made to do so by keeping records and by having 14 mc and 21 mc dipoles in addition to the V-beam, with a change-over switch. Each leg was also often tried individually, as a correctly coupled end-fed wire.

An aerial with 68ft. legs at right angles gave consistently better results, on both 14 mc and 21 mc, than dipoles when operating along a very broad line in the best directions (Fig. 1). Three-quarters of contacts in other directions were at least as good with the beam as with the dipole. Results on 80 metres seemed about the same as with a 80m. straight dipole.

With 91½ft. legs at about 85 degrees, remote DX stations in the preferred directions were heard and worked at times when the same stations *could not be heard at all with a dipole*. Results were particularly good on 21 mc. The aerial performed well on Top Band, 80, and 40 metres. No Top Band dipole was available for comparison. Results on 14 mc in the best directions were a little better than with a dipole. In other directions signals seemed as good as with the dipole.

Attempts were also made to compare the V-beam results with those obtained by using either leg as an end-fed aerial. On the HF bands, no station was found which gave better signal strength when either

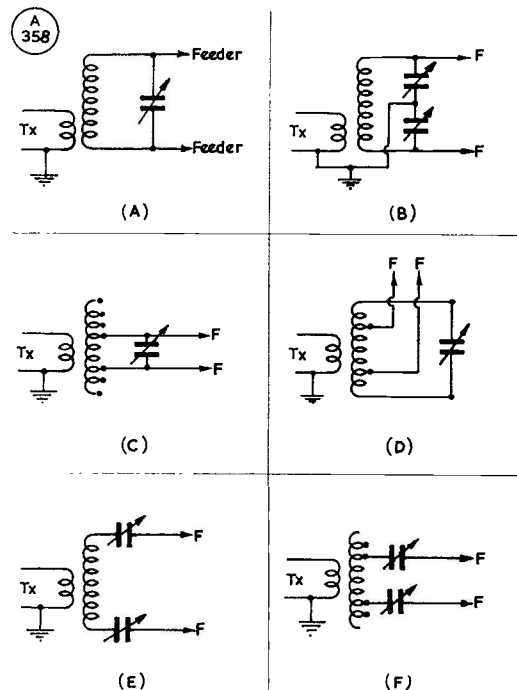


Fig. 4. The various ways in which the tuner of Fig. 3 can be connected. As stated in the text, on a given system of fixed physical dimensions, the impedance characteristic changes from band to band.

leg was used alone, though it had been expected that some stations at right angles to the beam might give better signals with a selected leg used alone.

After a large number of tests it was felt that a V-beam of the type discussed in this article is by no means a single-band aerial, and consistently good results can be expected.

VISIT TO THE U.S.S. "INDEPENDENCE"

AT CANNES, CHRISTMAS 1963

N. A. S. FITCH (G3FPK)

HAVING missed a summer holiday in 1963, it was decided, with G3KZI, to have a Christmas visit to Monaco to seek some sunshine and warm weather. The necessary 3A2 licences and car ferry reservations having been fixed, subsequent QSO's with W4KNF/MM disclosed that the U.S. Aircraft Carrier *Independence*, the floating shack of that station, would be anchored off Cannes during our stay and we were invited aboard.

As the local French only had Christmas Day off work, we agreed to make our visit that day so that

we could meet several local French amateurs on the ship. We arrived a little late from Monte Carlo and with so many other visitors on the ship, we arranged to have a quieter visit the following Friday. However, we did meet F2AX, F3EG, F3NT, F8SC, F8VD, F8ZF, G3HPH (now 3A2CP), W6NRT, 3A2BF and his wife, 3A2BY.

On Friday, we were able to spend much longer touring the ship and worked several U.K. stations from W4KNF/MM. As well as G3KZI and the writer, F3TR, F3WB and F8SC came aboard and we all had lunch with W4UNM. The other operators are at present WA4GXO, K8YEG, and the holder of the call, W4KNF.

The *Independence*, of 70,000 tons displacement, is a vast floating town with over 4,000 inhabitants. It is 1,100 feet long, the deck 90 feet over the sea and about four acres in extent. Four steam-catapults launch its hundred aircraft at 140 m.p.h. from the angled flight deck. The maximum speed of the ship is "... in excess of 30 knots ..." and we were told that it was impossible to stand up on the deck near the bow, when she steams at full speed.

The power plant generates about 200,000 horse power and this drives four five-bladed propellers each 20 feet in diameter. There are four 36-ton lifts to carry the aircraft between the hangar and the flight deck. During our tour, we rode on a long escalator such as one finds on the Underground.

The crew consumes a hundred tons of food per day which is served in 10,000 meals. There are 1,501 compartments—we assumed the extra one was the amateur station! And there are 2,300 telephones in this huge ship.

The ham shack is spacious and the present Tx is a Viking Invader 2000 and the Rx a Hammarlund HQ-180, and they will soon have a complete Collins S-Line. The aerial is a simple 35-foot whip matched to the Tx via a Johnson Matchbox; a counter-balance arrangement enables the antenna to be easily pushed over horizontally when flying is in progress.

Naturally, this ship is a highly complicated communications centre, abounding in extremely specialised and expensive equipment. Extensive use is made of SSB systems and we were told that when the ship is operational 66 of its 67 transmitters are in use; avoiding mutual interference must be quite a problem!

With G3KZI, the writer thoroughly enjoyed these visits to the *Independence* and would like to express thanks to the U.S. Navy for permitting it, and in particular to the radio amateurs on board for their hospitality.



The boys having a good time on the U.S.S. "Independence," when she was in Cannes over Christmas. The ship signs W4KNF/MM and here we see, left to right, standing: G3HPH (3A2CP), F8VD, G3FPK (3A2BT), 3A2BF, F3EG, F2AX and seated, left to right, W6NRT (3A2CV), F8ZF, SWL, and WA4GXO operating. (Official U.S. Navy Photo.)

TEST METER FOR AERIAL MEASUREMENTS

CONSTRUCTION AND USE OF THE ANTENNASCOPE

THE device described here was originated by W2AEF and published in *CQ* some years ago. He called it the "antennascope" and it has appeared in various guises since. In effect, it is an easily constructed and calibrated aerial test meter for impedance measurements, and is used in conjunction with a GDO as the RF power source.

Normally, the range of impedances in which we are interested for aeriels and feeder lines is about 50-400 ohms, and this is easily accommodated by the circuit shown here. As can be seen, it is a bridge arrangement, and is not particularly frequency-conscious except in the VHF ranges. Calibration is effected on the resistor R1, against resistors of known value connected across the "Test Z" point, with the GDO coupled to the input side at some convenient frequency—say, 14 mc.

In operation, the unknown feeder—or aerial-feeder combination—is connected at Z and, with the GDO supplying RF at the frequency of interest, R1 is adjusted to produce a minimum reading on the meter M. If R1 has been correctly calibrated, that reading will be the impedance of the load. It follows that, in a resonant system, it should be possible to see impedance changes as a mis-match occurs when the GDO is swung over a wide frequency range. Similarly, the mis-match or impedance variation can be checked as the system is changed from band to band. Indeed, this aerial test meter will make all sorts of startling revelations once its multifarious applications have been grasped!

To Construct

The circuit should be made up neatly as a single unit in a small box, with the meter M mounted in conjunction with R1 working against a marked scale, and having terminals for the "Test Z" connections with a probe for the GDO link.

For R1, a good-quality composition type resistor should be used and the diode D can be any semiconductor having a high backward and low forward resistance. The meter is shown as 0-100 μ A, but in fact a less sensitive instrument could be used if the RF driving power is increased (as from a VFO) and the diode will stand more current. In practice, however, it is better to keep these elements "sensitive," as thereby calibration will be more accurate and better impedance readings obtained.

Under usual conditions, chassis-earthing is sufficient—that is to say, bonding the earthy side of the circuit to the box is enough. But if the device is to be used in a static layout—as when a GDO is incorporated and the instrument is used as a regular

test meter on the bench—a physical earth should be provided and the calibration carried out under these conditions.

To Calibrate

In the ordinary way, a calibration done at around 14 mc will hold good for the HF bands, 7-28 mc. But if the LF bands are wanted, either separately or as well, it would be better to calibrate with the GDO feeding in RF at about 2.5 mc, and to scale R1 accordingly.

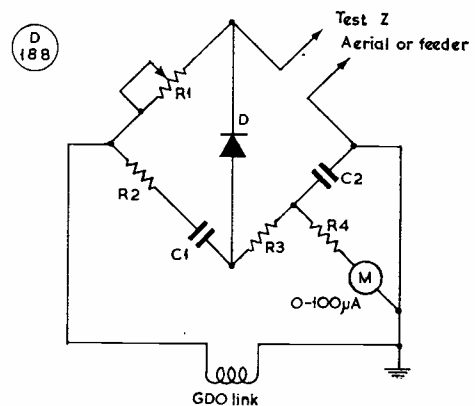
The method of calibration is simple: With the GDO providing RF drive, a series of carbon resistors of known value from 10 ohms upwards should be connected across the "Test Z" points and R1 adjusted till the meter reading is a minimum, thus balancing the bridge; this minimum setting of R1 corresponds to the value of the resistor in circuit, and hence to the load impedance on the device. By repeating the procedure over the range of R1, either its dial can be marked with the appropriate values, or a graph could be drawn against the R1 scale settings. There is no more to it than that.

If the meter tends to read too high, either R4 should be increased in value or the GDO coupling loosened—and the reverse if good readings cannot be obtained on a 0-100 microamp. scale. It is not possible to be specific about what readings can be expected, because they will be affected by the degree of GDO injection and the sensitivity of the meter.

To Use

Any load impedance to be measured must be of the two-terminal variety, *i.e.* it is not possible to measure the impedance of an end-on single-wire type of aerial, though the tuned circuit with which such an aerial is being worked could be checked.

Otherwise, it is simply a matter of "finding resonance" on R1, and the operation of the test



Circuit of the device described in the text, and known as the "antennascope" after the original design by W2AEF. It is calibrated against non-inductive resistors of known value, and in use the bridge is balanced when minimum meter reading is obtained by adjustment of R1. The instrument works with a GDO as the RF power source and the method of use is somewhat similar to that of a GDO. Values are C1, C2 500 μ F; R1, 500-1000 ohm linear potentiometer (see text); R2, R3 200 ohms; R4, 1000 ohms; D, OA81 or similar.

meter is as that of a GDO when checking a tuned circuit.

To measure a length of feeder line, take a section of the line which is short in relation to the frequency—say, 10 feet in the case of an 80m. system. With the far end of the line shorted, tune the GDO for a dip reading. Then take the short off the line, and adjust R1 for minimum. That value is then the impedance of the line in that frequency area.

By thinking out the possible applications, numerous tests and experiments can be carried out, either on existing systems or on projected aerial-feeder layouts.

Precautions

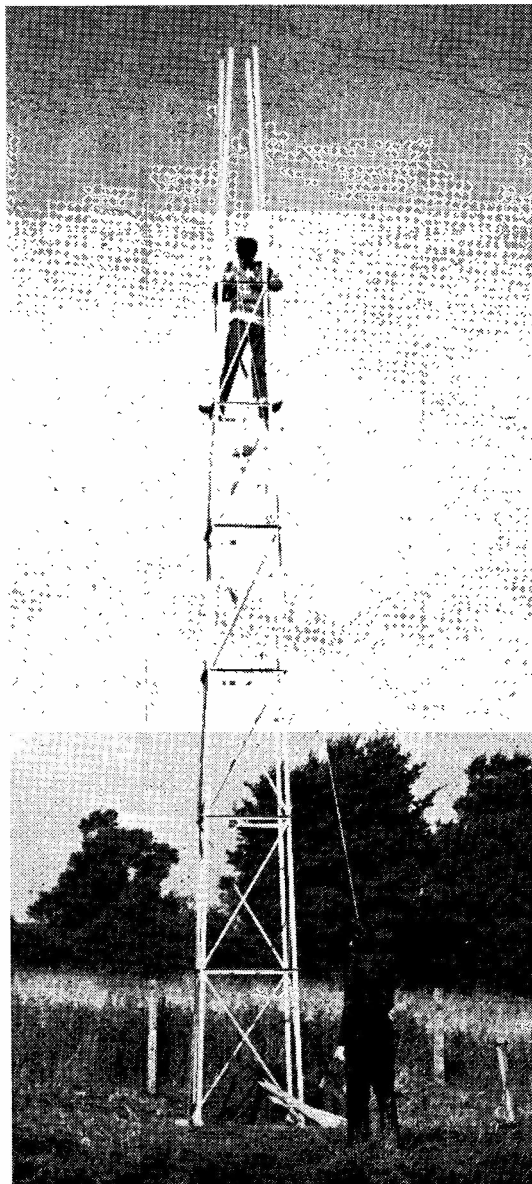
Never apply more than the loose-coupled RF output of a GDO or VFO to the device. During the calibration process, make checks at different input frequencies; if the response is not flat over a wide frequency range, suspect R1 to be giving a slight tuning effect. If results are erratic during calibration, especially at HF, try screening R1. While calibrating, make sure that the test resistors really are within a few per cent of the marked value; if these resistors can be bridged beforehand, so much the better; wirewound resistors of any value should be avoided for test purposes, even for the LF bands.

For VHF operation, the device should be built low-loss, with R1 in a screened compartment and on an extension spindle. The calibration frequency (GDO or VFO input) should be in the frequency area over which the device is to be used, e.g. at about band centre in the case of the TV channels.

As shown here, the circuit has not been tried on frequencies higher than the amateur bands up to 70 mc. Two significantly different sets of calibration values were obtained—with the same set of test resistors—at 2 mc and at 60 mc input frequency. Between 6 mc and 18 mc input frequencies, the difference was negligible—which brings us back to the original point that 14 mc is a good calibration frequency for the HF bands.

BBC TEST TRANSMISSIONS ON CHANNEL 33

From their Crystal Palace station, the BBC is now running regular trade-test transmissions for BBC/2 in Band IV, daily from 9.0 a.m. to 8.0 p.m. (except Sundays), the actual frequencies being 567.25 mc for vision and 573.25 mc for sound, horizontally polarised, and with an effective radiated power of 500 kW. Various forms of modulation are used, including periods of test card, film, music and 400-cycle tone. On the vision side, the standard is, of course, the new 625-line. The regular public service on BBC/2 is scheduled to start on April 20, and the notch on your TV tuner is Ch. 33.



The new Heathkit self-supporting tower goes to 32ft. and will carry a 2-in. mast for another 15 feet of height — this extension could be made rotatable, for a beam. The base footing is 3ft. square, for bolting on to a concrete standing, and the taper is to 11½ ins. square at the top. The tower comes in kit form, with all necessary fixings, and with full instructions for erection, which is the job of a few hours by two unskilled persons. The general design complies with the appropriate British Standards specification, and as such it is properly engineered, robust, rigid and safe. The total weight is 240 lbs., finish is full galvanized (or red oxide in a cheaper version), and accessories are available for rotary beam mounting and drive.

For anything radio you may want to buy, sell or exchange — use the Readers' Small Advertisement section in "Short Wave Magazine" — See pp.703-712

A NOTE ON CRYSTAL RESONATORS

GLOSSARY OF TERMS FOR QUARTZ CRYSTALS

DURING the last few years, the general use of crystals has increased enormously, in both amateur and commercial practice. So far as Amateur Radio is concerned, this is largely because of the advent of SSB, with the need for the highest possible frequency stability together with the convenience of crystals for heterodyne oscillators and for filter circuits.

As anyone who follows modern design trends will know, nowadays both receiver and transmitter will contain a flock of crystals—compare this with what was standard amateur practice only ten years ago, when crystals were hardly ever seen in a transmitter design, and never in a receiver (except in the calibration oscillator). Yet, before the era of the VFO, every transmitter was crystal controlled. So the wheel has turned full circle, and we are back with crystals again in a big way, used not only in oscillator-mixer circuits for highly stable VFO control on transmitters, but in a wide variety of other Tx and Rx circuits as well.

A paper called *Quartz Crystal Units for Oscillators*, circulated by the International Electrotechnical Commission, brings the definitions up-to-date for those who are not as familiar as they might be with quartz crystal characteristics.

Crystal Vibrator.—A crystal vibrator is a mounted crystal element with electrodes.

Crystal Element.—A crystal element (also variously referred to as a crystal blank, plate, wafer or bar) is a piece of piezoelectric material cut to a given shape, size and orientation with respect to the crystallographic axes of the material.

Crystal Unit.—A crystal unit consists of one or more crystal vibrators mounted in a holder.

Nominal Frequency.—The nominal frequency of a crystal unit is the frequency specified for the unit at a specified nominal temperature measured at the holder.

Working Frequency.—The frequency actually generated by a crystal unit forming part of an oscillator is the working frequency f_w .

Frequency Tolerance.—The frequency tolerance is the maximum permissible deviation of the working frequency from the nominal. It is the sum of the accuracy of adjustment of the nominal and the drifts in frequency that can occur with ageing and temperature variations.

Accuracy of Adjustment.—The accuracy of adjustment is the manufacturing tolerance on the nominal frequency measured at the nominal temperature.

Frequency Drift with Temperature.—The maximum permissible variation in frequency, referred to the working frequency measured at the nominal temperature, that will result from changes in ambient temperature over the operating temperature range is termed the maximum frequency drift.

Operating Temperature Range.—The operating temperature range is the range of temperature measured at the holder over which the crystal unit will function within the specified tolerances.

Equivalent Circuit.—The equivalent circuit of a quartz crystal unit is the electrical circuit which has the same impedance as the unit in the frequency region of resonance. The circuit usually comprises an inductance L_1 , a capacitance C_1 , and a resistance R_1 in series, the combination being shunted by the parallel capacitance C_0 between the terminals of the unit, see opposite.

Series Resonance Frequency.—The series resonance frequency f_s is defined by

$$f_s = \frac{1}{2\pi(L_1 C_1)^{\frac{1}{2}}}$$

Parallel Resonance Frequency.—The parallel resonance frequency f_p is defined by

$$f_p = \frac{1}{2\pi \left\{ L_1 \frac{C_1 C_0}{C_1 + C_0} \right\}^{\frac{1}{2}}}$$

Resonance Frequency.—The resonance frequency f_r is the lower of the two frequencies in the vicinity of resonance at which the electrical impedance of the crystal unit is purely resistive.

Antiresonance Frequency.—The antiresonance frequency f_a is the higher of the two frequencies in the vicinity of resonance at which the electrical impedance of the crystal unit is purely resistive.

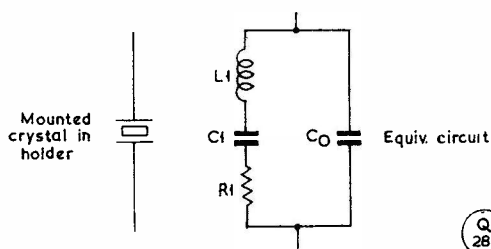
Frequency at Minimum Impedance.—The frequency of maximum impedance f_m is the frequency for which the absolute value of the electrical impedance of the crystal unit is a minimum.

Frequency at Maximum Impedance.—The frequency of maximum impedance f_n is the frequency for which the absolute value of the electrical impedance of the crystal unit is a maximum.

Resonance Resistance.—The resonance resistance R_r is the resistance of the crystal unit at the resonance frequency f_r .

Antiresonance Resistance.—The antiresonance resistance R_a is the resistance of the crystal unit at the antiresonance frequency f_a .

Equivalent Series Resistance (E.S.R.).—The equivalent series resistance R'_r is the impedance of the combination of the unit in series with a stated external capacitance at the lower of the two frequencies in the vicinity of the nominal frequency for which the electrical impedance of the combination is purely resistive.



Equivalent circuit of a complete quartz crystal unit, which must include mounting of the plate in its holder. The elements L1, C1, R1 are functions of the piezo-electric effect, and form the motional branch of the circuit. The value of C0 is the capacity across the electrodes.
(From "Mullard All-Glass Crystal Units")

Equivalent Parallel Resistance (E.P.R.).—The equivalent parallel resistance R'_a (also known as Performance Index P.I.) is the impedance of the combination of the unit in parallel with a stated external capacitance at the higher of the two frequencies in the vicinity of the nominal frequency at which the electrical impedance of the combination is real (purely resistive).

Crystal Activity.—The activity of a crystal is the qualitative term for comparing the ability of crystal units to oscillate under similar conditions. For quantitative comparisons, the E.S.R. or E.P.R. must

be measured.

Q-factor.—The Q-factor of a crystal unit is defined by the expression

$$Q = \frac{2\pi f_s L_1}{R_1} = \frac{1}{2\pi f_s R_1 C_1}$$

Capacitance Ratio.—The capacitance ratio r of a crystal unit is the ratio of the parallel capacitance C_0 to the series branch capacitance C_1 ; that is

$$r = \frac{C_0}{C_1}$$

Figure of Merit.—The figure of merit M is defined as follows:

$$M = \frac{Q}{r} = \frac{1}{2\pi f_s R_1 C_0}$$

Level of Drive.—The level of drive is a measure of the conditions imposed upon the crystal unit, expressed in terms of the power dissipated, current or voltage.

