

The SHORT WAVE Magazine

VOL. XXIV

APRIL, 1966

NUMBER 2

KW ELECTRONICS

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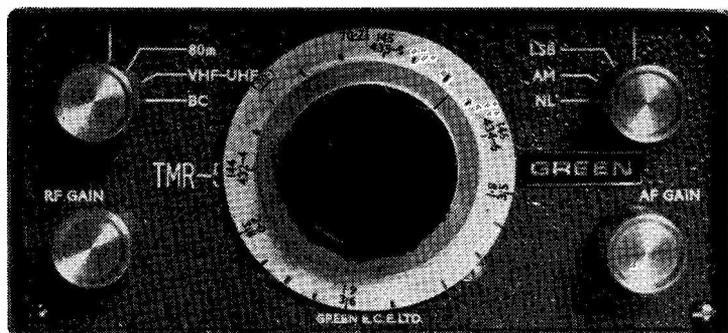
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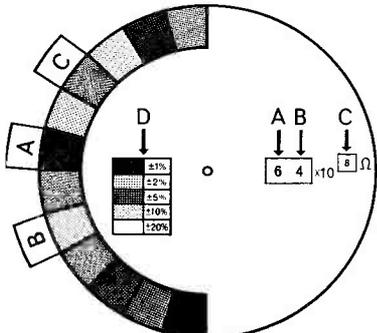
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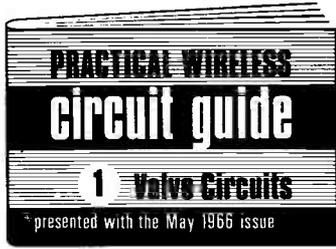


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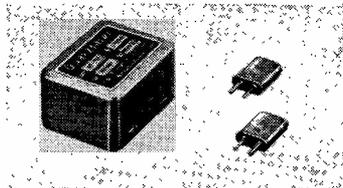
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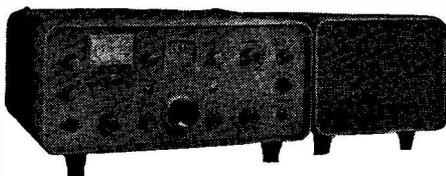
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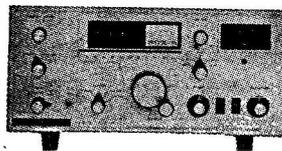
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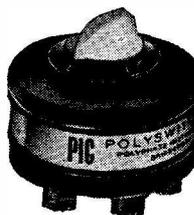
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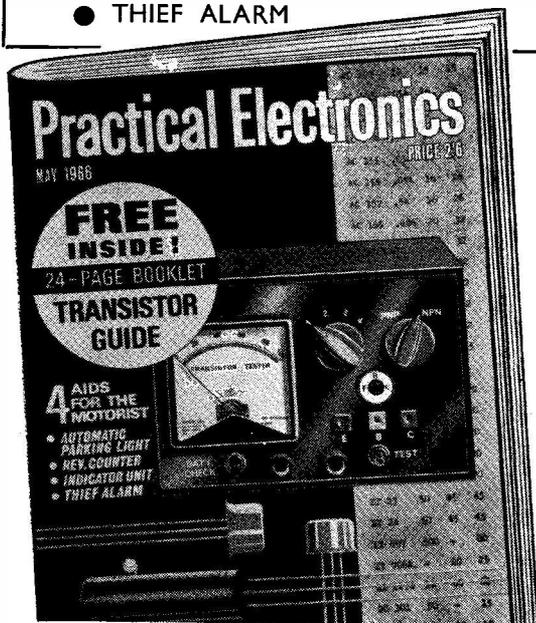
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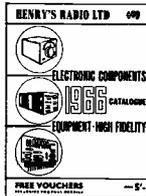
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CQ Magazine, December '65

(extracts from readers' letters)

"I bought a Joystick antenna from Partridge Electronics Ltd., in England and believe you me, your recommendation wasn't far off. I live in an apartment complex in New York and I tried window verticals, an indoor doublet and a few other configurations. When I got the Joystick I was skeptical. But after hooking it up I was amazed. The other antennas I had tried in my particular location were far below the Joystick's performance. I was allowed to mount it on the top of the building (which I did with a special bracket I made) and when I hooked it up to the matching network also supplied by Partridge I was able with my KEM-2 to work Europe without the difficulty I had before..."

"If you are up high enough the antenna will operate (especially at 15-20) as well as the well known 3 element beam with which we compared it. The tests were 'operational not theoretical!' We find that if we can hear 'em we can work 'em... and in most cases with a 100 watts input."