Load Capacitance.—The load capacitance C_L is the effective external capacitance associated with the crystal unit in an oscillator to determine the working frequency.

PRICE INCREASE REMINDER

We hate to have to do it, but we have to remind readers that, as explained on the Editorial page in the January issue, there will be a small increase in the cover price of SHORT WAVE MAGAZINE with effect from the next (March) issue. Single-copy orders from readers individually—which means mainly those who are unable to obtain a regular copy locally—will be accepted at 3s. 6d. post free. Until the date of publication of the March issue, the 6th, direct subscription orders and renewals for a year of twelve issues, covering any period, can be entered at the present rate of 36s.

"THE EARLY HISTORY OF RADAR"

This is the title of an interesting booklet recently published by the Smithsonian Institution of Washington, D.C. It traces the thinking and the experimental work in America from the early 1930's until the beginning of the war, and discloses the fact that the U.S. Navy had a workable ship-borne radar of a kind by April, 1936; this operated on 28.6 mc, with a p.r.f. of 3720, and gave a range against aircraft of 25 miles. By 1937, the Tx frequency had been raised to 200 mc, using a common aerial for transmission and reception, and operational results of great practical value were being obtained. The British development, started in England in 1935, was entirely independent, until in 1940 the two countries pooled their resources—and out of this the Americans got the cavity magnetron, uniquely British, and we got the uniquely American duplexer, which was the method of using a single aerial for both transmission and reception. The nett result

was that by the time America came into the war with us, the U.S. Navy had the best ship-borne radar; the R.A.F. the finest airborne equipment; and the U.S. Army Signal Corps the most advanced mobile radar for ground-based operations. The other important fact proved by *The Early History of Radar* is that between about 1935 and 1940, development in Britain and the U.S. was proceeding on roughly parallel lines, but with different operational problems to solve—the Americans wanted a radar for their ships; we needed it for air defence.

SENATOR GOLDWATER, K3UIG/K7UGA

The comment in the December Editorial implied that the Hon. Barry Goldwater, Senator for Arizona, no longer holds an active amateur call sign. In fact, as we are informed by an American reader, Senator Goldwater is regularly on the air, as K7UGA from his home at Phoenix, Arizona, and as K3UIG when in Washington, D.C. And since the December issue appeared, it has been announced officially that Senator Goldwater is offering himself as a candidate for the Republican nomination in the forthcoming American presidential election.

CORRECTIONS AND AMENDMENTS

In the article by G3RBH in our January issue, pp.598-600, on a Top Band Tx, the value of C26 should have been included, as .001 μ F; VR2 should be marked VR3 (the value for VR2 is correct, but it appears in the circuit on p.600), and the screen of V2 should go to pin 7, and not as marked.

And in the Fig. 2 circuit on p.625 of the same issue, the resistor across the external relay should be marked 270K, as stated in the text.

DX COMMENTARY

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

WHAT does the DX man do when there are no more countries to contact? Has the past year really been so good for DX? Who are the Top Twenty? How many VSILP's are there? In what circumstances can a 10-watt signal be stronger than a 10-kilowatt one? Who are the Stolz? Is One-Sixty no longer the "gentleman's band"? And was it ever? And who is the greater nuisance—the man who ticks you off for working a local on "his" DX frequency, or the man who persists in working locals on "your" DX frequency?

For the answers to these and many other questions, proceed with this thrilling instalment. With reasonable luck, these columns will become as much of a forum as a certain section of the 80-metre band, wherein the Pundits and the Oracles are known to reside, dealing out information, both wanted and unwanted, with unflinching generosity. (Seriously, though, they are doing a Grand Job . . . or are they?)

Certainly we have no cause for complaint about the variety of this month's mail, and need have no fears that this Commentary will turn into a dry-as-dust list of DX worked. One of our correspondents remarks that "the DX you don't work is almost as interesting as the DX that you do," and that just about sums it up. Once you get the really virulent bug out of your system (as your conductor kids himself that he has), you can enjoy life even more. Meaning that when the day dawns on which you can hear a really rare one without the

hand automatically reaching for the VFO knob or the change-over switch, you can often derive far more pleasure and interest by listening than by joining in the crush and calling. Try it sometime!

It is evident that we have really reached the bottom of the trough now, and people have been treating *Fifteen* much as they were treating *Ten* a year back. Take a look there occasionally, but don't bother to tune up the Tx until you actually hear something . . . that seems to be the current outlook, and it's fair enough, because the band really has been in pretty bad shape. But then it often is, in the depths of winter, and Spring 1964 will assuredly see it open again.

Top Band and the DX

No apologies are necessary for the amount of 160-metre material presented this month. More than two-thirds of the mail concerns this band in one way or another, and there is much of interest, though it will have to be condensed.

Trans-Atlantic conditions have been very variable. December 1 and 15 were undoubtedly the best days so far; on the other week-ends that phenomenal W1BB/1 signal never failed to come over, and there were some late-night openings, but on the whole the cross-pond DX has not been as good as was expected.

W1BB/1 has been working several "new" G stations every week-end, and their numbers must now run into several dozen. G3RJI raised him on January 3, and says that sometimes he has been readable until 0930! G3RRU made it, too, and also raised VE1ZZ for the second time.

G3GRL, with his famous vertical, has been rivalling DL1FF with his results. He had a heard-report of 579 from VSILP for the occasion on which he heard a 239 signal believed to be VSILP—no real QSO, but hopeful! Also

worked, 5B4KG and 5N2JKO, plus many VE's and W's.

G3RFS, too, had a reception report from VSILP, who heard him on December 1 at 2315 GMT (459). At the same time he also logged G3OUV and G3RRF. Since then, G3RFS has been working VE and W and is now really among the DX'ers.

G16TK was very successful on December 15 with the W's and VE's, and he heard HR3HH "swamped by G's calling CQ DX on his frequency." G3RAU worked six W's and two VE's on December 15; and on the 29th he raised KP4ALD at 0012 GMT—nice going! G5ZT had a field day on January 11, working ten W's and three VE's (including VE3EK and 3KE). Harold has a 600ft. long wire running E-W, which seems to be pretty effective.

European DX which has been worked by most of our correspondents includes 9A1VU, OH0NI, OH2YV/0, OH3NY, HB9's, ZB1BX and UA3NB. The latter call was used by a pirate last winter, but this one gives a different name, and—who knows?—*might* be genuine.

Others we look on with suspicion until confirmation arrives are HV1CA (worked by G3ROO), EA2CB (heard by G3PMR) and a PX1CR, worked by a whole string of G's, who said the name was "Judy" and the QTH "Dhahzig." This one, to whom your commentator listened for several QSO's, failed to convince, and even those making contact seemed quite unenthusiastic about it. (Must find out where "Dhahzig" really is?)

G3PLQ, aboard m.v. *Prahsu* in the neighbourhood of Bathurst, ZD3, logged G3FGT, 3PQA, 3RBP, 3OUV, 3GRL, PA0PN, DL1FF and DL9KRA as early as 2100 GMT. Around midnight, all the same, plus G3NQF, 3RQT, 3SEM, 3OLI, 3RAU, GM3NYY and GM3PQA. At Freetown, 9LI, he heard G3PQA and 3RBP.

Top Band Comment

All is no longer sweetness and light on this band! Tempers are frayed, remarks have a cutting edge and the rat-race has definitely penetrated this once kindly area. G3IGW points out that most of the non-American DX crams into the few kc between 1825 and 1830, and yet these 5 kc carry more inter-G communication than any other similar slice of the band. Stations like OHØNI have been putting out unanswered calls, drowned by G stations talking about how nice it would be to work them—and so on. G3IGW says "One-Sixty was once known as the gentlemen's band, and a retreat for those exhausted by the antics on the DX bands. Now DX-chasing has turned this one into a messy brawl." (It has, in short, been invaded by the Stolc . . . see later.)

Sad story from G3GRL: W2FYT called him and said that 6YAXG was in QSO but couldn't hear Europeans through the Loran QRM, and would G3GRL please QSY to 1810 kc? He did so, and worked him, but this brought out the worst in everyone within reach, and "the fellows who lost their temper were just as bad, or even worse—they weren't even working anybody, but just making nasty comments and causing more QRM." We sympathise with G3GRL on this one—if asked to QSY to a certain spot, what can you do? And it's hard to keep the Stolc at bay, once they start up.

Matti, OH3NY, has worked 80 counties and 24 countries on Top Band. He still badly needs a GM6 card, and wants Oceania for his WAC on the band.

G2HKU (Sheppey) wonders how some of these 10-watters produce signals stronger than GNF, who is almost on his doorstep! He is now getting out nicely, and collected 9A1VU, ZB1BX, DL1FF, DJ3VC, HB9T and OH2YV/Ø.

Thanks for other Top Band news and comments to G3SQX,

ZONE-BAND TABLE

Station	Zones Worked						Total
	28 mc	21 mc	14 mc	7 mc	3.5 mc	1.8 mc	
G2DC	40	40	40	36	25	5	186
G3DO	39	40	40	23	23	1	166
G3IGW	36	37	37	31	13	11	165
OH3NY	32	30	40	25	10	7	144
G3PEK	2	20	35	29	15	4	105
G3OLN	1	7	11	16	3	4	42

(Entries for this new table are invited; scores are post-war, i.e. starting from any time back to January 1946.)

3REA, 3PEK, GM3IAA and GI6TK.

The Tables

The G3P--/G3R-- Table now closes, with G3REA handsomely in the lead with his score of 94 counties, 18 countries. G3RRU makes a very creditable second. Thanks to all the others who have supported it, and commiserations to several who sent in entries for it *this month* (they closed around last July!).

We now hope to see all those whose calls were in this Table transferring their attentions to the normal Top Band Counties Ladder, on which there are too many static entries. A little infusion of new blood would be healthy—and we note that there is not a single G3S-- station thereon, although the band teems with them some nights.

Eighty Metres

Spectacular improvements have taken place on *Eighty*, and much DX has been worked, especially on SSB. G3DO's bag, on this mode, includes HZ1AT, MP4BBW, OH2AH/Ø, PY7VBR, VP7NS, VS1LP, W5 and Ø, ZL1AIX, 1ATQ, 4OD, 3A2CV, 4X4DK, 5N2JKO, 9Q5AB and 5RK.

GI6TK, also on SSB, worked VP7CW, PZ1AX, ZL1AIX, 1LD, PY7VBR, OHØNI, VE's (including

VE4) and "dozens of W's," including W6TSQ. UW9AF gave Frank his 90th country on Eighty SSB, and he recalls the fierce argument, a few years ago, about whether one could work 50 countries on this band, even with CW.

G3PEK worked the band with 30 watts of CW and emerged with M1M, 9A1VU, UA9 and UW9, 4X4DI, 5A1TW, 5Z4IV, 9Q5AB, VP9FK, KV4CI, 6YAXG and masses of W's and VE's. All between 2145 and 0845, mostly around midnight to 0130. Heard, but not raised, were JA6AK, VE1LP, XE1AX, ZS1A, VK5NO (1850 at 559), YV's, LU's, KP4 and numerous ZL's.

G6LX ran some skeds with VS1LP on SSB, and first contact was made by G2PU and himself, December 29; others who followed were G5BJ, 5UG, 3FPQ, GW3AX and DL1IN. All were confirmed in a letter from VS1LP, who, however, thinks his call is being pirated.

Since then, we have received more information about this phoney. SWL Dave Gray tells us that the real VS1LP was dismayed to hear the pirate actually calling G6LX at the scheduled time, and QSL's for non-existent QSO's are arriving at VS1LP on a worldwide basis.

Another SWL (Doug Bowers) says that VS1LP states that he has not been on Eighty since before Christmas; that the phoney one is in the Middle East; and that when the real one returns it will be at week-ends only. How-

CALLS HEARD, WORKED and QSL'd

ever, we gather that he is ready for Top Band, but permission to use 150 watts instead of ten has not been granted.

G3NOF only managed to work F9RY/FC with his SSB, but heard 9Q5AB, 5RK, VS1LP and HZ1TN around 2200, and several W's at S9 one morning at 0820.

Further news from SWL Doug Bowers is that he heard TG8EG working a PAØ, and also logged 5A1TW, VO1DH, OH2AH/Ø, ZL1AIX and W's. Many other correspondents mention the band, but mostly with only routine QSO's or loggings.

Forty Metres

This band has been "forcibly fed" of late; when a rapid DX-chaser gets home at 6 p.m. and finds Twenty already dead, what is he to do if the bug is biting? Yes, you're right . . . and those few poor kc of Forty have had something to put up with recently. But what a weird band it is, these days. G3PEK writes: "When I was first licensed, 2½ years ago, the G stations used to come rolling in at 599 around midday; now I listen at 1200 and hear W2, 3, 5 and UA9, with not a sign of a G. Forty has, for the last few weeks, been open for DX the whole 24 hours, e.g.: W5, ZL at 1000; UA9 at 1100; W2, 3, 5 at 1200; JA, VK and so on from 1300; really good Pacific openings from 1400-1600."

His 30 watts of CW raised only a small percentage of the DX heard, but what he raked in included 4X4's, UH8, UA9, MP4, HZ1, AC7A (1425), VK (1730-2050), 5Z4 (2100), 9Q5 (1920 and 2145), W6's (1500-1600) and YV5 (0745). Heard, but not worked (yet) were CX, FR7, ZD8, VS4 (1520), DU7 (1445), OA, BY, PI2, PZ, VP8, VS1, JA, VU, VP7, VP9, KP4, KV4, HK, ZP, EL, 5N2, CR6 and lots of ZS's. And some really unusual loggings were VE8RN (1400), VE8RG (1700), ZL2AWJ (1515), VK6RY (2200). G3PEK says he hasn't been higher than 7 mc for two months now, and doesn't feel that he wants to.

In place of the more usual short-skip we now have the medium-skip nuisance on Forty, which is worse in a way, since a radius of 1000 miles or just over

brings in innumerable signals of the creepy-crawly type, complete with operators who regard 1000 miles as super-DX and never listen for weak signals from further afield.

Interesting ones known to be active on the band: ZS3E (SSB) around 1800 GMT, DU6TY (1415), JA6YG (1405), UA1KAE (Antarctica), VP2KJ (0030), VS4RS (2300), 6O2BW (2320), 9Q5ZP (2200), XE1FE (0950), 4S7WP (0115), XZ2ZZ (1900), VK6EA (1630), VP2KD (1200), 9L1TL (2225). They are all there, but, brother, you have to dig! (On second thoughts, digging is probably not sufficient—you have to *excavate*.) If you want your DX the easy way, go back to Twenty, and call it a day round about 1900 GMT.

There's nothing new about all this, of course. Examination of a contest log for 1936 shows all continents worked on Forty between 1400 and 1800, using 50 watts and a very mediocre piece of wire (and a two-valve receiver!) But it is only recently, with Twenty closing so early, that the keen DX-ers have been forced to brave the modern QRM conditions of Forty.

Twenty Metres

And so to the band where all men are equal, but some more equal than others . . . but the band on which *everyone* can work DX of a sort without bursting any blood-vessels.

Mornings are pretty well cluttered up by Eastern Europe and most parts of the USSR, whence extremely strong signals emanate these days—not *all* of the T6-7 variety, but still too high a proportion of them. Afternoons are more or less dominated by the USA; the latter half by California! But in between, around lunch-time, there is an interesting period of transition when almost anything is liable to come in, from Oceania to the Caribbean. Evenings can almost be written off, most days, although the closing hour will be getting later by the time this reaches you.

GM3JDR has only been able to work the bands at week-ends and hasn't found conditions too good.

But his SSB list shows EL2V, HL9KQ and 9KR, 5N2RSB/TJ8, TT8AJ, VS9HAA, YVØAA, ZD6PBD, 5N2HJA, 9G1EO and 1EX; and on CW he raised EL7A, KG6AAAY, MP4QBG, M1M, OY1R, ST2AR, UAØ, UJ8, UH8, UM8, VK5NO, 5N2's, 5R8AI, 5T5AD and 9A1VU.

G3RRU, running 50 watts to a dipole, worked CW with VK and ZL (both paths), VS1JY, TI2LA, CT3AV, JT1KAA, VS9H, HI8MMN, HP1IE, 9L1TL, VP8GQ, MP4QBG, VS9MB and other nice ones.

G3NOF worked SSB with HB9AET/4W1, HZ3TA, KZ5WI, OA4DS, OHØ, ST2AR, TG9AD, VKØVK, VP2KJ, ZB2AH, ZD6PBD, 5N2RSB/TJ8, ZS8Z, 9G1, 9Q5 and many others. Also heard were VP2KM, LA1LG/P, FM7WQ, ZS6BBB/ZS9, AP5GB, YA5A, KG6SA and CEØZI/MM.

G3SEF, with 60 watts of AM, booked in VKØVK, VP9BY and ZS8Z; CW accounted for VP4VP, SVØWF, ET3GC, 9U5DS, VK's and W's.

Other good DX reported as heard or worked on Twenty includes CR4AE (1900), FR7ZF (1540), MP4TAS (1330), 5Z4GT (1715), 9X5MH (1540), BV1USC (0900), FB8YY (1500), KW6EC (1230) and VK9DR (1240), all on CW. Also FK8AU (1000), FM7WQ (2000), ZS7R (1700), 6W8AE (0840), AP5DC (0825), CP5EQ (1940), VK4JQ (1040) and 9M2DQ (1500), all on SSB.

Fifteen Metres

This band has gone through a real period of doldrums, but should by now be emerging. G3NWT, one of our "Fifteen-fanciers," asks "How can you *possibly* describe last year as the best we have known for DX? For me it's been a year in which ordinarily mediocre conditions have briefly alternated with the conspicuously punk . . . two or three years ago I remember hour-long QSO's with Guam and Grahamland—terminated for the best of reasons—a parched throat. What is there now? Quick sorties to capture some manufactured rarity before it is gone for ever . . . ten seconds on the frequency and a red face if you overstay.

Fun, but not a substitute for communication."

All right, 'NWT, you win! 1963 was a good year for "DX fun," on the whole, but not for solid DX communication except, perhaps, to certain parts of the world, and mostly on Twenty at that. Fifteen was, we freely admit, pretty chancy and rather mediocre.

And now it's suffering, like Ten, from a kind of boycott. Everyone has heard, or observed, that it's not too good, so they don't even bother to tune up. An observer with supernatural powers would be amused to note all the operators, spread over the world, looking at each other *via* their receiver dials on Fifteen, but never making contact because all were listening and none transmitting!

News from Overseas

VE3BWY (Toronto) has been among those getting across on Top Band this season, and he did it with an indoor aerial! Naturally he wonders whether he is the first to achieve this. And he now has the distinction of having worked across both ways, since he managed it in the opposite direction when he used to be G6WY, many years ago. He recently visited Mexico and met many XE's at their luncheon club in

Mexico City.

6YAXG (ex-VP5XG, VU2XG and so on) keeps a regular sked with "Dad" (G8VG) on 14 mc, often swapping 599 reports. But his efforts at working G's on Top Band are not so successful—the path has not really opened in that direction yet. He intends to spend more time on Eighty this season—CW around 3503-3505 kc. Forty has produced scores of Europeans but only a handful of G's. Peter says that that wretched "6YA" prefix (a mistake, of course) causes trouble and confusion wherever he goes. Every other contact develops into an argument—pirate or aircraft?—and on One-Sixty it is driving him crazy, signals usually being weak in any case.

W6AM (Long Beach) writes "Have now worked every country on the air, CW and Phone . . . The score, henceforth, is dependent upon expeditions and the splitting of countries." Happy state to be in—or is it? There's no doubt about it—sooner or later all DXCC scores will be expunged, and we shall all have to start again.

ZB1BX (RAF Siggiewi) says that ZB1 activity is still high; G3OJT, a recent arrival, awaits his licence and is keen on the LF bands; ZB1RM has become similarly infected; and ZB1BX himself

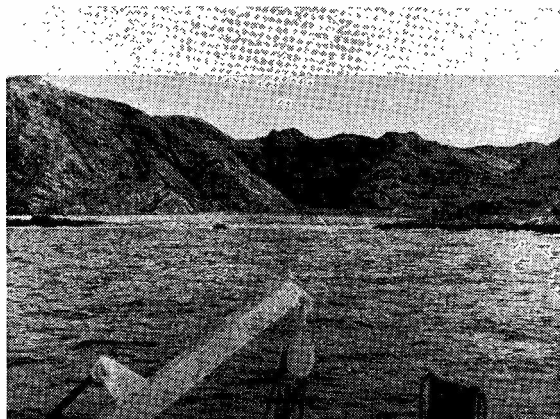
had fun on Top Band over Christmas working Europeans, though he spent a whole night calling W1BB without raising him! Now he is thinking of a super-aerial and says that the masts available would allow a Vee with 500ft. per leg, 100ft. high one end and 200ft. the other. (All he needs, really, is 1,000ft. of wire!)

Antarctic Activity

VP8HF/MM, who is Ken Randall, G3RFH, aboard H.M.S. *Protector*, was due to pick up some Hammarlund gear from Montevideo towards the end of January. With this he will be on the air from Candlemas Island (South Sandwich group) for roughly three weeks during March. Operation will be on 14 mc SSB and CW, crystal-controlled (three crystals) and a 12-volt transistorised power pack.

This information came direct from CE8BF (Punta Arenas) who is in frequent contact with VP8HF/MM and promises further details as they become known. South Sandwich Is. must be one of the rarest spots of them all, and it is doubtful whether a land-based transmission has ever been made from the group.

All reports concerning VP8HF/MM will be received with great interest, especially as no G's have



During November 16-24, the R.A.F. boys from Aden undertook a (hazardous) DX-pedition to the somewhat barren Kuria Muria Is. group, a few miles off-shore from the Muscat and Oman coast, round the bulge of Arabia. Running SSB and CW on all bands 10-80m, and signing VS9H, they made more than 5,000 contacts in 131 countries, with 20 metres producing two-thirds of the total QSO's, of which fewer than half were on Sideband phone — in fact, the 14 mc band gave no less than 2,337 contacts on CW — and they found that fast calling on an el-bug brought more DX replies than steady sending at 20's. The picture on the left is of the beach as the m.v. "Seiyun" closed in to land the party. The VS9H station set-up, at the water's edge, is as shown on right. Had it not been for an unexpected rainstorm, the party would have run short of fresh water.

yet claimed to have worked him this year.

Chagos, Agalega, Rodriguez

G8KS sends full details of the forthcoming VQ8BFA operation. Harvey Brain, VQ9HB, should leave for Chagos on February 14, doing the round of the VQ8 territories thereafter. G8KS is the organiser of the trip, sponsored by seven G's and five W's; the SSB Tx (14 mc only) was made by HB9TL, and the crystal frequencies are 14108-114-119 kc, but he will listen off his own frequency, especially around 14250-260 kc. G8KS writes "I have asked Harvey for a minimum of 5000 QSO's from each island . . . the trip will cost the sponsors £300, not including the QSL's, which will cost another £75. I would appreciate an s.a.e. for all cards required (or IRC in the case of overseas amateurs)." Requests for QSL's to G8KS *only*, and there will be a delay in receiving the logs.

The name of the ship is *Marsouin* and Harvey will have a native crew; he himself hails from Norwich. Callsign VQ8BFA, possibly with a suffix to indicate which island or group he is operating from.

TOP BAND LADDER

(G3P-- and G3R-- stations only)
FINAL APPEARANCE

Station	Counties	Countries
G3REA	94	18
G3RRU	91	19
G3PLQ	90	17
G3RBP	87	25
G3PVK	83	15
G3PWY	83	14
G3RJH	80	18
G3RHM	75	11
G3PPE	71	13
G3RQT	69	13
G3RFT	67	12
G3RJI	65	13
GM3PPJ	61	12
GI3RCS	61	9
G3PRT	53	10
G3PMR	49	11
G3RJM	45	10
G3RDQ	42	8

General Chat

G5ZT, reporting on his successes with Top Band DX, adds a footnote . . . "Still active with CW/AM/SSB on 160, 80, 40, 20, 15, 10, 4 and 2 metres." (Wonder what Harold does in his spare time?)

The newly-formed Cotswold Radio Contest Club entered for the CW section of the CQ World-wide Contest last November, and scored 41,195 points, using two transmitters, three operators, 60 watts input and no beam. G3OLN tells us that many lessons were learned, especially concerning interaction between the two transmitters, which forced one of them to spend far more hours on One-Sixty than were desirable. The highest-scoring band turned out to be Forty, with 8,190 points compared with 5,040 on Twenty.

G3OLN also mentions the club's "Fifteen on Top" Award, which has, so far, gone to W1BB, 8GDQ, 8JIN and G3OLN, 3RRU, 3RRF, 3PVK, 3PEO, 3NFV, 3RJH and GI6TK. The claims show that all the following countries have been worked (by somebody) on Top Band: VR3, VP2, HI, KG6, FP8, SU, 6YA, KH6 and XE.

Grafton's WALT (Worked All London Town) Award has been slightly changed by the imposition of a limit on the number of *mobile* contacts now allowed. The award is for working (and having confirmed) 65 of London's 118 Postal Districts, with stickers for each additional 15 of them. Contacts with mobiles are limited to *seven*. Starting date January 1, 1958; UK amateurs restricted to 160, 80, 40 and the VHF bands.

G3NWT substituted silicon rectifiers for the 5R4GY in his SSB transmitter. In his own words "the result is an impressive increase in p.e.p., at the expense of eye-strain and fatigue of the red-sensitive receptors, caused by peering through two thicknesses of expanded metal at what I hope will not be a costly spectacle." We know the feeling, and recommend G3NWT to investigate the new 6146B!

VQ1IZ (*ex* Project Mercury) is on his way home to K6PUC . . .

CEØAC has been reported active, 14060 and 14095 kc . . . Angus, HZ2AMS, has Neutral Zone licences and callsigns 7Z2AMS and 8Z2AMS . . . CR4AD (rare spot these days) is on SSB, 14105, '121 and '127 . . . VK9XI, one of the Christmas Island gang, has been heard on 14120 kc SSB, around 1500 . . . VQ9HB Expedition, starting February 14, should cover Chagos, Rodriguez, Agalega and St. Brandon, in that order—see details earlier.

Nice 80-metre plum—KC4USK, Antarctica, working CW (3501 kc) and calling USA stations . . . Peter, VP8GQ, about 14110 kc SSB from Falklands, around midnight . . . VP2DP, on AM (14180 kc) does his best to copy SSB.

Gus Browning was very active from AP5GB (East Pakistan), then moved over to AP2 (West Pakistan) and is next expected back at AC3PT, after which plans are uncertain. There is talk of his returning to the States—after which he will almost certainly start off on a lecture tour!

DX Shorts

HS1S (Box 2008, Bangkok) is W6CYI, and will be there eight months . . . YJ1DL (14088 kc xtal) is looking for Europe around 0900 GMT . . . ZL4JF, Campbell Is., now joined by ZL4LY, both looking for Europe on 14020 at week-ends, 0930.

ZS6BKO is in Antarctica (14214 SSB) . . . 4U1ITU now counts for DXCC, but 4UISU still scores as Egypt . . . HB9AET/4W is genuinely in the Yemen and will QSL when he returns to HB9 towards the end of the year.

HC8FN (Galapagos) reported on 3804 kc SSB working W's; also heard on 14 mc working Europe at 1250 . . . ZL1ABZ (Kermadecs) usually on 14290 kc SSB at 0800, but also sometimes on 14100 . . . 6V3AM is a new one in Senegal—good for WPX-chasers (SSB on 14275) . . . 8A3AA has been reported from Indonesia. Doubtful, we should say!

Lord Howe Island: VK2AGH will be there April 15-29, CW and SSB, on 3.5-7.14 mc (frequencies will be given next month).

ZD6PBD, since mid-November,

has worked 102 countries on SSB with the KW-2000 that he took out with him; mostly 14105 kc, 1430 onwards . . . CR4AD will shortly have an SSB rig supplied by HB9TL . . . VP2KJ, 2KM and 2KP all on 14 mc SSB from St. Kitts . . . VKØVK now on 14 mc SSB from Wilkes Land (QSL to VK2VK).

ZE1AC, on 14150 SSB with an HX-50 and linear, is G2CXO . . . ZS3E is active on 7 mc SSB and skeds with HB9FU around 1800 GMT . . . ZS7R has 50 watts of SSB on 14110 kc, same time . . . 5N2RSB/TJ8 was heard at both 0830 and 1600 GMT, January 11-12, working stations at more than one-a-minute, 14 mc SSB . . . 6O6BW should please the prefix-hunters—14 mc SSB around 1330 and 2030. (Thanks to SWL Dave Gray, Evesham, for most of the above.)

VR1B looks for Europeans, 14030 CW at 0700 . . . FB8ZZ now said to be on SSB (14100-150) . . . CR8AD (Timor) now back on the air, 14045 CW . . . KW6ED is looking for Europe on 3.5 mc (0700-0800). YJ1DL, crystal on 14088 CW, does likewise at 0900.

HZ3TA (14120 kc SSB) has been heard giving QTH as Amman, Jordan(!) . . . VS9MG will provide a second station on the Maldives Is., from late January onwards . . . VU5 (Andaman Is.) operation is promised in April by VS1LS—all bands Eighty to Fifteen, AM and CW . . . HBØ is the new prefix for Liechtenstein, effective January 1. HB9TL will be signing HBØTL, thence, February 14-16. HB9 stations on portable operation will henceforth sign /P and not HB1 as hitherto.

Ex-G Radio Club

British members of the club are asked to turn their beams towards Africa when nothing is heard from the USA; members out the other way include ZB1A, VS9AAA, 9G1DY and ZS6BBB, who recently checked into the net from ZS8Z. VP1RP, also active, is ex-VE3AEC/W4. The Sunday Ex-G Net at 1900 GMT has been pretty chancy of late, with the 14 mc band closing so early, and the 80-metre net has only functioned



The significance of this picture is that, on the left, Stuart Meyer, W2GHK, is presenting Hammarlund amateur-band equipment to the I.T.U. Geneva, radio amateur station 4UIITU. We are hoping to publish fuller details of this station in due course.

with some difficulty. Better times coming, it is hoped.

Late Flashes

FB8WW (Crozet Is.)—occasional CW activity reported, 14030 kc, around 1330; a working party is now building living quarters on the island . . . JY4X will be the call used by HZ3TA from Jordan, some time in February . . . W6FAY will soon be on again from KP6, and, later, from 5W1, KC6, VS4, HR, CE, KC4 and KS4—all before April 1.

Latest on Gus: he did not operate from West Pakistan after leaving AP5GB, but opened up as YA5A from Kabul. Latest sked, AC3 from February 7, XW8 from February 27, then maybe to VS4 and VS5, and then home to USA.

W6YY was due to be on during the CQ 160-metre Contest with two half-waves in phase (vertical) on a 450-ft. tower on Mt. Wilson . . . Dewi, GW3FSP, also hoping to do great things in the same contest, unfortunately had to go into hospital around January 15, and probably had to miss the whole thing; we hope for good news of him by next month.

5N2RSB will be signing /TY2,

February 8-9, on 14020 CW and 14120 kc SSB . . . VS9H logs (recent Kuria Muria expedition) are all in W4ECI's hands, and QSL's will be out shortly. . . . All new Czecho-Slovakian stations on Top Band will use the prefix OL, not OK. . . . Some suggestion of Top-Band activity from Iceland and Greenland in near future (all comers welcome!).

Sign-Off

And that's the lot for another month. (Oh, sorry, we nearly forgot about the "Stolc" . . . just "backward clots." Let us hope there will at some time be a month when they are no longer with us.) Next month's deadline will be **first post on Monday, February 17**—not a minute later! Address your news and views to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And so, with acknowledgments and thanks to the W1BB bulletins, the WGDXC, the *DX News-Sheet* and the NCDXC *DX-er*—and, of course, to all our direct correspondents, we wish you a good month of DX-ing. Until next time, very 73 and—BCNU.

MEASURING HIGH VOLTAGES

ADAPTING TEST INSTRUMENTS

G. A. W. PARTRIDGE

MANY transmitters and receivers have several stages that operate at high voltages. Now and again these have to be measured in order to trace and rectify faults.

In most direct current and mains frequency circuits the ordinary volt- or universal meter is quite satisfactory. However, some instruments have not a high enough range, especially when the HT is around the 1000 volts mark. Many meters read up to 500 volts only.

Such instruments need not be ruled out as useless for high-voltage tests, as a simple multiplier can easily convert a 0-500 instrument to an 0-1000 volt range. Fig. 1 shows the multiplier, which is really a high resistance connected in circuit with the meter, which in this case must be on the 0-500 volt range. The sensitivity is 10,000 ohms per volt. Therefore the total resistance of the meter when it is on the 0-500 volt range is 10,000 ohms x 500 volts which is equal to 5 megohms. Now, for a 1000-volt range the resistance of the meter circuit will need to be increased to 1000 volts x 10,000 ohms per volt which is 10 megohms. The instrument resistance is already 5 megs., so the multiplier will have to be another 5,000,000 ohms in order to make it up to the total of 10 megohms. So all that is necessary is to connect a 5,000K resistor in series and we have a 0-1000 volt range. The ratio reading is, of course, 2 : 1. Remember to multiply the 0-500 volt reading by two which will give the actual voltage.

Another point, the multiplier resistor will have to be large enough to carry the current drawn by the voltmeter. This is calculated by dividing the voltage by the total resistance, and (from Ohm's Law), is 0.1 mA.

The power absorbed in the multiplier will be amps. 2 times resistance, which in this case is 1/20th of a watt. So that a 1/4-watt resistor will be satisfactory.

If the resistor is non-inductive (as most composition types are) it will operate on AC as well as on DC. It must, however, be remembered that on some multi-range instruments the sensitivity is lower on the AC than on the DC ranges. When this is so it is necessary to have two multipliers—one for DC and the other for AC work. Meters for radio circuits should not be less sensitive than 5,000 ohms per volt. In fact,

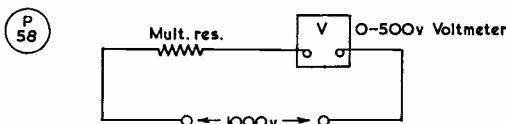


Fig. 1. Using a multiplier resistor to double the range of a voltmeter.

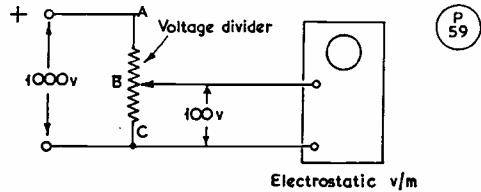


Fig. 2. Voltage divider circuit, to increase voltmeter range, as explained in the text.

the higher the sensitivity the better because there is less danger of overloading the circuit.

Electronic Meters

Electronic voltage measuring instruments (such as valve voltmeters) have the advantage of a very high resistance. The amount of current they draw from the circuit under test is virtually nil. They also operate very well on the high frequencies. However, it is sometimes necessary to increase the range of these instruments. Fig. 2 shows how this is done with the aid of a voltage divider. The range is increased from 100 to 1000 volts. The current drawn by the divider is 0.1 mA, which means that it has a resistance of 10 megohms. The voltage developed across B and C is 100 so the resistance here will be one megohm. For practical purposes the divider may consist of 5+4+1 megohm 1/4-watt resistors connected in series. The divider ratio is 10 so the meter reading must be multiplied by 10 to get the actual voltage.

Electronic meters for measuring voltages are mainly of two types: The valve-voltmeter which has a milli- or microammeter movement calibrated to read in r.m.s., and the cathode-ray oscilloscope. The latter is of considerable interest because it can also show the wave-form of an AC voltage under test as well as indicate its value. It is also possible to measure the frequency, so in many ways it is a more useful instrument than a valve-voltmeter. However, for AC voltage measurement, just connect the vertical plates directly across points B and C on the divider and make suitable adjustments until a straight line appears on the screen (Fig. 3). The length of this line will be equal to twice the peak voltage of the circuit.

For example, say the oscillograph tube is calibrated at 50 volts per centimetre, and during the test the line is 2.3 cms long:

$$\begin{aligned} &\text{Then R.M.S. voltage} \\ &= \frac{\text{Length of line} \times \text{volts per cm.} \times 0.707 \times \text{div. ratio}}{2} \\ &= \frac{2.3 \times 50 \times 0.707 \times 10}{2} \\ &= 406.5 \text{ volts across A and C} \end{aligned}$$

The factor .707 converts the peak voltage to an r.m.s. value. The ratio of the divider is 10, which is 1000/100 volts. If the oscillograph has no calibrations on its screen, the length of the voltage line can

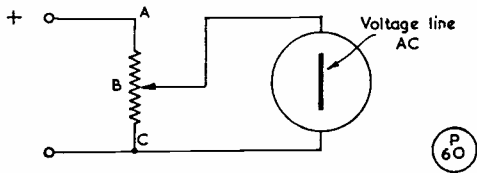


Fig. 3. Determining AC voltages on an oscilloscope; as actual measurement is involved, the sensitivity of the tube must be known.

be determined by transferring its length to a centimetre scale with the aid of a pair of dividers. The CRO sensitivity must be known for this to be done accurately.

For DC work the same connections are used but this time a spot will appear on the screen instead of a line. It might damage the tube so a line is formed by putting AC across the horizontal plates. Most oscillographs have a built-in saw tooth oscillator for this purpose.

The voltage is arrived at by measuring the displacement of this line (Fig. 4). Again, if the screen is not calibrated, place one point of a pair of dividers on the line when no test voltage is applied. Turn on the test voltage and open out the second divider point to the new position, and then transfer this distance to

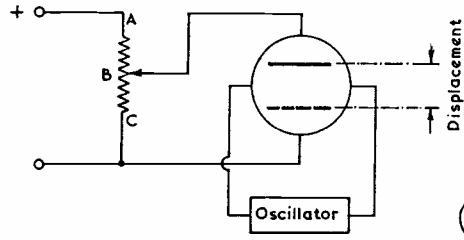


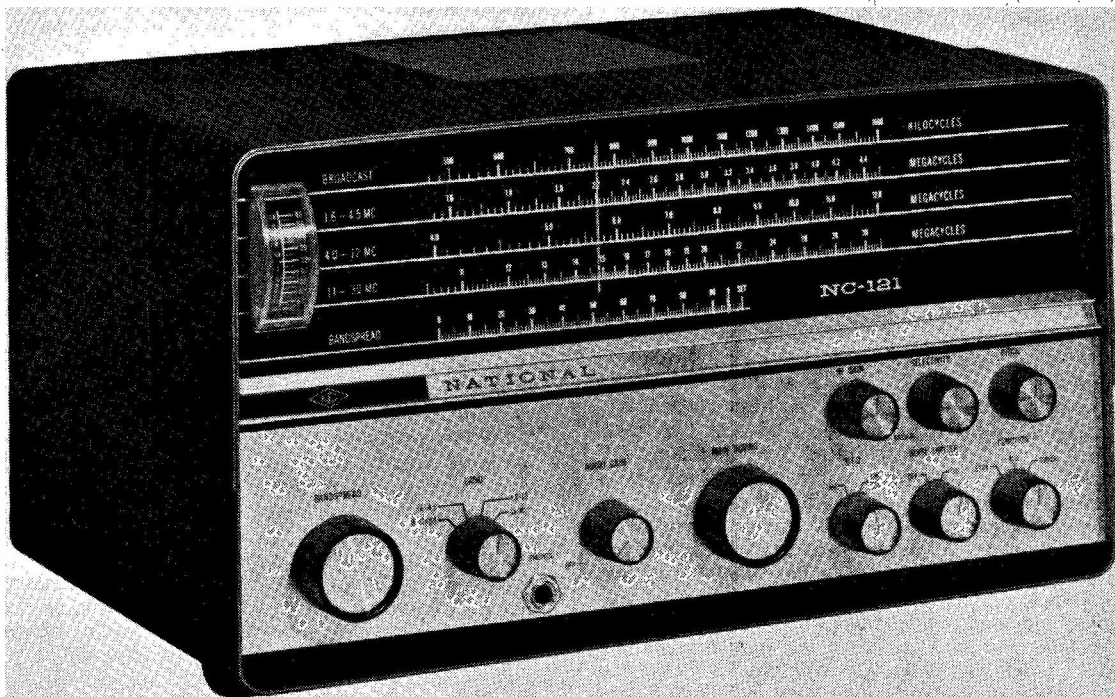
Fig. 4. DC voltages can also be measured on an oscilloscope; the method is discussed in the article.

a centimetre scale.

For example, if the displacement is 1.5 cm. and the sensitivity is 50 volts per centimetre, then the voltage across A and C will be :

Actual voltage
 = Length of line × volts per cm. × div. ratio
 = 1.5 × 50 × 10 = 750 volts across A and C

Finally, it can never be over-emphasised that great care is necessary when working with HT equipment. The *live* side must always be connected to A on the voltage divider and not to C. All apparatus must be *off* when making connections.



The new National NC-121 receiver for general coverage over the range 550 kc to 30 mc. These are picked up in four bands, and features of the design include an edge-reading S-meter, a Q-multiplier, automatic series-gate noise limiter, product detector for Sideband reception, and the receiver is self-contained for power, with a built-in speaker. It is also provided with bandsread calibration charts for the amateur bands, there being a separate logging scale, as this picture shows. The U.K. agents for National products are Ad.Auriema, Ltd.