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MORE JOYSTICK TRANSATLANTIC 160 METRE QSO'S

W2EQS sends these latest reports

Worked HB9CM (extract from QSL letter) "It was great to QSO you again this morning on 160 metres at 0635Z. When I was RST 569 I was using my half-wave inverted vee antenna. When I became RST 229 that wasn't QSB. I changed over to my English made Joystick antenna which is only 7½ feet long, 22 feet above ground.

"... On the Joystick I also QSO'd G3RFS at 0755Z getting RST 329. On my half-wave inverted vee antenna I was RST 569..."

"... With this Joystick I've worked on 160 the following: W1, 2, 3, 4, 5, 8, 9, 0; VE1, 2, 3; 6Y5, VP2; VP9; G; HB.

"Another one to list in my 160 metre DX with the Joystick. It is now 0730Z and at 0613 QSO'd G3PQA. On my half-wave inverted vee got RST 579 when in clear but bad QRM from fish Phone on 1799 and 1806 kcs. I was on 1803 5 kcs. On Joystick John got me RST 229 through this fish Phone QRM."

Here are a few more extracts from the letters we get every day :

WASLEM—Henry Wilkins III, of Houston, Texas, writes: "The Joystick really surprised me; it really works like you said it would... I took all my dipoles down."

L. G. Rigden, Leighton Buzzard: "I cannot speak too highly of my internal Joystick which continues to give most excellent reception."

G3UGB—A. Woffenden, Bristol: "I have used the Joystick for some months now and am more than pleased with its performance... extremely good reports on 160M and 80M."

Frank McAuley, Glasgow: "I am beginning to make quite a few contacts with my De-Luxe Joystick and tuning units on 80 and 160 metres using 8 to 10 watts. The Joystick is indoors using the 8 feet feeder and some of my contacts are quite surprised when they hear my Joystick is indoors. As you stress many times I have removed all other antennae and am finding quite a difference. Quite a few of the local amateurs are using the Joystick."

G2FMR—F. W. Broomfield, Nr. Leamington Spa. "Joymast... is giving satisfactory service on transmitting and receiving using DX100TX, SSB100 adaptor and AR88."

G4PJ—William L. Honeywill, Salcombe. "I am still using the Joystick indoor, with 40 ft. feeder and getting results all-round on every band, needless to say I am very pleased."

K6MDJ—Fred Tulpin, California. "Early results are astounding. I've been using a trap dipole for 40-20-15. This Joystick out-performs the dipole 2 x 1."



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Special tuner only 4¾" x 3½" x 3½"

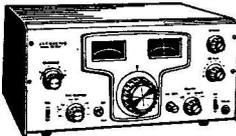
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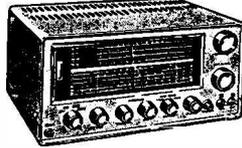
SWM4

SUPERB LAFAYETTE AMATEUR EQUIPMENT

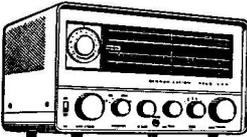


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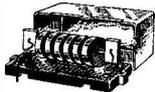
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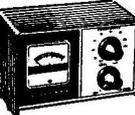
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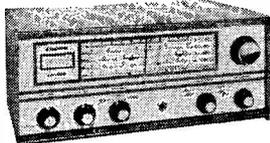


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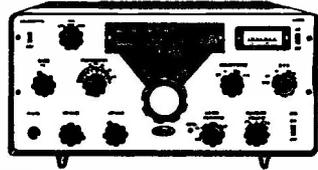
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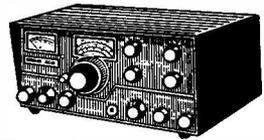
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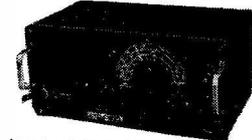
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**INDEX TO
ADVERTISERS**