CW/MCW OPERATING UNDER MOBILE CONDITIONS

A NOTEWORTHY TOP BAND DX CONTACT—SOME ASPECTS OF SAFETY—AND KEYING TECHNIQUE

E. L. GARDINER (G6GR)

RETURNING home late in the car to Wolverhampton, Staffs, and listening round the Top Band as usual, 5A4CJ was heard coming in quite readably near the LF end of the band, and working G's. I therefore got out the key always carried for such emergencies, and got calling. A little later I pulled up in a quiet side-road only a few hundred yards from the home QTH in order to give full attention to the job! This was no falling-off-a-log QSO, of course, and the "big boys" with the half-wave aerials kept getting hold of him first; it seems to have been just into the next day before he noticed G6GR/M, after several overs, we made quite a fair job of it! *

Mobile Installation

The gear used for G6GR/M comprises a *Minimitter*—which has given yeoman service in the car for over three years—running about nine watts from an early model of a *Transipack* PSU, into a *Minimitter* whip, which has been lengthened by some three feet below the centre-loading coil; this is mounted on a bracket on the off-side windscreen pillar of an Allard saloon. The standard coil has been well protected with PVC tape, which is found to maintain the "Q" under damp or rainy conditions. This position for the aerial gives a feeder length of about ten inches into the transmitter, mounted at the extreme off-side end of the dashboard shelf. An RF ammeter directly in the bottom of the whip reads an average 300mA, and the original *pi*-match, supplied as part of the transmitter, is used but is adjusted for maximum RF current rather than for maximum loading. It is believed that the large size of the car, and the consequent high capacitance to ground, plays an important part in good radiating efficiency; in co-operation with G8CK/M it has been found that transferring similar gear to smaller cars gives inferior results, and lower aerial current.

The receiver used on the car is a standard Heathkit *Mohican*, working from its own internal batteries (on this occasion into head-phones) as it is found that not supplying the receiver from the car battery reduces background noise. There is thus no drain upon the car battery during reception, and one can check the band freely without worry. The location for the QSO with 5A4CJ is a pretty noisy one.

Point of Controversy

The question of operating mobile whilst travelling, particularly on CW, is a very controversial one, and as a matter of interest the writer and several friends do not agree with the view often expressed to the effect that this is dangerous. With certain provisos, our view is exactly to the contrary. At least one experienced CW operator prefers this mode, and has not infrequently worked the States whilst mobile on good, straight roads in light traffic. Whilst I do not do this myself, I would certainly not regard CW as any more difficult under mobile conditions than phone—in fact, easier because of the much better signal-to-noise ratio usually obtained on CW. Trying to follow speech while driving under noisy conditions can be quite a strain, whereas a well-operated CW signal is easy copy.

In our view the crux of this whole matter, and of the wide divergence of strongly-held views about it, is essentially just that of the degree of experience of the driver. Nobody who is not a *really* experienced driver and also a *really* experienced operator should attempt to use radio at all whilst driving, and no one should do so under difficult road conditions or really heavy traffic. Five year's experience in each field would be the very minimum, although people differ so much in the powers of concentration and speed of learning, that time is a very poor criterion. The writer has been lucky perhaps in having driven well over half-a-million miles in some 43 years without a serious mishap—and has been operating on CW since the age of twelve. To a friend, a founder-member of the F.O.C., Morse is easier to read than speech, and he will copy a good transmission quite comfortably whilst carrying on a conversation.

With sufficient experience driving becomes absolutely instinctive in the mechanical sense, and the writer regards himself as much less of a menace on wheels than when on foot! All really expert motorists drive without conscious thought for the processes involved. Their attention is concentrated on noticing every movement around (including those through the back of the neck!) and this is essentially a *visual* occupation. Sounds are merely a distraction, and in any case the average driver in a modern, tightly closed saloon can hear very little except tyre noise and the roar of the heater fan.

Radio operating, on the other hand, is essentially an *aural* activity, and there should be little or no need for vision, except perhaps for a brief instant whilst netting—provided, of course, that the gear is laid out properly, with everything within easy reach. After all, one doesn't take a good look at the gear lever before every change. The two activities just shouldn't interact, provided that you really know how to drive and how to operate. The bright lads in Mini Minors, who just *must* be ahead of the car in front at any cost, might as well forget mobile radio—that is a whole-time job, until you get old enough to learn that there are better things in motoring than taking the maximum risk for the minimum result.

* This QSO was on March 13, 1963—Editor.

Using Common Sense

On balance the writer and his friends are prepared to express the strong view that mobile operating used with discretion and common sense makes driving safer, and certainly less tiring (is not this almost the same thing?). It is, of course, much the best to have a passenger to operate on long journeys—to tune the receiver, and generally lend a hand. Under good or average conditions mobile operating can make very little difference to safety. Most drivers talk to their passengers, but without taking their eyes off the road, and the “back-seat driver” can be far more distract-

ing than any radio. After all, you can turn the radio off!

Under really bad road conditions, however, without a passenger to help, only mugs try to operate. But late at night on M.1, for example, or when one is bored or tired, mobile operating can be a very real safety factor, and is the finest way the writer knows of keeping awake and alert. The other man expects you to take an interest in what he says, and make an intelligent reply; whilst if you do happen to run into difficulties or have a mechanical breakdown, help is only a telephone-call away. So, very often, is advice on finding the route, from a local amateur.

CW Operating /M

And what of this dreaded CW? The snag is, of course, that one needs one hand free to punch a key. Under easy road conditions, is this so unheard of? Do all motorists have both hands on the wheel all the time? It doesn't take long to raise one's hand perhaps three inches from a well-placed key. But if we feel that a bug on the parcel shelf, or a light key strapped to knee or screwed to the driver's side-door panel, is not safe enough, is there no better way?

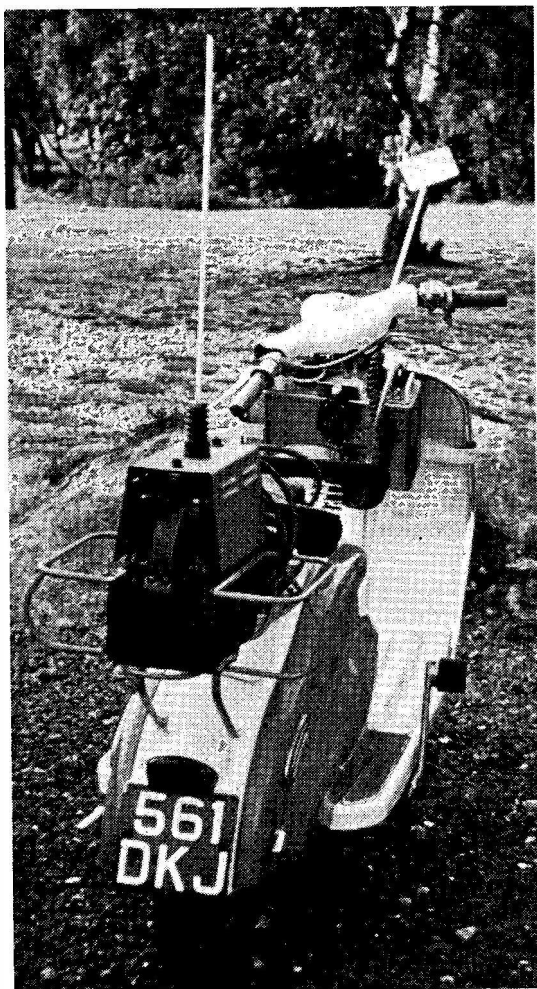
Undoubtedly there are several. Perhaps the simplest is to mount a small key near the base of one spoke of the wheel, with the lead loosely wound down the steering column. If you are fortunate to have a car with the old type of Blumell's or “sports” wheel, having wide flat spring spokes, this could not be simpler; and one can tap away without sacrificing one jot of perfect car control.

But for the really technically-minded, what about Vox? A microphone is clipped to the lapel in the usual way, connected into a simple transistor amplifier driving a diode rectifier, which in turn passes rectified current into the coil of a keying relay, and all you have to do is sing *da-di-da-dit da-da-dit-da* into the microphone at something like a thousand cycles, and the transmitter keys happily away. A better snap action can be obtained from a Vox-triggered flip-flop—the SSB boys know all about it—“anti-Vox” to eliminate the effects of car noises, or the passing driver who first just *has* to send “V” on the horn; it's all in the hand-books! So, as CW is so *very* much more efficient than SSB, and costs less than half, perhaps we can help to solve the QRM problem by hearing a little more of it?

The MCW Possibility—And Some Results

There is yet another approach to this problem which can be quite useful—that of MCW. Both a transmitter and receiver for use on CW on a car in motion need to be very stable mechanically, but many of them are far from it! The *Minimitter*, even without crystal control, shows up very well in this respect, and on Top Band will give practically a T9 note. The *Mohican* is not quite as good, but reasonable if the oscillator stage is carefully wired, most of the circuits being pre-fabricated. However, switching on the BFO on many home-built car rigs can be something of a revelation—the frequency wobbles all over the place.

To get over this trouble, the transmitter can be



On p.477 of the November issue, we showed G3RGD's version of a /M rig on a scooter. Here is how G3OGK (G. R. Kennedy, of 17 Southbourne, Hayes, Bromley, Kent) does it, also on a Lambretta, except that his is a two-metre installation. He has a 10w. Tx, a double superhet Rx tuning two and four metres, with a quarter-wave whip operated as a ground plane against the equipment housing. The Tx/Rx assembly clips on to a shock mounting, and HT is from a vibrator pack run from a 12v. non-spill accumulator. A feature of the G3OGK/M rig is that it can be quickly fitted or removed, as the scooter has not been modified to accept the gear; this is carried in such a way that there is no interference with driving.

tone-modulated by a single-transistor oscillator working at between 400 and 1000 c/s. There are plenty of published circuits for the oscillator, and the methods of keying already described can be adapted to it readily. It lends itself particularly to the Vox approach. Tests have been done with G8CK/M on MCW at the limit of range on Top Band, and MCW found to be a very useful improvement. With one car located in Wolverhampton and the other travelling through Birmingham, and then along A.45, M.45 to M.1, phone signals are very good over the first fifteen miles or so, but as the car travelling south disappears into the central Birmingham traffic, are usually lost. However, on emerging into clear country on the south side towards Birmingham Airport, at perhaps 25 miles, contact can be resumed, but usually at near to the limit of Top Band phone intelligibility. Changing over to MCW restores communication completely, and if interference is not

exceptionally bad, will extend the range to the Coventry area, perhaps doubling the total distance.

Straight CW is, of course, better still, and using the mobile equipment between Wolverhampton and North Devon on 80 metres, solid CW communication at scheduled times was possible every day for a fortnight; whereas phone under the same conditions could only occasionally be read in both directions.

Mobile communication is mainly a problem of noise and anti-noise, man-made in various ways, and any form of tone signal is much more easily distinguishable from this kind of background than is speech. Moreover, it offers much greater scope for noise suppression, as a sensitive on-off squelch type of circuit can be designed to pick out a tone signal very effectively, and can be further backed-up by a selective audio filter, such as the once-popular FLA.8 type available some years ago on the surplus market, but now, alas, very difficult to find.

Miscellany

INCIDENTAL INFORMATION AND ITEMS OF TOPICAL INTEREST

Amateur Radio, which many of us still regard as the finest hobby in the world, suffers from one great disadvantage: The more popular it becomes, the more difficult it gets. It is one of the few hobbies whose devotees get in each other's way and (literally) interfere with one another. Stamp-collecting, the keeping of birds or tropical fish, model-making, gardening . . . in these hobbies, and countless others, there is room for all, and the more the merrier. Looking round for a fair comparison with Amateur Radio, one could only think of bird-watching under severely crowded conditions. More watchers than birds; the keen ones getting in the way of the more reticent; and always the fellow with bigger and better binoculars carrying off the trophies. But perhaps one could also draw a parallel with motoring (for fun) . . . the 1920's were the Good Old Days, with room for everyone, but nowadays anyone can buy a car and "do the ton" without any acquired skill. The way of the real enthusiast is not easy.

The DX-chasing types who show an interest in propagation forecasts will be glad to know (if they haven't already found out) that WWV is now sending his North Atlantic forecast every five minutes, instead of only at 19½ and 49½ minutes past the hour. The regular announcement, at five-minute intervals, on MCW, now runs "WWV WWV 1730 N6"—substituting the appropriate GMT and forecast figures. When the "N6" or "W5" or what-have-you was only transmitted twice an hour, one

always used to look at the clock and find that it had been missed by two or three minutes. Now it is almost as good as a continuous signal.

— • • • —
"Have you heard of the man who connected a variable resistor in parallel with the mains in order to obtain 110 volts? This isn't the end of the story—he tried again with a higher-rated resistor."

(GSGR, in "CQ Cars")

— • • • —
The MARS network station at the U.S.A.F. Base at Mildenhall, Suffolk, has "a 75-ft. vertical for Forty and Eighty, and a dipole suspended between two 40-ft. telescopic steel masts, all ready to go, and awaiting British authority to transmit."

("Auto-Call," Washington, D.C.)

— • • • —
"The FCC, investigating a case of interference, traced it to a well-known penitentiary. One of the convicts, a licensed amateur, had persuaded his wife to smuggle in a rig to comfort him during his incarceration. Tiring of it, he had sold it to another, non-licensed, convict, the terms of the deal including use of his call sign. Thirty days' solitary for both!"

(Letter from G3NWT)

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W4CJD, after some years of overseas service in Japan, whence he signed KA2AB, was returned to the U.S.A. He very shortly wrote back: "Now settled in this desolate place of Tonopah, Nevada, 200 miles from any large town. Should have an antenna up soon so we can contact Japan."

(FEARL "News Letter")

"Is there a need for a code which would enable us to convey to, and receive from, non-English speaking amateurs some information other than RST, QTH and Pse QSL? I have in mind something like the existing Q-code, but covering personal details such as age, occupation, other hobbies, number of years in Amateur Radio and so on."

(Letter from G3IDG)

— • • • —

"Do I have to learn a new language? I mean, all this 'Pizzle-Quizzle' business you read on the cards?"

(Young SWL in Old-Timer's Shack)

— • • • —

"Some time ago GM3AXX's XYL complained that his voice, or something like it (SSB being used), was emanating from the ATU in the spare room... GM3AXX is now trying to fathom some way of adding a BFO to his aerial tuning unit, but none of the text-books cover this contingency."

(*"GM" Magazine*)

— • • • —

An omni-directional VHF aerial with universal polarisation, known as the "Skew-Planar Wheel Antenna," is described in *QST* for November; full constructional details are given, and it is suitable for mobile work (but preferably with a large American car!). Other articles of interest cover the subjects of Crystal Control for Microwave Communication, a transistorised Auditory Meter for the Blind, and a most comprehensive one on RF Chokes for the VHF Bands.

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A panoramic receiver, giving a complete visual display of a band or a part of a band, is described by ZL2AMJ in the December issue of *CQ*. Basically, it uses that "stand-by" receiver found in so

many shacks, plus an oscilloscope, but some very interesting refinements are detailed.

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Heard on the Air: "I am using a 75-ft. vertical lying on the ground." (G3-- on Top Band)

— • • • —

"Just where does all this 'bought' stuff fit in with the objectives of our hobby? How do we develop a trained reservoir of radio operators if all they can do is hook up store-bought pieces, like a garden hose and a lot of fancy sprinklers?"

(*"Auto-Call," Washington, D.C.*)

— • • • —

"Certainly, within the Army, the licensed amateur operator is twice as competent a tradesman as his counterpart, the operator or technician who merely practises his trade when called upon to do so in the line of duty."

(*"Mercury," Royal Sigs. A.R.S.*)

— • • • —

"A really good man who wants to do experimental work would not be put off by the Morse test. In fact, we go as far as to say that the Morse test keeps off those frivolous amateurs who want a licence for the fun of the thing."

(Letter from G3JDK)

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An SSB adaptor based on the McCoy 9 mc filter, using eight valves and costing only about £30 for parts, is described in the January 1964 issue of *CQ*. Other subjects of general interest covered in the same issue are a Four-Band Trap Aerial, an RTTY Audio Oscillator, and VQ9HB's account of his first voyage to Agalega.

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Heard on the Air (2): "I still love Amateur Radio as much as ever, after 35 years of it. It's only the actual QSO's that are such a bore!"

AMATEUR LICENCE TOTALS

We are informed by the Post Office that the total of U.K. amateur-station licences in issue as at December 31, 1963, was 10,452. Of these 1,452 were endorsed for /M operation, with 147 permits issued for amateur TV. It is probable that a large proportion of the latter would add to the main total, since /T licences can be obtained separately for the UHF bands (from 430 mc up). Over the five months August-December last year, the nett increase was 267 full licences, 50 mobile, and nine for ATV.

ENTRIES FOR THE MAY R.A.E.

Readers who propose taking the next Radio Amateurs' Examination, in May, are reminded that their entries should be going in very shortly—it is not possible to specify a closing date, because different examination centres make their own rules about when they can accept last entries.

ORDEAL OF THE WILSON FAMILY

On p.628 of the January issue of *SHORT WAVE MAGAZINE* there appeared a brief note mentioning that Harry Wilson, EI2W, his wife and son were among the survivors from the *Lakonia* disaster during the Christmas holiday. We have since had fuller details, and it is evident that the party had a very bad time. Besides losing everything they possessed, their lifeboat was not properly manned, and James Wilson (EI2W's son) had to take an oar; with a young English girl, they rowed for nearly five hours. They were eventually picked up by the s.s. *Salta* after EI2W had attracted her attention by flashing SOS on a torch! With other survivors, they were landed at Madeira and got thankfully home to Dublin in time to see the New Year in. And we rather gather that Harry himself now has a much greater appreciation of the merits of CW as a mode of communication!

INPUT SCREENING DEVICE

AGAINST HUM AND RF PICK-UP

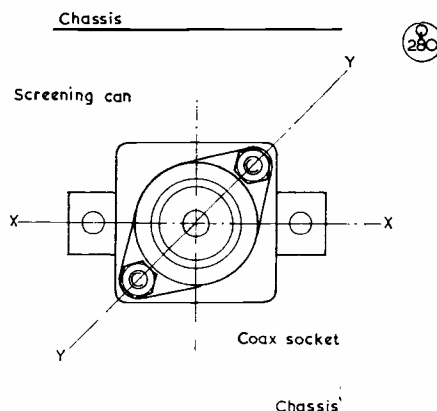
L. E. Profaze (G3KAB)

PERHAPS you have experienced trouble with hum in an audio-amplifier or RF feed-back in the modulator and have found the only remedy to be complete screening of the rear of the input socket and the grid resistor associated with the first valve.

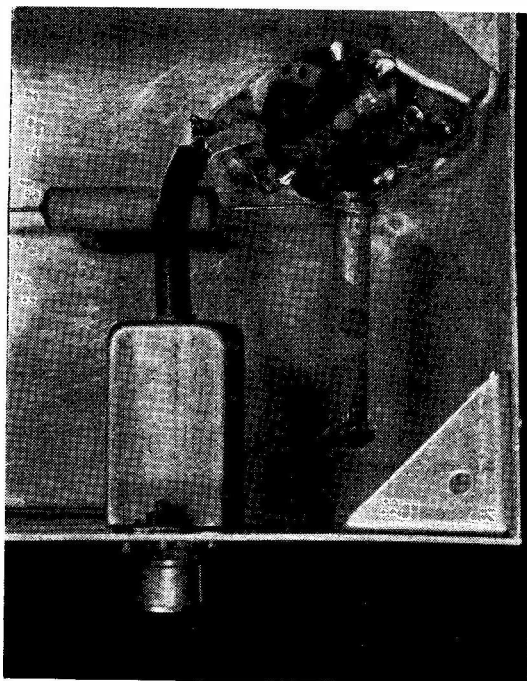
In practice this often proves to be one of those tedious constructional tasks for which one seeks an easy way out. But in this instance a ready-made solution is offered by the aluminium screening cans intended for use with the small moulded *Aladdin* coil formers. The illustration here shows one of these cans totally enclosing both the rear connection of a standard television-type cable socket and the grid resistor, while a short length of coaxial cable can be seen emerging from the hole originally provided in the can for access to the coil trimming core, thus establishing a fully protected lead right to the base pin of the valve.

The diagram shows that the dimensions of both items are such that, purely by chance, the socket fixing nuts fit within the diagonal width of the screening can, while the space inside the box is sufficient to accommodate several small components; if desired, the larger screening cans, normally used for IF transformers, could be adapted in the same way.