	PAGE
Amateur Electronics ...	127
B. J. Ayres & Co. ...	67
B.I.E.T. ...	128
Britec, Ltd. ...	68
Charles H. Young ...	<i>cover iii</i>
D. Cursons ...	68
Daystrom ...	<i>cover iv</i>
Delta Electronics ...	124
E.M.S.A.C., Ltd. ...	120
Finnigan Speciality Paints	127
George Francis ...	127
G3HSC (Morse Records)	120
Green Electronics, Ltd. ...	<i>cover ii, 126</i>
G.W.M. Radio ...	122
Halsen Radio Services ...	120
Henry's Radio ...	68
A. Imhof, Ltd. ...	125
John's Radio ...	120
K.W. Electronics ...	<i>front cover</i>
J. B. Lowe ...	123
Mosley Electronics ...	<i>cover ii</i>
N.W. Electrics ...	126
Partridge Electronics, Ltd.	69
Peter Seymour, Ltd. ...	<i>cover iii, 123</i>
Photo Electronic Services	127
Practical Electronics ...	68
Practical Wireless ...	65
RCA Great Britain, Ltd.	121
Short Wave (Hull) ...	122
Small Advertisements ...	119-128
Smith & Co., Ltd. ...	70
Stephens-James, Ltd. ...	68
S.S.B. Products ...	124
S.W.M. Publications	65, 66, 118, 120, 126
Withers ...	72
Yukan Products ...	124
Z. & I. Aero Services ...	72

SHORT WAVE MAGAZINE

(GB3SWM)

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CONTENTS

	Page
Editorial ...	73
Beginner's Receiving System for 70 Centimetres, by S. J. Birkhill (G8AKQ-G6ABK/T) ...	74
Discussing Single Sideband, Part IV, by B. A. Watling (G3RNL) ...	76
Do You Know That ...	82
Oscilloscope for the Amateur Station, Part II, by C. Bowden (G3OCB)	83
Mobile Rally Calendar ...	89
Miscellany — <i>Comment on the Times</i> ...	90
Interesting Marine Transmitter ...	92
Moving Quartz Crystals About, by R. F. C. Bennett (G3SIH) ...	94
Communication and DX News, by L. H. Thomas (G6QB) ...	97
VHF Bands, by A. J. Devon ...	104
New QTH's... ..	107
The Month with The Clubs — <i>From Reports</i> ...	108
A School Radio Club, by R. Wallwork (G3JNK) ...	114