When arranging the layout first establish the location of the socket and drill a small hole in the chassis at the point of entry of the centre conductor. Next draw a line $x-x$ through this point at right-angles to or parallel with the chassis edge, mark the positions of the holes to correspond with those of the screening can fixing lugs and drill 6 BA bolt clearance holes. Now draw a line $y-y$ at 45° to the line $x-x$ and, with the socket serving as a template, mark the positions of the required fixing holes and again drill to clear 6 BA. The centre hole should now be enlarged to avoid the conductor coming into contact with the chassis metal and as soon as the socket has been installed the wiring can proceed until it is convenient to fix the screening box. The end of the coax lead is then soldered to the grid pin and the job is complete.



A plan-view sketch of the mounting of the coax socket with its screening can.



The method of input screening suggested by G3KAB. A small coil or transistor can envelopes the connector end of the coax socket and the input components, with a screened lead into the grid of the first stage.

INTERESTING POLICE APPOINTMENT

It is reported that the new Chief Constable of Bristol is Mr. George Twist, until recently an assistant chief for Liverpool. In addition to having read for the law and being a member of Gray's Inn, he also has another distinction—he holds the active callsign G3LWH, and is well known on the air in the Lancashire area. In wishing G3LWH success in his new and very important appointment, we feel he

will also be a strong acquisition to the Bristol radio amateur group.

CALLSIGN HB-BIW—BALLOON

If you saw a recent documentary on the BBC's telly, you may have noticed that there was radio working from one of the balloons drifting over the Alps. Her callsign was in the regular 5-letter series for aircraft.

VHF BANDS

A. J. DEVON

THERE can be no doubt in the mind of anyone active on VHF that 1964 has started very well for us—indeed, the dying days of the old year gave some good openings, as if to make up for the rather dull December period.

Another fact that will not have escaped observation—or, at any rate, we hope it hasn't—is that the glass has been standing very high and steady during most of January, with the TV weather maps showing large areas of anti-cyclonic conditions. It is always worth seeing these charts if you can manage it, as the met. boys hand out a good deal of valuable information in those five minutes around 6.30 p.m. each evening. If a large high-pressure area is indicated, covering Northern Europe and most of the U.K., and it is going to be fine and dry, with no wind, a falling temperature and a clearing sky, it is a reasonable bet that good conditions will develop during the evening for VHF/DX. A muddled weather state, with pockets of highs and lows, rain and wind, means that local working only can be expected by the generality of two-metre stations, with ranges of more than 100 miles or so exceptional—though always one must qualify such a statement by excluding the well-placed, high power operators, and the schedule-keepers, who will generally overcome local conditions and get out a good deal further.

Another important factor in

the propagation picture is fog. Large areas in fog for long periods—rather as we had it at times during January—will also produce good GDX conditions, and this seems to be more helpful as the frequency goes higher, *i.e.*, for the 430 and 1250 mc bands.

As there is a good deal to report and to talk about this month, let us look first at the facts, more or less in the order of their occurrence.

New MS Contacts

With the meteoric phenomenon known as the Quadrantids due around January 3, we expected to hear of some new results at EDX ranges. Sure enough, G5YV (Leeds) worked OH2HK (Helsinki) by meteor scatter on January 4 at 0510, this putting Harold up to 21 in Countries Worked.

And also an MS report from our old friend OK2WCG, one of the leading European VHF/DX stations, and for many years a follower of this piece. He worked LZ1AB (Sofia) on January 5, (0030-0330, S27/S26), for his 16th meteor-scatter QSO and 10th country worked by MS, putting him up to 18C in the table. Apparently, OK2LG, also in Prague, likewise had an MS contact with LZ1AB. And we are informed that the latter is a well-genned-up VHF operator, running 350w. on 144-166 mc, with a good receiver and a large and gainy beam. He is now anxious to open skeds with U.K. stations for MS tests—he can be reached through Box 311, Sofia.

This business of EDX working by MS is definitely a ploy for the specialist—it involves very accurate frequency setting; a really good beam; a more than usually sensitive receiver which can be tuned, and held, exactly to the distant station's frequency, often for long periods; schedule keeping at usually the most awkward and uncomfortable times—and a knowledge of the right direction for the beam heading.

GDX on 23 Centimetres

From time to time, progress-reports from G2CIW (Birmingham) have been quoted in this

space, Jack being one of those taking a close and particular interest in the 23-cm. band. By the beginning of the year he had his 3CX100A5 tripler running 33w. input on 1298.25 mc, the driver being the QQV06-40A 70-cm. PA. The Rx and reflector-type aerial had already been successfully tested locally with G3KFD, and G3NBQ in Coventry had heard the Tx. On January 17, in the fog and with the glass very high, he and G3FP (Thornton Heath, Sy., 110 miles) had a both-way QSO on 23 cms., G2CIW getting G3FP at S6/7 on phone, and the latter giving Jack 589; they then kept further skeds at intervals all through the day on Saturday 18th, and each time were

TWO METRES COUNTRIES WORKED SINCE SEPTEMBER 1, 1963

Starting Figure, 14
From Home QTH only

Worked	Station
57	G3BA
55	G3LRF
52	G3GWL, G3NUE
49	G3CO
42	G3SAR, G4LU
40	G3HRH
36	G3PTM
34	GM3LDU
33	G2BJY, G3PSL
32	G2CDX, G3LAS, G5JU
30	G3CKQ
26	G3CCA, G3DVQ, G3GSO, G3PKT, GW3PWH
24	G3ONB
19	G2BDX, G3KPT
18	G3EKP
17	G3KQF
16	G3HWR, G3IOE, G3OJY, G8VN
15	G3AHB
14	G3OZF, G5UM, G5ZT

This annual Counties Worked Table will run till August 31, 1964. 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 call sign and date for the county worked. To keep the Table up-to-date, claims should be made at intervals of not more than two months.

able to put signals over. G2CIW reports that "the remarkable thing about the whole business was that at no time on January 17-18 were 70-cm. signals particularly strong." During one of the tests G2CIW had to go to two metres to keep contact with G3FP, though the latter was coming through consistently on 23 cms.

During the sked with G3FP for the first contact on January 17, G2RD (Wallington, Sy.) was standing by, but he and G2CIW could not hear one another. Another of Jack's collaborators is G3GWL (Bletchley) who has got the receiving side going on 23 cm. As the latter is very well located and is taking the UHF side seriously, it cannot be long before G3GWL is able to report a result—especially as he is also in a good position for tests with G2WJ and G3LTF, at reasonable distances in the easterly direction.

EDX Results on Two

While EDX/GDX conditions on two metres have been consistently above average during the period, the morning and the evening of Friday, January 3 and the day-time of Saturday 4th gave what were probably the best EDX sessions. During this spell, the EU's available included HB, LX, OZ and SM—and there are rumours of either an EA or a CT having been heard. And for the record, the TV Wx chart on the Thursday evening foretold all this quite accurately. It was clear that VHF coverage could extend right down to the south and south-west of France.

In addition to HB9LN, HB9WB, LX1SI, OK1VR, OZ9OR and such, a station causing some mis-tification was PIIHTG—quite genuine, and a Dutch allocation for an official station licensed for amateur-band operation, e.g., a technical school, military establishment or government institution, and as such only of special interest to WPX/HPX hunters (of whom it is to be hoped that we have none on VHF).

G3LAS (Berkhamsted) says of the January 3 opening "it really is fun when the evening QRM is absent and there is a satisfactory

level of activity from the Continent"—he is referring to the morning of that Friday when, as he puts it, "the XYL suspended her washing-up rights for the day." Anyway, out of it G3LAS got HB9LN and LX1SI worked in addition to many DJ/DL's, F's, ON's and PA's, and on the receiving side he found HB9RG on SSB, also OK1VR right at the band-edge (LF, needless to say), and OZ9OR.

From G5MA (Great Bookham, Sy.) we hear that he worked two HB's, '9LN and '9WB/P, LX1AL (a Luxembourg station not mentioned by anyone else), and a number of the near-EU's; and on the GDX side, which Bob always watches when the two-metre band is open to the Continent, he knocked off GC2TR for Jersey, GI3GXP, and G3RHE for Cumberland.

For G3GWL, the DX conditions produced a number of EU's and some GDX to contribute to his scores for the tables. From G3LRP, up in Wakefield, Yorks., who is going strong in Annual Counties, comes a report of several of the nearer Europeans raised during the openings—which shows how far they extended, because it is only under really good conditions that G3LRP can expect to hear EU's; he mentions F3LP as being particularly strong on January 18.

All the morning of January 3, G4LU up in Oswestry stuck to the two-metre band and by mid-afternoon had accounted for such exotic stuff as DJ3ENA in the Black Forest, F3XK, F3XY, HB9LN, LX1SI, ON4LV and PAØCOB—remember, Stan is 150 miles north-west of London, so this sort of EDX does mean

TWO METRES

G3ZYX, 147A Upper Nobber Grove,
Birmingham, 47.

HEARD: DJ3JO, 3KZ, DL6MU, E12A, 2W, F3NT,
8MX/A, G2AXI, 2C.DX, 2FQP, 2FRL, 3AYT, 3BA, 3DMU,
3EYV, 3FZL, 3GVV, 3OSS, 3PKT, 3PSL, 4LU, 5DS,
SHZ, 5UM, 6AG, GQ2FZC, GØ3UB, G13GX P, GMSAXX,
3LØU, GØW3MFY, HB9ØT, LA6T, PAØFB, SP3GZ.

WORKED: DJ3FL, DL6KZ, E16A, F3FSK, G2ØQ,
2MY, 3BØQ, 3BØX, 3CO, 3LAS, 3LHA, 3LTF, 3MG,
3OHT, 3OZF, 3PLQ, 3SAR, 3SKH, 5ØF, 6NB, GQ2CNC,
GØ2HQ, 5BI, 8UH, ON4BZ, PAØCOB, SM2ALU.

(During Dec. 30 to Jan. 22).

Sample layout for preparing a calls/heard worked list. Show first the band, with your callsign and QTH as given in the heading (somebody may want to know how and when you heard him). The "heard" section comes before the "worked," with a division between them. All callsigns are in strict alphabetical and numerical order, with clear differentiation between letters and numerals, e.g., the 'U' always has a tail to distinguish it from 'V'; the 'Z' is made clearly different from '5' or 'S'; the 'I' is dotted so that it cannot be printed as '1'; the letter D has tails so that it cannot be read as a carelessly-written 'O'; the 'C' is shown so that it cannot be mis-read as a 'G.' The callsigns are written in order from left to right, as when reading print, and not tabulated. "Heard" and "worked" calls are not duplicated—it is assumed that if you worked him, you also heard him. In the case of SWL lists—which we shall also be glad to have under this heading—the SWL name and address takes the place of the callsign. Though we do not make it a condition for publication, it will be appreciated by A.J.D. if lists conform strictly to this layout. And if you can use a typewriter, so much the better.

something.

Keeping to 70 centimetres on January 3, G2CIW worked F3LP, F9NJ and ON4HN, with F3XK and PA@COB heard. G3PBV (Wolverton, Bucks.) reports LXIST raised that same evening, for his 14th country on two metres.

G3SAR (Sevenoaks), who is well located and strategically placed for Europe, with his gear in good shape, did very well with the EDX, the HB's being worked, as well as OZ5AB, OZ6EI, SM7BAE and SM7CJZ on January 4 for two new countries. Much GDX was also raised during the period, advancing G3SAR in the tables. And he says that recent conditions have been much better than anything experienced during the summer.

G3CO (Dartford, Kent) got in with HB9LN, LX1SI and a number of DJ/DL, F, ON, OZ and PA stations—and is another to mention the GDX, which for him included G3BJD (Seascale) and G3RHE (Egremont) both for Cumberland. G3AOS (Hale Barns, Ches.) worked HB9LN, for a 1000-mile QSO.

Two-Metre Contest, 26 January

This RSGB affair was one of those occasions almost unique nowadays—a CW-only contest which was well supported and played off under good GDX conditions, producing what can only be described as a satisfactory level of QRM! Though some of the keys sounded a bit rusty, and there were widely different interpretations of the Code of Morse, the point is that there must have been well over 100 CW stations on, and it was good to hear so many trying on the key—and it should be said that a lot of the 50 or so stations heard by your A.J.D. were very well operated. For instance, G2PL (Wallington, Sy.) was using full break-in, and G3NUE from Worcester was putting in a real T9x signal; clean, sharp and nicely keyed. By contrast, there were some other stations showing bad drift, with very chirpy notes; add to this over-fast keying, with poor formation and spacing, and you get an effect which shows up the

difference between good and bad CW operators. Never mind, everybody was giving and getting T9!

There was some concentration of stations at the LF end, several of them well out of zone, and a certain amount of frequency changing; nowadays, this sort of thing is probably regarded as fair-enough under contest conditions. However, it is hardly necessary for those with what might be called "prominent signals"—a good example is G5YV, who kept to his regular frequency in the HF sector and worked many stations. Some of the best scores heard, in terms of location related to stations worked, were: G6GN, Bristol, 82 at 2135; G3ICO/P, Okeford, Dorset, 65 at 2150; G3NUE, Worcester, 67 at 2130; and G4LU, Oswestry, 57 at 2140. The actual rate of scoring is well indicated by the figures from G3KEU/A (Romsey, Hants.) who had 11S in the book by 1130, and 52S at 1745; and by G3ICO/P, whose figures were 9S at 1200 and 45S by 1820. These and some others noted suggest an average scoring rate of about six stations an hour during the daylight period, with the tempo hotting up towards the close at 2200, when there were more people on. By mid-evening, the South Wales stations were activated and getting out well—it was interesting to hear GW3MFY, GW5BI, GW8UH and G4GR (who could be GW if he cared to use the prefix) all on together, and knocking 'em off.

Returns to the Fold

G3AHB (Slough, Bucks.) writes to report his return to two metres—after an absence of 12 years! He now has a 6/6 at 45ft., a nuvistor converter, and an 829B in the PA, giving 28w. RF out for an input of 40 watts. Since the re-start, G3AHB has worked 117 stations in 15 countries and six countries.

Another re-starter, after a move of QTH, is G3KQF, now in Borrowash, Derbys., who also has a slot-fed 6/6, with a temporary Tx running 30w. NBFM, to be improved to 60w. with SSB in due course. G3KQF remarks "it looks like being a long haul back

TWO METRES

COUNTRIES WORKED

Starting Figure, 8

- | | |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 22 | G3LTF (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP, UR) |
| 21 | G3HBW, G5YV (DL, EI, F, G, GC, GD, GI, GM, GW, HB, HG, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP) |
| 19 | G3CCH |
| 18 | G6NB, ON4BZ, OK2WCG |
| 16 | G3BA, G3BLP, G3CO, G3GHO, G3KEQ, G5MA, G6RH, G6XM, PA@FB |
| 15 | G2CIW, G2XV, G3AYC, G3DKF, G3FZL, G4MW, GM3EGW |
| 14 | G2FJR, G2HDZ, G3AOX, G3FAN, G3HAZ, G3HRH, G3IOO, G3JWQ, G3KPT, G3PBV, G3WS, G5BD, G5DS, G6LI, G8OU |
| 13 | G2HIF, G2HOP, G3AOS, G3DMU, G3DVK, G3EHY, G3GPT, G3HIT, G3NNG, G3NUE, G4LU, G6XX, G8VZ |
| 12 | EI2A, EI2W, F8MX, G2BJY, G3BNC, G3GFD, G3GHI, G3GWL, G3JAM, G3JLA, G3JKN, G3LAS, G3OBD, G3WW, G5CP, G5JU, G5ML, G8DR, GW2HIY |
| 11 | G2AJ, G2CDX, G2CZS, G3ABA, G3BDQ, G3BOC, G3GSO, G3IUD, G3JYP, G3JZN, G3KUH, G3LHA, G3OHD, G4RO, G4SA, G5UD, G6XA, GC2FZC, OK1VR |
| 10 | G2AHP, G2AXI, G2FOP, G3BK, G3DLU, G3GSE, G3JHM/A, G3KQF, G3LAR, G3LRP, G3LTN, G3MED, G3OSA, G3OXD/A, G3RMB, G5MR, G5TN, G8IC, GW3ATM, GW3MFY, GW5MQ |
| 9 | G2BHN, G2DVD, G2FCL, G3BOC, G3BYY, G3FII, G3FUR, G3OJY, G3PSI, G3PTM, G4LX, G5UM, G6GP, GC3EBK, G3ONF, GM3DIQ |
| 8 | G2DDD, G2XC, G3AEP, G3AGS, G3CCA, G3EKX, G3GBO, G3HCU, G3HWJ, G3KHA, G3PKT, G3MPS, G3VM, G5BM, G5BY, G8SB, GM3JFG, GM3LDU |

to my original places in the tables, although in the three months I have been on, 17 counties and three countries have been nailed."

And yet another in this category is G2CNT (Longstowe, Cambs.), who makes his return to two metres after seven years' QRT. Though in Cambs., he is very near the Hunts.-Herts.-Beds. boundaries, at 239ft. a.s.l., with a good take-off in all directions. At present, the gear consists of a 3-ele Yagi, an 832A in the PA, and on the Rx side the converter described in the September '63 issue of SHORT WAVE MAGAZINE, which seems to be giving a good account of itself, with EU's heard and worked. G2CNT is on daily

at the breakfast hour (and usually finds someone to work), and also from 1930 most evenings. He is equipped for 70 cm., with the old gear, and says he finds himself "within the G3NOX/T fall-out area." Other projects in hand include Rx gear for 23 cms. and /M for two metres—and he mentions that there are about 20 stations active on VHF in the Cambridge district.

General Reports—Two Metres

G3IOE (Newcastle) is now at 16C for the Annual, and regards his contact with G3NUE as "real 24 carat solid gold" in the never previously heard county of Worcester.

While keeping an ear for the DX and doing his stuff in the CW contest, G4LU (Oswestry) has been busy perfecting his new transistor converter—consisting of 2N2398 and 2N1742 RF stages, into a 2N2361 mixer "aroused" by injection at 138.3 mc from an osc.-mult. chain consisting of an OC171 overtone oscillator at 46.1 mc, tripled in a 2N1742; this gives 5.7-7.7 mc tunable. The back-end is also fully transistorised and incorporates a Kokusai filter (and you don't need to be told where that comes from) to tighten up the selectivity. At present, the converter is giving an NF of 3.5 dB, but Stan thinks he can make it do better than that.

G8VN (Leicester) was amused to hear someone saying to someone else on two metres that "old 8VN won't get anywhere with his indoor antenna!" However, G8VN is now at 16C in the Annual, has worked about 60 different stations in the last few months, and has been hearing GM's on CW. And he mentions the number of stations, either new on the air or new to the band, now to be heard in the Midlands area, with a steadily increasing level of activity.

In his scores for the tables, G3NUE shows more than 500 stations worked on two metres, and mentions some good contacts in the north on January 19—also that G3STW, likewise Worcester, is a new station on, putting out a good signal.

G3DVQ (Purley, Sy.) has a new

Tx running 60w. to a QQV06-40A PA, and another converter is also on the way. G3PSL (Loughborough) claims for the tables, as does G5DS (Surbiton, Sy.); his total of different stations worked on two metres is now 898. And likewise G3AOS (Hale Barns, Ches.) puts in amending claims, with 82C for the All-Time. So do GC3OBM (Guernsey), and G2BJY (Walsall).

G3ONB (Kirkby-in-Ashfield, Notts.) says he has had two bits of luck—the successful installation of a slot-fed 6/6 J-Beam at 40ft., and the winning of a two-metre converter in the club's Christmas raffle. So he was able to raise some EU's during the January opening and is getting better reports than before—and he has now worked his 100th station.

In his report with claims for the tables, G3PTM (Solihull, Warks.) says that having spent a year on two metres, he can "look back on a very enjoyable time on a very enjoyable band." In that time he has worked 320 different stations scattered over the U.K. and Europe, ranging in distance from 550 miles to 30 yards (with a mobile).

Periodically, we are glad to have a claim for the two-metre All-Time from F3XY (St. Remy, S. et M.) whose ploy on VHF is to work U.K. counties and whose score we have carried in that table for the last several years. Robert is now up to 31C, and his latest list shows good coverage of England—nice going from where he is, with the nearest G station something like 200 miles away.

G2DHSV (Sidcup, Kent) has a rotatable, indoor 6-ele close-spaced Yagi, with remote motor control and indication, and arranged for continual rotation at one r.p.m., if required; this is achieved by a four-way wiper assembly and, by having a good-quality RF cable for the inter-connection, a gain of 6 dB over the old beam is being obtained. G2DHSV also does a lot of /P,/M work and for this has a knock-down 10-ele Yagi.

Four-Metre Notes

Several northerly stations have been given a new county since

FOUR METRES ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8
From Home QTH Only

Worked	Station
40	G3EHY
37	G3IUD
36	G3PJK
35	G3OHH
34	EI2W
33	G5JU
30	G2OI, G3JHM/A
29	G3NUE
26	G3PMJ, G5FK
21	G3AYT
20	G3LZN
19	G3BNL
16	G3BJR, G3FDW, G3OWA
14	G3OKJ, G1BHXV
12	G3LQR, G5DS
11	G3HWR, G3SNA
8	G3PRQ

This Table records Counties Worked on Four Metres, on an all-time basis. Claims can be made as for the other Tables, e.g. a list of counties with the stations worked for them, added to from time to time as more counties accrue. QSL cards or other confirmations are not required.

G6NB (Brill, Bucks.) has come on 4m. again—he was one of the early starters, when there was very little occupancy. It has taken us some time to get this band going, and there is still plenty of scope for useful and interesting work on it—particularly, one would think, for mobile operation. There are groups who use it thus, as previously reported here, but it would be a very good thing if we could have even further development. And your A.J.D. would like to have many more individual reports covering 70 mc activity.

G3SNA (Oldham, Lancs.) started on 4m. and now has the creditable total of 11 counties worked. G3PMJ (Manchester) mentions the contacts the 4m. boys up there had with G6NB on January 19—and also the fact that in each case Bill's card was in the post next morning. G3OHH (Macclesfield, Ches.), now at 35C in the table, is another to com-

ment on G6NB and his signal, and says "why can't we have more signals from the south like this?" G3IUD (Wilmslow, Ches.) goes up five rungs in the ladder, and shows G3JYP for Westmorland and GM3FDW for Dumfries as interesting 70 mc QSO's.

"Calls Heard" Revived

With the increasing occupancy of the VHF bands and the large number of stations new to them since the days when we ran "Calls Heard and Worked" as a regular section in this feature, it has been decided to revive VHF Calls Heard. The whole idea is that by being able to print a sufficient number of lists, a much better impression will be gained of occupancy and activity, apart from the important fact that many people will be given useful information as to where they are being heard.

So take a look at that bit of copy on p.690, which shows how your list should be set out—and on a *separate* piece of paper, *please*. This is most important, because if the lists are received initially in a form legible to the printer, they can be pasted straight down, and hours of time will be saved. If your list can be made to look like G3ZYX's effort, it can be used—subject, of course, to the availability of space and its intrinsic interest as a list. Obviously, long lists of regularly-heard locals within about 50 miles are not as useful nor as interesting as, say, stations logged at 100 miles and over under average conditions. On the other hand, stations new on the band locally *are* of interest. So use a bit of discretion. The list can always be explained or qualified by a brief note with the date area covered. And you will also find it helpful (to us!) to read carefully through the caption on p.690.

VFO's and the Band Plan

We have come a long way on VHF since the idea of frequency-zoning the U.K. was first set out in *SHORT WAVE MAGAZINE* 15 years ago. Since then, the zoning system has undergone various modifications, some of which have not stood the test of time and the occupancy of the two-metre

band under the conditions of recent years—particularly when we get a big EDX opening.

As things stand at the moment, it can be said that, technically, VFO working as on the HF bands is entirely practicable for two metres, and that occupancy—now higher than ever before, and increasing steadily — justifies the adoption of single-frequency operation, as on any other communication band. That is to say, the level of two-metre activity in the populated areas of the country is such as to make cross-frequency working undesirable and an unnecessary waste of band space—in other words, the concept now is that, broadly, two-metre stations in QSO at distances of 100 miles or so should be able to steer themselves accurately on to the same frequency. And if they can do it outside their own locality, equally they should be able to do so for any desired QSO, at whatever distance.

We can quote G2HCG (Northampton), a well-known VHF worker for many years who has made considerable contributions to the art, as a strong protagonist for the modernisation of our operating procedure by the general adoption of frequency setting by VFO, rather than by crystal. To quote him *verbatim* ". . . the Band Plan has now outlived its usefulness and there is

every reason for normal single-frequency working as on the LF bands in view of the rapidly increasing number of stations now active . . ." Bill goes on to suggest that even if those Air Ministry guard frequencies have to be protected, the unshared top half of two metres (145-146 mc) could be made VFO-only.

You can really only have an opinion about this if you have ever worked, under strict single-frequency crystal-control conditions, when the band is wide open for DX, and it has not been possible for you to move—either to avoid strong QRM or to get on to a frequency from which you thought you may have had a better chance to raise the DX.

Till Next Time

And with those thoughts we have to leave you, in the hope that you will give A.J.D. the benefit of your ideas and suggestions on this and any other topic of VHF interest, in time for comment in the next issue, the closing date for which must be **Friday, February 21 latest**. Address all your news, views, claims and opinions to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.—and don't forget those calls heard-worked lists. With you again on March 6, all being well. *73 de A.J.D.*

"STOP PRESS" — Items received up to 31 January

The CQ 160-metre World-Wide Contest (January 25-26) was once again blessed with excellent band conditions. Trans-Atlantic QSO's were very numerous on both mornings, and many European stations had multipliers of 20 or more. At least thirty W/VE stations were heard in the south of England—as well as VP7NS, HK4EB, 6YAXG and others in that area. Tipped as European leader is DL1FF; highest scorer for the U.K. is almost certainly GM3IGW/A, with GI6TK running strongly. So many G's had high scores that prediction is difficult, but none of them can touch the "loaded" scores of GI, GM and GW operators, who collect 5 pts. for each G worked. All available details will appear in "DX Commentary" for next month.

For the OH2AH/Ø operation, mailing of QSL cards from Hammarlund's should start about February 15. They also report that logs are now coming in covering the '2AMS activity, and cards are being sent out.

Using Hammarlund equipment, ZB6PBD will give Nyasaland throughout February, mainly on 20m. SSB (American phone area) and on 14100 kc when the situation demands. For the VP8HF foray from the South Shetland Is. the period is March 6-27, but is somewhat dependent on the ship's local schedule. (These items from *Hammarlund*, dated 23 January.)

NEW QTH's

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

E18AR, J. Shortall, De La Salle House, Ardee, Co. Louth.

G3LBW, J. R. Bird, 15 Conway Road, Redcar, Yorkshire (*Re-issue*).

G3RAM, F. C. Langmaid, 2 Clarendon Road, Shoreham-by-Sea, Sussex.

G3REP, R. E. Parkes, Great Oaks, Green Lane, Blackwater, Camberley, Surrey.

G3REP/A, R. E. Parkes, Parkview, Abbey Road, Malvern, Worcs.

G3ROO, I. H. Keyser, 36 The Ridgeway, Ruislip, Middlesex.

G3SCT, No. 335 Unit (Thurrock) Sea Cadet Corps, T.S. St. Clements, Tilbury Dock, Tilbury, Essex.

G3SHT, Kingsbridge Amateur Radio Club, c/o D. Wilson, 11 Frogmore Terrace, Kingsbridge, S. Devon. (*Tel. Kingsbridge 2603*).

G3SJV, D. J. Viney, 42 Cavendish Place, Eastbourne, Sussex. (*Tel. Eastbourne 3909*).

G3SKB, W. A. Whitehouse, 2 Church Crescent, St. Albans, Herts.

GM3SPC, I. M. Malcolm, Viewforth Secondary School, Kirkcaldy, Fife. (*Tel. Dysart 5147*).

G3SPX, K. G. Baker, 87 Batley Road, Alverthorpe, Wakefield, Yorkshire.

G3SPY, Apprentice Association Amateur Radio Society, c/o Training Office, The G.E.C. (Coventry) Telephone Works, Stoke, Coventry.

G3SQQ, D. Best, 17 Springdale Road, Langho, Blackburn, Lancs.

G3SQU, C. S. Clarke, 52 Millmead Road, Margate, Kent. (*Tel. Thanet 20751*).

G3SQV, J. S. Davis, 12 Avon-vale Road, Loughborough, Leics.

G3SRA, Silverthorn Radio Club, Friday Hill House, Friday Hill, Chingford, London, E.4. (*QSL via J. E. Johnson, 35-A Woodland Road, London, E.4*).

G3SRD, J. R. Darlow, 16 Coates, Cirencester, Glos.

GW3SRG, A. E. Peake, Winley, Higher Lane, Mumbles, Swansea, Glam.

G3SRS, Slade Radio Society, Hq. Church House, High Street, Erdington, Birmingham 23 (*Formerly G3JBN, now relinquished*).

G3SRZ, K. Rodgers, 7 Broadlands Avenue, Hockley, Essex.

G3SSA, F. Longson, 4 Chester Road, Hull, E. Yorkshire.

GM3SSB, D. K. McDermott, 114 South Woodside Road, Glasgow N.W.

G3SSD, J. Derbyshire, 22 Vicarage Lane, Wilpshire, Blackburn, Lancs.

G3SSI, R. Simpson, 25 Bowes Road, Acton, London, W.3.

G3SSL, N. G. Ward, 8 Overton Drive, Water Orton, Birmingham.

G3SSM, N. A. Currey, 19 Paragon Street, Stanhope, Bishop Auckland, Co. Durham.

G3SSP, L. Whitaker, Lime Cottage, Ash, Canterbury, Kent. (*Tel. Ash 248*).

G3SSQ, C. Spear, 19 Tavistock Avenue, St. Albans, Herts.

G3SSX, D. P. Scully, 53 Valley Road, Portslade, Sussex.

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G2RP, E. D. Dunn, Meadow Cottage, Holloway Road, Duffield, Derbyshire.

GM3AKM, L. R. Richardson, 39 Silverknowes Grove, Edinburgh 4.

G3BOC, H. M. Synge, Ravelstone, Manley, Helsby, Cheshire. (*Tel. Manley 379*).

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G3KYM, H. Stamper, c/o Sgts' Mess, R.A.F. Station, Medmenham, Marlow, Bucks.

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- G3MEW**, G. E. R. Denman, 17 Testcombe Road, Alverstoke, Gosport, Hants. (Tel. Gosport 81697).
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- G3PVT**, K. Field, 42 Minworth Road, Water Orton, Coleshill, Birmingham.
- G3PWR**, D. G. Marsh, 108 King George Road, Rossington, Doncaster, Yorkshire.
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- G3RYY**, N. Penketh, 4 Sandycroft Avenue, Wigan, Lancs.
- G3RZC**, R. D. Pellett, 29 Jubilee Road, Bexhill-on-Sea, Sussex.
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- G3SCW/A**, R. Hooper, 2 Chestnut Road, Peverell, Plymouth, Devon.
- G4RO**, A. E. Read, 1-A King Harry Lane, St. Albans, Herts.
- G5CX**, C. R. Pill, 22 Stratford Road, Bromsgrove, Worcs.
- G5UP**, J. W. Robinson, Omega, Bank Top, Ingleton (Yorks.), via Carnforth, Lancs. (Tel. Ingleton 261).
- G8CA**, A. J. Frisby, Highpoint, Woodhouse Hill, Uplyme, Lyme Regis, Dorset. (Tel. Lyme Regis 2799).
- G8TA**, Wolverhampton Radio Society, c/o J. Rickwood, 852 Stafford Road, Fordhouses, Wolverhampton, Staffs.

POSSIBLE UNWANTED EFFECT

With reference to the circuit on p.599 of the January issue, G3MQT draws attention to the possibility of the network C21-N-R13 going into oscillation on its own, since it constitutes a relaxation type of oscillator—according to G3MQT, it could produce a sawtooth waveform at about 17 c/s, to modulate the HT on V1. However, G3RBH assures us that no such effect has been noticed, and that anyone having doubts could try the effect of disconnecting C21.

THE RADIO AMATEUR CALL BOOK

This remarkable publication continues to show the astonishing progress of Amateur Radio over the world as a whole—and particularly in the States. As well as re-styling the cover, the publishers have changed the sub-titles of the two sections. The big Americans-only edition is now called "U.S. Listings" and what used to be known as the Foreign, or section covering the world outside America, is re-named "DX Listings." We are the *Call Book* agents for the U.K. and Europe, and one of our responsibilities is to keep the G-prefix pages up to date—for each quarterly issue many hundreds of additions and amendments are prepared for the *Call Book* publishers, covering the U.K. section alone, and are taken into the next issue. Both sections of the *Call Book* are always obtainable from us, usually from stock, and at the moment the Winter 1963-64 edition is available, at 45s. for "U.S. Listings," and 27s. for

"DX Listings," both post free—or 65s. for the two together. Orders, with remittance, to Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. (Orders in advance can also be taken for forthcoming editions, in this case the Spring, which we should have early in April.)

"THE OTHER MAN'S STATION"

For many years a regular feature of SHORT WAVE MAGAZINE, but which for some time now has had to lapse because of pressure on space, it has been decided to resuscitate "The Other Man's Station," to appear monthly as before. Any reader who can get a good, sharp black-and-white picture of his station, and give a fairly detailed write-up "in own words," is eligible to be featured. We write the story from the information given (which should also include such personal details as may be agreed for publication) and the material is paid for at the regular space rate. Photographs may be any size (within reason, and in particular *not* 16mm. film negative!) but sizes around post-card and half-plate are best.

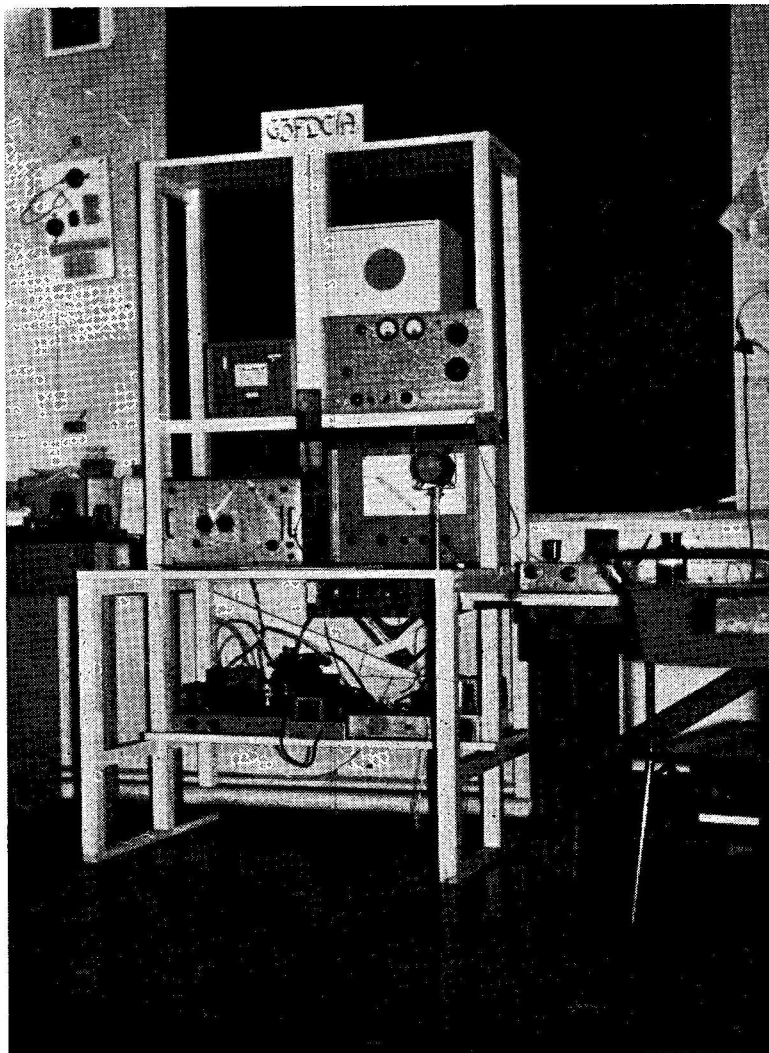
PERSONAL APPEARANCE

One of the supporting cast for the "This is Your Life" programme on BBC TV on January 9 was Sir Evan Nepean, better known to most of us as G5YN. He had met the subject of the interview during his journey into Tibet, in AC4YN days before the last war.

"Short Wave Magazine" advertising gives the largest and most consistent coverage of the U.K. radio amateur market

THE OTHER MAN'S STATION

G3FDC/A



THE station signing G3FDC/A is located at the J. H. Whitley County Secondary School, Holdsworth Road, Halifax, Yorks., and is operated under the supervision of H. Makin, G3FDC, of the school science department.

Its workmanlike layout, appearance and accessibility belies the fact that, as the G3FDC puts it, "we have built mostly out of the junk box." Well, it shows what can be done. The transmitter, at present operated on Top Band only, is on the upper shelf, and consists of 6I5 VFO-6V6 BA/CO into an 807 PA with the usual *pi*-tank output circuit; the modulator is 6J7-6I5-6L6 with a moving-coil microphone. The Tx takes plug-in coils and can also be put on 80 metres.

Receivers consist of a modified TR9D—that goes back a bit!—and a BC set adapted to cover 80-160m., with bandspread. This Rx also goes quite well on 20-40 metres, though the TR9D is a better performer on the 7 mc band.

The aerial for G3FDC/A is a 136ft. wire Zepp fed for 80m. and used end-on for Top Band.

Plans are in hand to get a better receiver and another project is to build an all-band Tx from a Geloso VFO. But as G3FDC explains, in the nature of things at a school, all this takes time if

the boys are to participate fully, and of course there is the difficulty—experienced by every master running a school station—that they leave just as they are becoming really interested, and useful. G3FDC says that at least 50 boys have worked on this station in the last five years. The keen ones start by building a 1-valve, or single transistor, receiver, and their enthusiasm is maintained by running competitions for stations-heard. And, of course, the QSL's garnered by G3FDC/A are also of great interest.

Though simply as a station description this one is not perhaps very exciting, in fact it is the sort of school activity which is playing a large and important part in arousing a practical interest in radio and electronics generally. As we well know, there are science masters at schools up and down the country who, like G3FDC, are putting their own enthusiasm for Amateur Radio into similar stations.

THE MONTH WITH THE CLUBS

By "*Club Secretary*"

(Deadline for March Issue: February 14)

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

ACTIVITY reports for this month have reached an all-time record (66 Clubs), so we will dispense with the usual preamble, except to remark that it is good to know that so many Clubs are in such a flourishing state. It is also a welcome sign of the times that more and more club journals, newsletters and the like are appearing almost every month.

And so to this month's reports, highly condensed on account of their numbers.

CLUB ACTIVITIES

East Worcestershire give notification of their AGM on February 13, and hope that as many members as possible will turn up. **Exeter** express the same hope concerning their Dinner and Social, on February 8; they already have promises from more than 40 members.

Halifax, who were visited by Spen Valley at their last meeting for a Junk Sale, are themselves visiting the Bradford club on February 11 for a talk on Colour TV. And in January they entertained Bradford at a social evening. We always feel that more inter-club visits would be an excellent idea, and beneficial to both parties.

Swindon have formed a club, and held the inaugural meeting on January 10. They will now meet on the second and fourth Fridays (February 14 and 28) at Headlands Grammar School, Swindon, 7.45 p.m.; membership is already about 25, the majority being licensed amateurs, and the club is affiliated to the local Adult Education Organisation, and therefore in a position to attract juniors and SWL's.

Leicester (back with us after a long absence) report that they now open on Sunday morning, 10.30-12.30, as well as on the normal Monday evenings. A membership list will be circulated with their new programme (see panel for secretary's QTH).

One of the most successful of the Christmas parties must have been that held at **Barnet**, with an attendance of 216! The G3AAE Trophy (for the best DX QSL's for the year) went to G3RPB. Next meeting, February 28, will cover the Green and Davis products. At a recent Junk Sale an R.1155 went for the sum of one penny!

Manchester, at their AGM, elected G3IOA chairman, D. H. Poole secretary (see panel for QTH) and P. Singleton treasurer; they also have two licensed members, two adult SWL's and two junior SWL's

on the committee, which must make for a good balance.

Northern Heights report good attendances and a very successful Annual Dinner. On February 19 their subject is "Accidents in the Shack," the lecturer being Mr. F. C. Luxton, M.Ch.S., M.A., S.R.C. March 4 is booked for a Ragchew.

Acton, Brentford & Chiswick will hear from G3IGM on "A Simple Tx" on February 18 at the AEU Club, 66 High Road, Chiswick; their January meeting was the AGM.

A full programme has been arranged by **Hounslow**, continuing their fortnightly meetings at the Canteen, Mogden Works, Isleworth. On February 10, G3HZL will be talking on Operating Techniques; Constructional Techniques were dealt with by their chairman, G3NHR, in January.

The Annual Dinner at **Reading** took place on January 18, followed up by the AGM on the 25th, when the judging of the Club Badge Competition also took place. On February 29 (yes, the date is correct!) the subject will be "Contests to be Entered in 1964."

Decoration and renovation have been the main activity at **Sheffield**, and light refreshments can now be dispensed. On February 15 they will hold an Exhibition and Open Day, 3 p.m. to 9 p.m., and will stage demonstrations of VHF, SSB and RTTY; the public are invited, and it is hoped to enrol some new members. Normal meetings are on the second and fourth Fridays at the Clubroom, 8 Sandrock Place, Sheffield 11.