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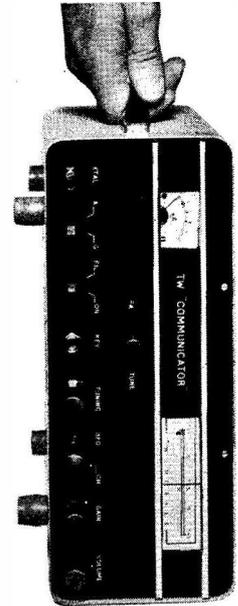
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3Q4 ... 6/6	6C4 ... 2/6	30FL12 ... 12/6	EL86 ... 8/6	PCF801 ... 11/6	U801 ... 18/6
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5T4 ... 8/6	6CW4 ... 12/6	30P12 ... 10/6	EL821 ... 6/6	PCL80 ... 12/6	UBC81 ... 8/6
5MGB ... 6/6	6CY5 ... 10/6	30P19 ... 14/6	EN34 ... 12/6	PCL81 ... 9/6	UBF80 ... 7/6
5V4G ... 9/6	6CY7 ... 11/6	30PL1 ... 12/6	ECH21 ... 10/6	PCL82 ... 8/6	UBF89 ... 7/6
5Z3 ... 7/6	6DK6 ... 6/6	30PL13 ... 12/6	ECH35 ... 12/6	PCL83 ... 8/6	UBL21 ... 11/6
5Z4G ... 8/6	6EA8 ... 11/6	30PL14 ... 12/6	ECH42 ... 9/6	PCL84 ... 8/6	UCC84 ... 10/6
6/30L2 ... 11/6	6J4 ... 9/6	30PL15 ... 12/6	ECH81 ... 6/6	PCL85 ... 9/6	UCC85 ... 7/6
6A84 ... 6/6	6J5 ... 9/6	30PL16 ... 12/6	ECH83 ... 7/6	PCL86 ... 9/6	UCF80 ... 10/6
6A94 ... 10/6	6J6 ... 10/6	30S15 ... 11/6	EY81 ... 8/6	PCL801 ... 12/6	UCH21 ... 9/6
6AF6G ... 11/6	6J7 ... 9/6	35S25 ... 6/6	EY82 ... 9/6	PFL200 ... 17/6	UCH42 ... 9/6
6AK5 ... 5/6	6K6G ... 6/6	35S25 ... 6/6	EY84 ... 7/6	PL36 ... 10/6	UCH43 ... 8/6
6AK6 ... 7/6	6K7GT ... 5/6	35L6GT ... 7/6	EY86 ... 7/6	PL38 ... 16/6	UCH81 ... 7/6
6AL5 ... 3/6	6K8 ... 8/6	35W4 ... 5/6	EY88 ... 12/6	PL81 ... 8/6	UCH82 ... 8/6
6AN4 ... 15/6	6L25 ... 12/6	35Z4GT ... 8/6	EZ21 ... 8/6	PL82 ... 7/6	U3L83 ... 10/6
6AN5 ... 15/6	6L25 ... 12/6	35Z5GT ... 8/6	EZ80 ... 5/6	PL83 ... 7/6	UCL84 ... 9/6
6AN8 ... 10/6	6L26 ... 18/6	50A5 ... 12/6	EZ81 ... 5/6	PL84 ... 7/6	UF41 ... 9/6
6AQ4 ... 5/6	6L27 ... 18/6	50A5 ... 12/6	EZ90 ... 10/6	PL302 ... 14/6	UF42 ... 9/6
6A05 ... 6/6	6L28 ... 7/6	50B5 ... 7/6	EF41 ... 8/6	PL500 ... 15/6	UF43 ... 8/6
6AT6 ... 4/6	6L29 ... 7/6	50C5 ... 6/6	EF42 ... 8/6	PY33 ... 9/6	UF80 ... 8/6
6AU5GT ... 15/6	6L30 ... 7/6	50E1 ... 6/6	EF43 ... 7/6	PY80 ... 6/6	UF85 ... 8/6
6AV6 ... 6/6	6L31 ... 7/6	50E2 ... 6/6	EF44 ... 5/6	PY81 ... 6/6	UF86 ... 11/6
6AW8A ... 14/6	6L32 ... 7/6	50E3 ... 6/6	EF45 ... 5/6	PY82 ... 6/6	UF89 ... 7/6
6AX5GT ... 12/6	6L33 ... 7/6	50E4 ... 6/6	EF46 ... 5/6	PY83 ... 7/6	UL41 ... 9/6
6BA6 ... 5/6	6L34 ... 7/6	50E5 ... 6/6	EF47 ... 5/6	PY88 ... 8/6	UL84 ... 6/6
6BE6 ... 5/6	6L35 ... 7/6	50E6 ... 6/6	EF48 ... 5/6	PY800 ... 8/6	UM4 ... 10/6
6BG6G ... 15/6	6L36 ... 7/6	50E7 ... 6/6	EF49 ... 5/6	PY801 ... 8/6	UM80 ... 7/6
6BH6 ... 7/6	6L37 ... 7/6	50E8 ... 6/6	EF50 ... 5/6	QV02-6 ... 10/6	UYIN ... 9/6
6B15 ... 15/6	6L38 ... 7/6	50E9 ... 6/6	EF51 ... 5/6	QV03-10 ... 45/6	UY21 ... 9/6
6B16 ... 8/6	6L39 ... 7/6	50E10 ... 6/6	EF52 ... 5/6	QV04-7 ... 35/6	UY41 ... 6/6
6B17 ... 7/6	6L40 ... 7/6	50E11 ... 6/6	EF53 ... 5/6	QV04-7 ... 35/6	UY85 ... 9/6
6BK4 ... 2/6	6L41 ... 7/6	50E12 ... 6/6	EF54 ... 5/6	RT11 ... 35/6	W81M ... 6/6
6BK7A ... 9/6	6L42 ... 7/6	50E13 ... 6/6	EF55 ... 5/6	TT21 ... 35/6	X81M ... 18/6
6BL7GT ... 9/6	6L43 ... 7/6	50E14 ... 6/6	EF56 ... 5/6	U25 ... 11/6	Z759 ... 23/6

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The SHORT-WAVE Magazine

EDITORIAL

Mobile *Even old bones can feel the stirrings of Spring and in the context of Amateur Radio activities — now covering such an immense field, with so many specialised interests, that we are hard put to it to find enough space to do them all justice — Spring means that many a keen amateur's fancy lightly turns to thoughts of Mobile. But it is also clear that a certain amount of re-thinking is called for on the Mobile front.*

In the first place, even now not enough attention is being paid to safety; this does not only mean driving or operating safely, but applies to ungainly LF whip fitments. Many of these are far too long, with loading coils that are too big and mountings not sufficiently secure. While rough-and-ready hay-wiring inside the home station is a matter for the personal judgement of the operator concerned, when out on the road it becomes a matter of the convenience of other people — to say nothing of aesthetic considerations.