Derby will have held their AGM just before publication date, on February 5, and their Annual Dinner and Dance follows on February 15. The normal Wednesday meetings will continue at Room No. 4, 119 Green Lane, Derby. **Dorking** will be meeting at The Wheatsheaf on February 11, 8 p.m., for an informal meeting and a discussion on Receivers. On February 25, Mr. Green of Decca will give a talk and demonstration on Wiring Techniques, Printed Circuits and similar matters. This one will be at The Star and Garter, Dorking. Both meetings are at 8 p.m.

At their recent AGM, **Rotherham** elected G2LG president, Mr. A. Tinsley chairman, G3NXZ secretary and G3GCV treasurer. Club nights are alternate Fridays in the new Clubroom at the T.A. Centre, Fitzwilliam Road. Next dates are February 14 and 28 at 7.30 p.m.

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Salop, a newly-formed club, reports a membership of 40, the acquisition of the call G3SRT, and a good programme of lectures in the Clubroom at Chatwood Tennis Club, Harlescrot Crescent, Shrewsbury. February 13 is booked for a Film Show and March 12 for a lecture by Dr. K. E. Jones, G3RRN (their secretary) on "Man, Medicine and Electronics."

Silverthorn have also acquired a call—in this case G3SRA—and promise regular operation from the Clubroom on 160 and 2 metres. They meet on every Friday except the first of the month, 8 p.m. at Friday Hill Community Centre.

Spen Valley will meet on February 20 for a Junk Sale, and on March 5 for a lecture on Moonbounce, by a visiting lecturer—7.15 p.m. at Heckmondwike Grammar School. And on March 7 there is a talk on Communication Satellites, at the Griffin Hotel, 3.15 p.m.

Torbay welcomed DL3BQ and VS1LV (G3BBF) at their January meeting, when the latter gave a talk on Operating in Singapore and Malaysia. The February date is booked for the Club Trophy judging, and the March one for a talk on TVI, by G3LKI. All 7.30 p.m. on the first Saturday of the month, at the Hq. in Belgrave Road, Torquay.

Blackpool and Fylde will meet on February 10 for a Tape Lecture, with slides, on Basic Valve Circuits; the 17th will be an Open Night, for reviewing the past year's work, and the 24th is the date of the AGM.

Another AGM—at **Bury**. G3MTL was elected president and chairman, G3PVG secretary and G2AYG treasurer; this club also has its own QSL manager (G2GA). Their new programme places more emphasis on social activities, but R.A.E. and Morse classes will continue. On February 11, at the

Names and Addresses of Club Secretaries reporting in this issue :

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 BARNET: F. Green, G3GMY, 48 Borough Way, Potters Bar.
 BLACKPOOL & FYLDE: J. Boulter, G3OCX, 175 West Drive, Cleveleys, Blackpool.
 BURY: J. Bennett, G3PVG, 21 Harwood Drive, Elton View, Bury.
 CAMBRIDGE: H. Lowe, G3PEI, 47 Hurst Park Avenue, Cambridge.
 CHESHUNT: B. B. Charge, c/o 3 Robinson Avenue, Goffs Oak, Cheshunt.
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 CRAY VALLEY: S. W. Coursey, G3JJC, 49 Dulverton Road, London, S.E.9.
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 DORKING: J. Greenwell, G3AEZ, Eastfield, Henfold Hill, Beare Green, Dorking.
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 EAST WORCS: M. J. Nicholas, 12 Crabtree Close, Lodge Park Estate, Redditch.
 ENFIELD: R. Langston, 54 Poynter Road, Bush Hill Park, Enfield.
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 HOUNSLOW: R. T. Heywood, G3NHH, 383 Whitton Drive, Isleworth.
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 ROTHERHAM: J. W. Lowe, G3NXZ, 18 Laburnum Grove, Conisbrough, Doncaster.
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 SUTTON AND CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
 SWINDON: I. S. Partridge, G3PRR, 104 Grange Drive, Stratton St. Margaret, Swindon.
 TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.
 W.A.M.R.A.C.: Rev. A. Shepherd, G3NGF, 121 Main Street, Asfordby, Melton Mowbray.
 WEST KENT: H. F. Richards, 17 Reynolds Lane, Tunbridge Wells.
 WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral.
 WOLVERHAMPTON: J. Rickwood, 852 Stafford Road, Fordhouses, Wolverhampton.
 WORCESTER: G. W. Tibbetts, G3NUE, 108 Old Hills, Callow End, Worcester.

Kinnersley Hotel, Kay Gardens, Bury, there will be a Quiz between the home club and a visiting team from Eccles Radio Society.

West Kent, meeting, as always, at Culverden House, Tunbridge Wells, have a Film Show (from the Electricity Board) on February 14, and a Hi-Fi talk and demonstration, aimed mostly at beginners, on the 28th.

East Kent, down Canterbury way, held their AGM and elected G2JF chairman, G3MDO secretary and W. Broad treasurer; they also formed a Contests Committee under the chairmanship of G3SGH. The club now has a 300-ft. aerial at a height of 60 feet(!) and hopes to put G3LTY on the map—it should! Membership totals 44, with 22 holding licences.

Harrow report that their membership in 1963 topped the 100 mark, for the third year in succession; they held their 18th AGM on January 17. **Slade** have replaced their old callsign, G3JBN, with the more appropriate G3SRS. Note also their change of secretary (*see* panel for details). On February 7 they have a Junk Sale; on the 20th a Mullard Film Show, with such subjects as Colour TV, UHF and 625 lines; and on March 6 another talk in the Radio Fundamentals series, by G3JZF.

Plymouth, at their January meeting, heard from G5ZT about "Gadgets"—from a Top-Band QRP transistor transmitter to a bug-key made from an old kitchen knife, and including several items of test gear. All meetings are now held at the new Club-room—every Tuesday at Virginia House, Bretonside, Plymouth. February 8 is the date for the Annual Dinner, at the Magnet Restaurant, Cornwall Street, Plymouth—7.30 for 8 p.m.

The new season started with a swing at **Grafton**, whose social evening on December 7 was attended by roughly 100 members and guests. G2CJN was suitably thanked for his thirteen years' service as the club's secretary, and a presentation was made—and richly deserved. Forthcoming meetings are on February 14 (G2MI on International Aspects of Amateur Radio), and the 21st (G3MCA on The Post Office Tower). The 7th and 28th are set aside for practical work and R.A.E. talks to the student members.

South Birmingham are suspending publication of their newsletter for the time being, but send details of their programme for the next three months. February 20 will be "Nostalgia Night," with G2AGK speaking on Thirty Years of Amateur Radio, followed by a discussion. On March 19 there will be a lecture on Mobile Operation (taped) and possibly one on Transmitter Design and TVI. Both events will be at the Friends' Meeting House, Balsall Heath.



Though G3CMH of the Yeovil Amateur Radio Club did not do well in the recent "Magazine Club Contest"—they came 95th with 136 points—they did enjoy themselves, making it a strictly Club effort. Left to right are: G3CFV, SWL Merryweather, G3OMH, G3NOF, G3BEC and on right the Parkhursts, both SWL's.

Cambridge will be discussing Four Metres on February 7—especially polarisation and the question of spot frequencies. February 14 will be an informal meeting, and on the 21st the subject will be Crystal Filters. Visitors and new members welcomed at all meetings—Hq., Victoria Road, Cambridge.

Mid-Warwickshire report a membership of roughly 40, meeting on alternate Mondays at the Civil Defence Hq., Leamington Spa. Their 1964 programme is being decided upon at the AGM, and further details will follow. **Liverpool** will henceforth be meeting at West Derby School, Meadow Lane, West Derby Village—every Tuesday. Next big event is their Hamfest and Dinner-Dance, on March 7 at the Gateacre Country Club; there will be the usual raffle, and a cabaret as well. Tickets (21s. each) from G3MCN, the secretary.

Crawley, at their recent AGM, elected G3TR chairman, G3FRV secretary and Mr. Parsons treasurer. For the January meeting they moved to a new headquarters, at Trinity Congregational Church, Ifield. February event still under discussion.

A new club has just recently been formed at **Cheshunt** (Herts.), with G3NEE as chairman and Mr. B. B. Charge as secretary. They will be meeting on the first Friday of the month at the Cheshunt Civil Defence Hq., and the February 7 gathering will take the form of a Junk Sale. In March there will be a lecture by G3HJL, and G3NEE will be starting Slow Morse transmissions on Top Band shortly. New members and visitors welcome.

Civil Service, meeting at the Science Museum on February 17, will hear a tape lecture by the late Capt. P. P. Eckersley on The Engineer and Society; on March 2 there will be a lecture and colour films on Construction and Manufacture of Radio Valves. Both

meetings begin at 6 p.m.

Clifton, at their first meeting of the New Year, had a demonstration of the Green and Davis products, mainly for the VHF bands. On February 7 G3OYU will be talking on Transmitter Design; and on the 21st films and slides will be shown, with a talk on DX-peditions, by G3JEQ, the well-known expert on the subject. Hq.: 225 New Cross Road, London, S.E.14.

Stourbridge, with headquarters at The Library, Foley College of Further Education, Hagley Road, will hear the second of two Hi-Fi demonstrations on February 11. March 10 is the date for the AGM—both meetings at 7.45 p.m.

Kingsbridge had some good press publicity for their official opening meeting, and went straight into operation with their station G3SHT. Since then, they have held their first AGM, and have decided to buy a second-hand caravan which they intend to equip fully as a shack which can be used by members either static or mobile. G6JF is starting Morse classes, and the new club intends to bring on its junior members as fast as possible.

Peterborough report a good Brains Trust at a recent meeting, with G3KPO (secretary) presiding over a panel on which were G3ARS, 3HXR, 3RED, 3RDZ, 2BXI and SWL Taylor. On February 7 they will have a Film Show. **Grimby**, who meet at the Model Engineers' Clubroom, Fletchers Yard, Wellingate, on alternate Thursdays, announce the date of their Annual Dinner as March 19.

At their December meeting **Worcester** had a talk by G3NUE on Two-metre Portable Working; on January 4 the Junk Sale was so successful that selling continued for three hours! The club is negotiating for premises so that they can have a permanent home again, and hope to be able to move in during February.

Wolverhampton will hear from G3ONP on Silicon Controlled Rectifiers on February 10; on the 17th there will be Morse and R.A.E. classes; the subject for the 24th is not yet fixed.

Norfolk have just produced *The Challenge*, their first effort at a club magazine, and very good it is, running to 22 pages and a pictorial cover, to say nothing of a page of cartoons and a page of poetry! (No details of forthcoming meetings, however.)

Cray Valley, whose February meeting falls before publication date, will be having a further talk on Antennas, by G3ISX, on March 5; and April 2 is the date for their AGM—all at 1 Court Road, Eltham, S.E.9.

A.E.R.E. (Harwell) look forward to a visit by G5JU, who will talk about the new Eddystone EA-12 receiver, on March 17; on April 21 the subject will be RTTY, by G3GKH.

WAMRAC now claim members in 18 countries, with the number still increasing; their monthly Circular Letter contains much personal news from

CLUB PUBLICATIONS RECEIVED

We acknowledge, with thanks, the receipt of the following Club Publications:

A.E.R.E., Harwell (*QAV*, Nos. 26 and 27); **Coventry** (*CQ CARS*, December); **Cray Valley** (*Newsletter*, December and January); **Crystal Palace** (*Newsletter*, December and January); **Enfield** (*Lea Valley Reflector*, November and December); **Lothians** (*Lothians Radio Amateur*, November); **Medway** (*MARTS Newsletter*, January); **Midland** (*Newsletter*, No. 198); **Mitcham** (*Newsletter*, November, December and January); **Norfolk** (*The Challenge*, No. 1); **North Kent** (*Newsletter*, No. 74); **Reigate** (*Feedback*, October and January); **Royal Signals Amateur Radio Society** (*Mercury*, January); **Southgate** (*Newsletter*, December and January); **South Hants** (*QUA*, December and January); **Surrey** (*SRCC Monthly News*, December); **W.A.M.R.A.C.** (*Circular Letter*, No. 38); **Wolverhampton** (*Newsletter*, December); **Worcester** (*Newsletters*, Nos. 3 and 4); **Plymouth** (*QUA*, December); **Grimby** (*News Sheet*, No. 1); **West Kent** (*QLF*, December); **R.A.I.B.C.** (*Radial*, December and January); **Kingston** (*Newsletter*, January); **South Shields** (*Spectrum*, No. 80, January); and **A.R.M.S.** (*Mobile News*, December).

members, both home and far-flung.

South Hants announce a Southampton group meeting on February 8, when G3NIM will be talking about Photography and Cinematography, with a large amount of equipment on demonstration. Two social functions are a dinner (provisional date February 15, but contact G3ION) and a Skittles Evening in March, arranged by G3HKT!

Reigate, having held their AGM in January, look forward to the Annual Dinner, on February 15, at The Mill House, Salfords. The normal club night will be on the 22nd. **Midland** will be hearing "More Thoughts on SSB" from G5BJ on February 18.

Medway are pressing on with the ambitious idea of building their own Hq., and in their Newsletter call attention to the fact that they have been running for 42 years—a fine record. February 10 is the date of their AGM, at the Brasenose Club, Nelson Road, Gillingham.

The **Luton** club is being reactivated, and the December AGM elected G3RXW chairman, G3HVA secretary and G3JZW vice-chairman. Meetings will be at the ATC Hq. in Crescent Road, Tuesdays at 8 p.m., but the premises will also be open for keen members on Mondays and Thursdays. February 10, Tape Lecture; 17th, Quiz by G3RXW; 24th, Field Days plans.

Oxford meet at the Cherwell Hotel, Water Eaton Road, and run an R.A.E. course at each meeting (second and fourth Wednesdays at 7.30 p.m.). Membership is on the increase, and an interesting season of lectures is on the way.

Roding Boys' Society report several improvements to their shack, with the library increasing in size, and a growing stock of components. G3EYE has given them some surplus equipment, which is being

dismantled. Methodical storage is being planned, since the shack is only 13ft. by 16ft., at the bottom of the garden of Wanstead House.

Wirral meet on February 19 for a Symposium—"Why Amateur Radio Appeals to Me," led by G3SEJ. On March 4 G2AMV and others will give a lecture-demonstration on Test Gear.

Sutton and Cheam are holding their Constructional Contest on February 18 at The Harrow, High Street, Cheam. Their committee evening has been moved to the first Thursday for the future.

Lothians entertained about forty guests from four other clubs at their Visitors' Night in December, and highly recommend this type of get-together. Coming events are a talk on Silicon Planar Transistors, on February 13; and a lecture on SSB, by GM3EDL, on

the 27th. Note secretary's new address.

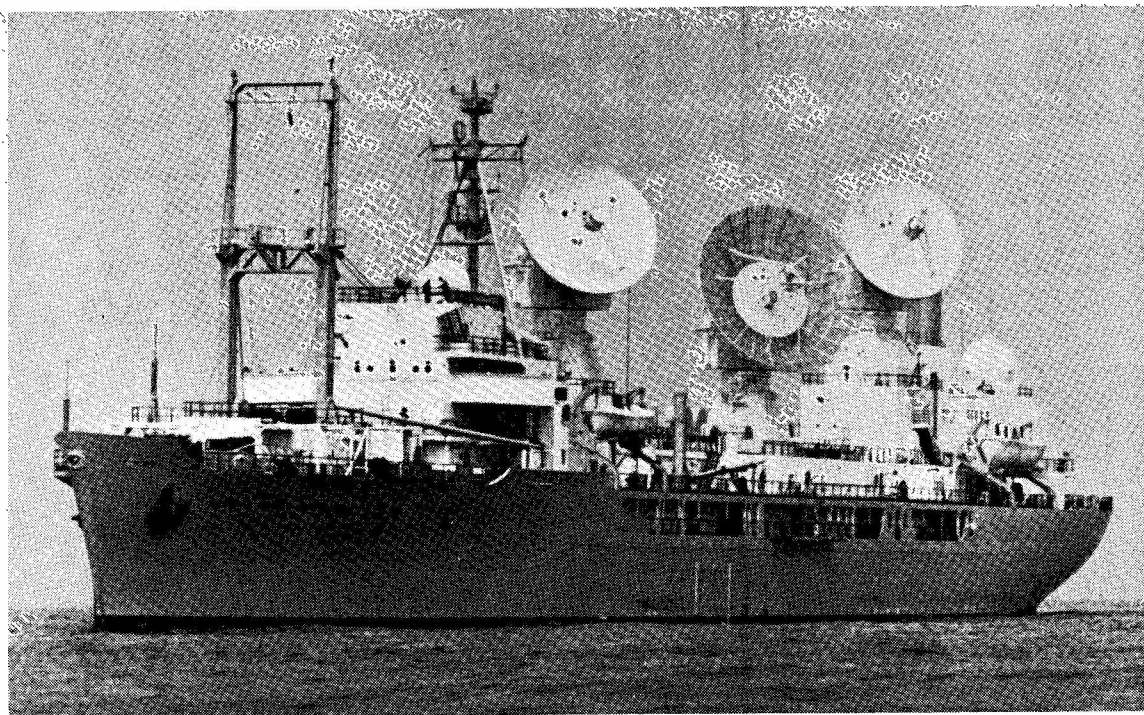
Mitcham will be holding their AGM on February 14, their January meeting having been a Junk Sale. At a special Christmas meeting, the G5UX Key was awarded to G3NGY, the Listeners' Trophy to S. Stevenson and the Constructional Cup to G3HQX.

One of the active London clubs is **Paddington**, with regular weekly meetings and a station (G3PAD) in operation on all bands 160m. to two metres. Their chairman is G3NDZ, supported by G3JDP, G3JEA, G3KNL and a committee. Forthcoming events include a Junk Sale on February 5; a lecture by G3MHQ on Receivers Ancient and Modern on February 12; and a Film Travelogue by G3DPW on February 26. And each Wednesday evening at 7.30 there is Morse instruction for beginners.

HENRY'S RADIO, LTD.—LOSS OF MAIL

We are asked by Henry's Radio, Ltd., of 303 Edgware Road, London, W.2, to explain that during the period November 10 to December 31 last, they suffered a regular loss of mail, for which the G.P.O. have accepted full responsibility. This unfortunate episode has naturally resulted in many complaints

by readers and customers, but failure to deal with orders and enquiries was in no way the fault of Henry's Radio, Ltd. Those of our readers who may have written to the firm during that period should claim on the Post Office in the usual way for repayment of postal orders and cancel their cheques, re-ordering goods as necessary.



This remarkable vessel is the conversion of a basic 14,000-ton troopship into a mobile radar tracking station. Stationed in the Indian Ocean, she is being used at the distant end of the Cape Canaveral range to observe, monitor and track the behaviour in flight and the accuracy on the target of American satellites, long-range rockets and deep-space probes. The ship has been virtually rebuilt above the water-line as a self-contained radar and radio communications unit, and is said to have the capability of any similar land-based station, with the added advantage of mobility. The radar dishes are up to 40ft. in diameter and are stabilised against the ship's roll. The information given by her radio, radar and telemetry systems are processed by computer. The liquid nitrogen for cooling the receiver parametric amplifiers is produced on board. Since absolutely accurate positioning is essential for operations of this sort, the ship's inertial navigational system is capable of locating her within a matter of yards with respect to the firing point at Cape Canaveral, ten thousand miles away. Her auxiliary power plant gives 18,000 kW for the electronic requirements alone. She is called the "General Hoyt S. Vandenberg" and is sister to a similar ship, the "General H. H. Arnold," also operated by the U.S. Air Force for these outer-space investigations. *Official Photograph, U.S. Embassy*

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500µA	25/6	100mA	22/6	1A	DC	22/6	50v	DC	22/6	150v	AC
50-0-50µA	29/6	150mA	22/6	5A	DC	22/6	300v	DC	22/6	300v	AC
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CR-100 with S-meter, £14, excellent order. Prop pitch Beam Rotator new, £6. AC mains beam rotator, £5. 813, 17s. 6d. 1,000 valve holders, £3. 50 Valves, 30s. 50 QST, 35s. 50 block capacitors, 25s. Slow motion dials, 5s. post 6d. Tons of other bits for beginners; your prices. WANTED: circuit R.1359 VHF Rx.—(Tel. Trevelyan 8141.) Write Briscoe, 335 Eton Road, Ilford, Essex.

WANTED: Panda low-pass filter, 5 stages tunable, or ex-WD filter unit HF design 12, No. A.P.5612.—State price to Box No. 2942, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO SENIOR. Model M. rack mounting. Excellent unmodified condx., apart from o/p valve, with 9 GC coils plus 5 bandspread coils (incl. 21 mc); delivered within 40 mile radius, £27 10s. LM-13 freq. meter (modulated version) excellent condx., with charts and p/pack, in carrying case and with spares kit, £15 plus carriage. BC-455, 6-9 mc mint, boxed unmodified, £2 10s. plus postage.—A. Hitchcock, 38 West Road, Spondon, Derby.