Secondly, it seems high time that, for amateur /M working, a move should be made away from Top Band. While a fair proportion of mobiles are on two metres, it is obvious that far more use could be made of ten metres for mobile operation. This band is well suited for short-haul working at the sort of ranges now being obtained on 160 metres — moreover, a much simpler and far less obtrusive aerial system is involved. And a very good band for /M-DX is 15 metres, which again presents no serious aerial problem.

Thirdly, it can be said that, in general, the neatest installations are the safest, as well as being the most efficient. This is not necessarily true in every case, nor does it follow that all the rather rough jobs one can see at Rallies are unsafe or ineffective — but where trouble has been taken in putting the equipment together, usually it will be found that proper attention has also been paid to the requirements of efficiency with safety.

With the large number of U.K. amateurs now licensed /M — getting on for 20% of the total of licences in issue — it is a reasonable certainty that given the weather, the local organisation and adequate advance publicity, this season's Rally events will draw larger attendances than ever before.

Aus tin forgh, G6FO.

BEGINNER'S RECEIVING SYSTEM FOR 70 CENTIMETRES

ADAPTING A TV TUNER UNIT
WITH TELEVISION RECEIVER AS
IF/AF AMPLIFIER

S. J. BIRKHILL (G8AKQ-G6ABK/T)

THIS article describes a receiving system for the 432 mc (70-centimetre) band, requiring little setting-up, and costing hardly more than £3.

There must be many VHF enthusiasts who are anxious to receive on 70 cm., but who are discouraged by the difficulty in building a converter giving adequate performance, and by the high price of advertised equipment. However, as shown here, a commercial UHF Band IV/V (BBC-2 type) tuner can be modified to cover 430 mc, giving a signal/noise performance superior to that of crystal mixer type converters. When headed by a transistor, *e.g.*, AF139, pre-amplifier, and fed into the IF strip of a standard 405-line TV receiver, the sensitivity is as good as any commercial 70 cm. converter into a tunable narrow-band IF/AF amplifier when used with the same transistor pre-amp.

The drawback of using a TV Rx as the main receiver, with perhaps 200 kc of sound bandwidth, is the noticeable lack of selectivity when many stations are on the band, *e.g.*, during openings. It was felt necessary, however, to use the TV Rx, as injection of the IF into a narrow-band receiver of the conventional communications type would be difficult due to the relatively poor stability of the oscillator in the tuner—and would also defeat the object of simplicity. Nevertheless, on the writer's receiver, strong signals within 100 kc can be separated, and this is no problem when working locals, using a directional aerial. At this bandwidth, no drift can be detected.

Choice of TV Rx

Many amateur operators will already have a spare TV, but second-hand 14in. or 17in. sets can be obtained of the conventional commercial type very cheaply. A set with three IF stages sound and vision (one or two stages may be common to both) should be chosen, so as to give enough gain. It must have 34-38 mc IF, *i.e.*, not be earlier than about 1954. Flywheel sync. is a great advantage on weak TV signals, but some types of line flywheel circuits give unstable lock on amateur pictures using the simpler types of pulse generator. The writer uses the Bush TV62 receiver series, these having a good flywheel sync. arrangement, as well as high gain, and are ideal for modification.

The output from the tuner is fed into the TV Rx at IF (38 mc) and not on Band I, as the latter arrangement would give reversal of the sound and vision carriers from amateur TV stations using

simultaneous transmission. The switching arrangement shown in Fig. 1 below gives selection of VHF or UHF tuner, switching the IF output and tuner HT supply. The valve heaters are connected into the series chain, adjacent to those of the VHF tuner.

UHF Tuner

The generally available BBC-2 tuners are all suitable for modification, although some can be more easily converted. Fig. 2 shows the circuit of the Mullard AT 6360/02, which is representative of most models. These have four half-wave lines, tuned by a 4-gang capacitor. (Some models have 3-gang tuning.) Padder condensers are mounted to chassis from the valve end of the lines, with trimmers across the tuning gang. The padders (C1, C2, C3 and C4 in Fig. 2) are the only ones to need adjusting (*see* opposite).