AR88D, as new, S-meter, speaker, phones, manual, £30. 80 to 10 metre Tx, 85 watts input, Gelo So VFO and PA, power supply inc., AR88 size, £23 o.n.o.? 19 Set, new, unmodified, 50s. Two new 813's, 35s., or 20s. each. 8 and 4 mF condensers 1000v. wkng., 4s. 6d. each, inc. p/p, new and unused. WANTED: 2-metre Tx, must be in perfect working order.—G3JML, 28 Banks Avenue, Golcar, Huddersfield. (Tel. Milnsbridge 650.)

SALE: Advance Sig. Gen. 100 kc-30 mc, £15. BC-342, £10. BC-453, £4 10s. All carriage extra.—Crossan, 9 Palace Street, London, S.W.1. (SPR 6645.)

WANTED: BC-221Q. Good condition with calibration book. Will collect.—G. Southgate, 17 Oak Avenue, Walton Heights, Stafford.

CLEARANCE SALE: Marconi portable Rx, battery, 200-550 metres, £2. AVO Resistance-Capacity bridge, £6. Morse Training Set Mk. III, £2. 18 Receiver, Mk. III, £1. Power Pack 120v. HT, 2v. LT, £2. Power Pack 200v. HT 6.3v. LT, £2. RF24 Unit, 10s. 110 Valves, untested, old and new, £3 lot. Valves, speakers, transformers and other components, s.a.e. list. Magazines: *Short Wave Magazine* March '57-Dec. '61; *Practical Wireless* Feb. '57-Dec. '63; *Radio Constructor* Jan. '59-Dec. '61. Offers? Please include postage for items.—Box No. 2943, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Two chimneys and sockets for 4X150A type valves.—Johnston, 26 Greendykes Lane, York.

SMALL ADVERTISEMENTS, READERS—*continued*

FOR SALE: R.107; modifications include fitted S-meter, extra output stage, and sensitive Q-multiplier, plus coax aerial sockets. Will take highest offer.—R. Makin, 1 The College, Malvern, Worcs.

MCR1, famous midget spy Rx, excellent working condx., no mods., all coils; exchange for ex-Gov. Rx in similar condx. W.H.Y.?—Money, 29 Carlyle Road, Norwich.

WODEN UM2 and DT1 modulation and driver transformers for sale; both in excellent condition, with UM2 connection and impedance chart, £5 pair; add postage.—G3OCB, Tretheague House, Stithians, Truro, Cornwall.

MOHICAN Rx, £27 10s., as new, manual, factory checked.—E. Burger, The Causeway, Marlow, Bucks.

SALE: Minimitter converter multi-Q unit, £15. G3M3QA Triple Quad Aerial, brand new, unused, £12.—N. Stuart, Sandbeck Hotel, West Cliff, Whitby, Yorkshire.

SALE: 70 cm 12-ele Aerial, 35s.; 5 band conv. 6 mc IF, £5. 6146 (2), G6JP 2-metre preamp valveless, RSC battery/mains conv. unit, set (3) shelves, £1 each. SCR-522 mod. trans, BC-453 o/p trans., 5s. each. Meters; 5s. each 100 mA, 10 mA, 5 mA DC, 10s. each. 500 μ A, 0.5A RF, IF's 5.2 mc (4), 5.2 mc disc., 2s. 6d. each. Crystals: 7550, 7575, 7750, 7740, 7800, 7825, 21.0, 23.4, 23.5, 32.5, 36.3, 11666.6, 2s. each. Trans. 450/0/450v. 200 mA, 5v. 6v. fil., 30s. Add postage.—Marriott, R.A.F. Weyhill, Andover, Hants.

R. 1155A power-pack, speaker, for sale. Mint condition, working order, £5 plus carriage.—M. Stephens, 61 Blatchington Road, Hove 3, Sussex.

DRAKE 2B with xtal calibrator, Q-mult., speaker unit, £95 o.n.o.? Heathkit SB-10U SSB Adaptor, £20 o.n.o.?—G3PQP, 20 Poplar Drive, Wootton Hall, Wootton Waven, Warwickshire.

FOR SALE: Eddystone 680X, condition as new, with matching speaker; any trial allowed. Price £75 or nearest offer.—Box No. 2944, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED URGENTLY: Manual and PSU for R.107.—Trevor Kent, 119 Page Hall Road, Firth Park, Sheffield, 4, Yorkshire.

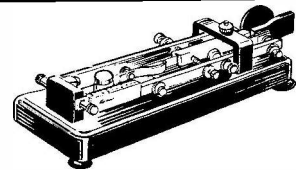
WANTED: TCS-12 or CR-100 Receiver, good condition, unmodified. Details and price please—Thompson, Mere Close, Hull Road, Hornsea, Yorks.

MINIMITTER X20 rotary beam for sale, £7; few months old, excellent condition.—G3RLP, 263 Kingsbury Road, Erdington, Birmingham, 24. (ERD 6946.)

SHACK CLEARANCE. AR88LF in new cabinet, S-meter, ex con., £29 10s. R.206 ex con. really good on SSB/AM/CW, with speaker and phones, no PSU, £12 10s. Minimitter 5-band converter, mint, £10. Geloso VFO complete, needs 6L6, £4 10s. Black crackle cabinet with lid, ideal table-top Tx, 37s. 6d. Valves, condensers, mod. transformers, etc. Prefer callers.—S. Kirkbride, 24 Skipton Old Road, Foulridge, Nr. Colne, Lancs.

WANTED: Late model Eddystone 888A, preferably with speaker, S-meter, manual.—Pallant, Wheatley, Martins End Lane, Great Missenden, Bucks. (Phone 2642.)

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SMALL ADVERTISEMENTS, READERS—continued

TIGER NUVISTOR 144 mc converter, 21 mc IF, nearly new; 2-metre halo; G2MA (813) linear amplifier 80/40/20/15/10 metres; quantity useful components for collection. Offers.—G3ADZ, Havant 1861. (QTHR.)

TOP BAND Command Rx, brand new in carton, £9. Command Rx spares, IF's, tuning condensers, etc.; s.a.e. for list. **WANTED:** Admiralty B46 Rx and Hallicrafters S40A, preferably in original condition.—Box No. 2946, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Table top Tx, 80-10 metres, Geloso VFO, 60 watt AM, 75 watt CW, UM3 mod. transformer; in excellent condition, only 6 months old, £30. BC-221 frequency meter, with PSU and charts, in cabinet, £14. Eddystone bug key, £2 10s.—Frew, 9 Hollyband Place, Bloxwich, Walsall, Staffs.

TWO AM/FM Transmitter-Receivers (Redifon TGR.174) one on 70 mc, one 144 mc; QOV03-10 PA, complete with handbook. Offers over £8 (each). Six numeral indicating tubes, 25s. (each).—Chapman, 119 First Avenue, Gillingham, Kent. (Tel. 52518.)

SELL: Eddystone S.640 receiver, unmodified, excellent condx., manual, £20 o.n.o.? BC-348 receiver, good condx., built-in PSU, £10. Prefer buyer collects.—Ayton, 1 Allendale Road, Stockton-on-Tees.

WANTED: Tiger TR-300 transmitter, good condition. State price.—Box No. 2947, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Eddystone 750, excellent, £40. Top 2-7, mint, £24. Radiocraft ATU, mint, £6. Complete station, £65. **WANTED:** Equipment for 160 metres, /M & /P.—Box No. 2948, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: *Short Wave Magazines*, Sept. 1960 to Jan. 1964, £3 5s.—Box No. 2949, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Hammarlund HQ-170 (silicon rect.). Mosley TA-33 3-ele beam. Minimitter FB5 stacked array, 5-band high gain aerial. Olympic T-100 transmitter, 160-10 metres, with Z-match. Radiovision Pre-selector, AC, 80-10 metres. Geloso N.4/102/N VFO unit, with dial. UM4 mod. transformer. High-voltage mains transformers, chokes, condensers, short-wave equipment, valves, etc.—Ellis, G3SN, 12 Hillside Road, Saltash, Cornwall.

GONSET Transceiver S.76, 6-band with mobile power supply, ideal for desk or mobile; cost £350, accept £160.—Eastell, 9 Prod Lane, Baildon, Yorks.

SALE: Latest Minimitter Mercury "100" Tx, £50. MR44/2 Rx, £35. Geloso 209 Rx, £50 o.n.o.? Each good condition.—Box No. 2950, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: CR100/2, excellent condition, £17 10s., prefer buyer collects, if not, carriage extra.—G3SGR, Cauldwell, Horam, Sussex.

WANTED: QOV02-6 valves. 70 cm Tripler-Amplifier.—G2FXA, 35 Kensington Road, Stockton-on-Tees.

EXCHANGE: K.W.77 for HQ-145X. S. London Area.—Box No. 2951, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—continued

EDDYSTONE 840C Receiver for sale, £30, new condition.—James O'Keefe, 88 Barton Avenue, Rush Green Road, Romford, Essex.

PYE-MACE Marine transmitter for sale, PU and all cables, handbook, 1.5 mc-15 mc, xtal or VFO, Phone/CW, 40 watts output, new condition; £40 plus carriage. Further particulars—Box No. 2953, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: CW/AM 120w. Tx, 10-80 metres, TT21 PA, £16; PSU, £4; 813 plus base, new, 30s.; Muirhead drive, 10s.—G3OFS, QTHR or Tel. Bristol 682985.

SALE: Dependapac 150-watt transistorised DC conversion unit, as new, £15. No. 62 Transceiver, 1.6-10 mc, 6 watts p-and-s modulated, less power supply, £10. Heathkit Q-Multiplier, £5 or offers to—GM3PZR, 5 Rosselm Cottages, Rossie, Auchtermuchty, Fife.

WIRELESS WORLD, Dec. '45, Dec. '63. QST, April '45, Dec. '63. CQ, June '45, March '63. *Bulletins*, June '46, March '55. Offers?—Jamison, 46 Pound Street, Larne, Co. Antrim.

FB S.640 with handbook and S-meter, £20. Raymart band checker/monitor, 45s. Carriage paid.—GM3OWU, 9 Belmont Avenue, Juniper Green, Midlothian.

HRO MANUAL, INFORMATION, theoretical circuit and pictorial diagram, adjustment points all stages, with complete realignment procedure. Components lists, values, etc. Installation, operation, special features, notes, etc., 15s. 6d. Send s.a.e. for indexed details.—G3ANK, 145A Station Road, Sidcup, Kent.

COMPLETE STATION COMPRISING: QRO Tx; 160m. Tx; 2/ATU's, R.1155, LPF, SWR Meter, Key; Rack with 4 xtal converters, 6 PU's, 100 kc marker, pre-amp, audio amp, GDO, AVO. Cabinet of components, 1kV PU; Tx cabinet, mast, E1 T/R switch. Ant. bridge, dummy load, etc., some finishing work required, £65. Buyer collects.—G3KAB, 28 The Vale, Southgate, N.14. (PAL 7906.)

WANTED: CR-100, about £12.—Wright, 8 Elgin Avenue, Harold Park, Romford, Essex. (Ingrebourne 44746.)

SX101A, mint, £110. **SX111**, new, £90. **TF144G**, £15. Carriage extra on above. **WANTED:** Manual for BC-221AK.—Burns, Mews Lane Garage, Kirkcudbright.

CLAROSTAT wire-wound pots; 5K, 10K, 50K, 1K twin-track, all 4 watt. 5K, 10K, 2-watt 5K, 500K, 750K, 2 meg. carbon and 100K, 200K twin-track carbon; 4-watt and 2-watt, 2s.; carbon, 1s. 6d. Also high-grade panel lights, ½ in., single hole fixing, red and green, 1s. each; 9s. doz., p/p 6d.—I. Austin, 24 Clarke's Road, Hatfield, Herts.

LISTENERS! G3JNX has new aerial, wants reports sent direct; will QSL, address as *Call Book*. No s.a.e.

FOR CASH SALE: AR88D (550 kc-32 mc) in excellent condition, with brand new, outboard self-powered pre-selector, £37 10s.—O'Shea, 25 Kings Road, London, S.W.3.

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RECEIVERS, HALLICRAFTERS S36, 27 to 145 Mc/s. good condition and working order, £22/10/—, carriage £1, **CR300 MARCONI**. Complete with power unit, 15 Kc/s. to 25 Mc/s. Good condition, £12/10/—, carriage £1. **CR100 MARCONI**. Good working order, £18/10/— carriage £1.

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R.F. CHOKES, 3 PI, 1/—, post 3d.

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WORLD RADIO AND TV HANDBOOK for 1964. 18th edition, published by O. Lund Johansen of Denmark, price 22/6, post free. Reviewed in *Short Wave Magazine*, November 63, p.504.

NEW EDITIONS TO COME!

41st Edition **RADIO AMATEUR HANDBOOK**, by A.R.R.L., on sale end of February, 1964, 37/6; special library edition 47/6, post free. See review *Short Wave Magazine*, November 63, p.502.

The new edition of **GUIDE TO BROADCASTING STATIONS**, by Iliffe & Sons, should be ready by early Spring.

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SMALL ADVERTISEMENTS, READERS—*continued*

COMplete TVI-Proof station. Panda Cub; CR-100; control unit; ATU; LPF; various bits and 300 radio magazines, £60 the lot. Could install if required. H.P. possible.—G3KFE, 30 Dovedale, Bandle Hill, Stevenage, Herts.

888A, matching S-meter, speaker, blocks, £75. Tiger TR-60X, 10-160m., TT21 PA, BK keying, 75w. phone, 100w. CW, £45. Minimitter MC8 all-band mobile converter, 1.5 mc IF output, with separate 12v. p/pack, £9. Hallicrafters S36A VHF Rx, FM/AM, 27-143 mc, 110/240 AC, £20. Cossor 339A double beam 'scope, with instruction manual, £10.—G3SFS, 32 Maitland Road, Woodthorpe, Nottingham. (Phone 61855.)

WANTED: K.W.76 mobile receiver, good price paid; details to—R. S. Scales, G3NRS, 17 Westfield Avenue, Scarborough. (Tel. 1238 day, 623 evenings.)

SCANDINAVIAN AMATEURS require the following: AR88D, CR100/8 mod. PCR3, R.1475, HRO, BC-342, BC-348, second-hand Eddystone, Hammarlund and Collins receivers, etc. Immediate payment and collection from your shack within 200 miles London.—Brian J. Ayres, 21 Grange Road, Chessington, Surrey. (Lower Hook 2000.)

HRO-5T model, exceptional condition, with four bandspread coils, PSU and speaker, £24.—H. A. Spashett, Bungay, Suffolk. (Phone Bungay 88.)

TX 10-80m. switched, TVI proof, less PSU, £5. R.107, £3. T.U.B. unit, £1. *Short Wave Magazines*, Jan. '58-Dec. '62. R.S.G.B. *Bulletins*, July '58, Aug. '63, mint condition. Offers? Buyer collects; week evenings, Sat./Sun. mornings.—130 Avenue Road, Acton, London, W.3.

BRT-400E receiver, table model with 500 kc calibrator, manual and some spare valves, £58. Purchaser must collect (South London).—(SYD. 3217 7 p.m. to 10 p.m.)

FOR SALE: HRO-MX Receiver, 9 coils, PSU manual, good condition, £20.—G3GWD, 11 Gwydor Road, Elmers End, Beckenham, Kent. (Tel. BEC. 3168.)

TCs 1.5 mc-12 mc Tx/Rx, remote LS control unit. dynamotors and cables, Tx modified for xtal mike, £25 or offer? 100-156 mc signal generator, field strength meter, £5. Eddystone miniature 3-tier rack, panels and cabinets, £5.—G8DT, 18 Newcourt Park, Charlton Kings, Cheltenham.

American 2m. Tx, 150w, complete with Mod., PSU and Variac 200-250v. AC, totally enclosed, bargain, £30. Minimitter "Mercury" Tx, good condition, £40. SX-28, working order, £25. SSB driver unit, xtal filter, £8 10s. 3X teleprinter plus commercial TU, £9 10s.—G3MCS, 3 Robinson Avenue, Goffs Oak, Herts.

888A, recently aligned and in excellent condition, with S-meter. Best offer over £60 secures, for inspection—Box No. 2954, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Modern SSB receiver, preferably Drake 2B or SX-100, SX-111, K.W.77, at fair price. Money waiting, collection in London area possible.—Box No. 2955, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—continued

VANGUARD type transmitter for sale. Geloso VFO and PA coils, will run 150 watts; beautifully styled, £18.—Box No. 2945, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

6146, £1. QOV03-10, £1. QOV03-20A's, £2. BC-453, £3. BC-348, £12 10s. Geloso 4/102 VFO and pitank with valves, £6 10s. Miniature receiver, Marconi AD108, 1.8-18 mc, xtal filter, BFO, etc., 28v., £15. All above new or excellent condition. BC-221, £3 10s. Marconi TF144G signal generator, £12 10s. TF913 transmitter output meters, £7 10s. All working. Letters—Advertiser, 1 Somerset Road, Coventry.

K.W.160, £20. Mosley Top Band converter CV160B, £5. UM3 with mod, £2.—Burke, GW3HEA, Barcdy, Caernarvon Road, Criccieth, Caerns.

CR150/6, £30, and Bridge Megger Series 2, measuring to 50 megohms, with handbook, checked by makers. Offers, please?—Mrs. Edwards, 28 Morgan Crescent, Theydon Bois, Epping, Essex.

FOR SALE: Mohican, recently constructed, in excellent condition, with mains power pack; manual also available, £29. WANTED: SB-10U.—Foley, 79 Prehen Park, Londonderry, N. Ireland.

K.W. VANGUARD, 160-10 metres, factory built, good condition, £45. Eddystone S.640 with matching speaker and S-meter, £25; will deliver reasonable distance.—Coward, The Cottage, Cross Hands, Old Sodbury, Glos. (Tel. Chipping Sodbury 2309 after 8 p.m.)

WANTED: Good accurate GDO, must be transistorised (self-contained), XGD-1 or good homebrew considered. Details to—B. Clark, Tx Troop, 259 Signal Squadron, Episkopi, B.F.P.O. 53.

WANTED: 4X150A and special air socket. Also 4-125A or QY3-125A.—Parker, 133 Station Road, Cropston, Leicester.

AR88LF, silver-grey hammer finish, manual and miscellaneous spares, £28. Minimitter Oscillator and PA, unused, £10. Accept £35 for lot, or exchange Mohican or similar Rx. Also SX-28 manual, £1.—12 Rosehill Gardens, Sutton, Surrey. (Failands 5727.)

SALE: CR-100, £16. R.107, £11. Both nice condition, buyer collects.—Miles, The Dene, Ford, Nr. Chippenham, Wilts.

FOR SALE: Eddystone 898 dial, new, £3 10s. 1.610 mc filter crystals, set 3 1/2-lattice, 2.2 kc spacing with 6 "Electroniques" IF's, all new, £4. "Electroniques" QP166, new, £8 10s.—or, all above with cabinet, £15. BC-221 dial and condenser, £1 5s.—G3GAH. QTHR.

150 WATT 3.5-28 mc, VFO CW/phone Tx, fully metered, aerial change-over relay, £20 o.v.n.o.? Free delivery 30 miles from London. Owner emigrating.—Gravina, 52 Birch Grove, Acton, W.3. (ACOrn 9114.)

WANTED: CR-100 receiver, must be in good working order; external appearance secondary consideration. Price required, together with details of any circuit modifications, to—Geoff Watts, 62 Belmore Road, Thorpe, Norwich, Norfolk. NOR 72.T.

FOR SALE: Eddystone S.640 in perfect condition, with speaker and handbook, £21.—Bridges, 18 Methuen Avenue, Gaywood, King's Lynn, Norfolk.



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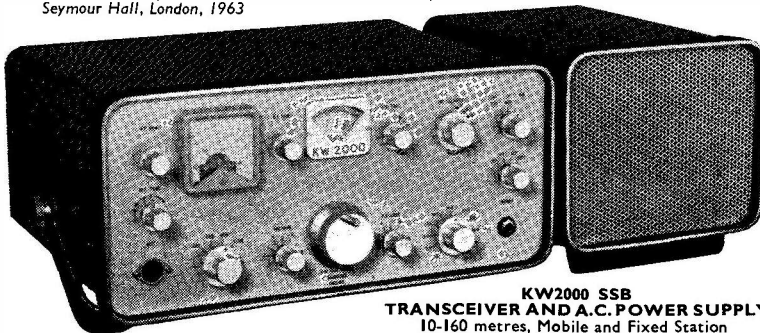
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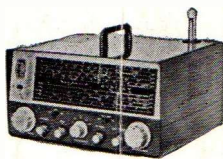
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