Retuning and Setting Up

The tuner should be connected to the TV and a rise in noise observed, the local BBC-2 (if available where you are) being receivable on the appropriate channel. The main tuning gang should be fully meshed, and then the padders are carefully tuned LF (screw slug inward), beginning with the oscillator (C4). As soon as the tuner noise begins to fall off, it should be re-peaked by tuning down the other three padders, before continuing with the oscillator adjustment. If no signal generator is available, the 3rd harmonic of a two-metre Tx can be used as a band marker. If the padders reach maximum capacitance before 427 mc is tuned (depending on make of tuner) a small ceramic fixed capacitor, of

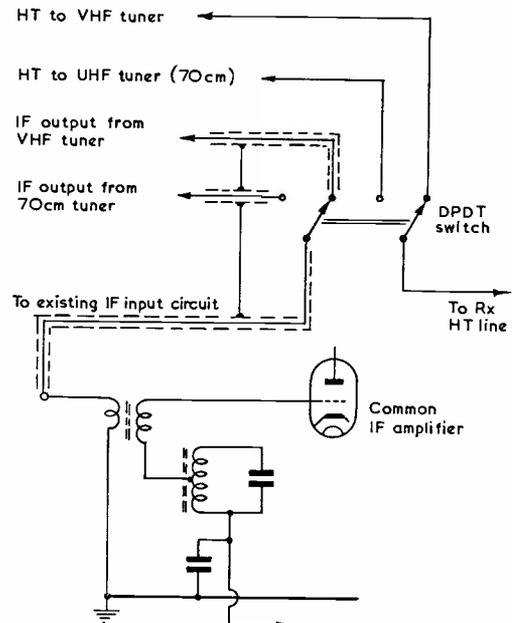


Fig. 1 Switching between VHF (original) and UHF (70cm) tuners.

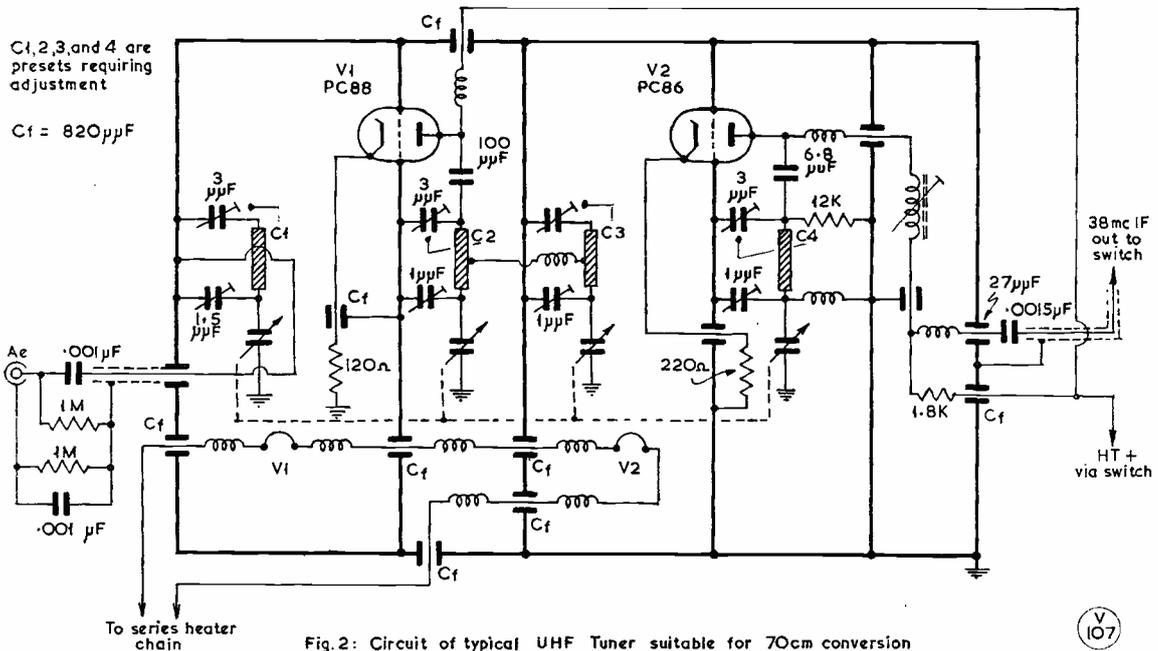


Fig. 2: Circuit of typical UHF Tuner suitable for 70cm conversion

equal capacity to the padder, must be shunted across each one. The leads to these should not be longer than a quarter-inch.

When the band is reached, final adjustment of the padders is best done on a weak 70 cm. signal, although ignition noise gives a good indication of optimum tuning, if near a road. A slow-motion drive and dial should be fitted to the tuning shaft, and the tuner and switch mounted through the side of the cabinet. Suitable dial calibration would be 1 mc points from 430 to 440 mc, with sub-divisions in the range 432-434 mc.

Safety Considerations

Due to the "live chassis" technique used in almost all TV receivers, the importance must be emphasised of ensuring the correct polarity of mains connection, and avoiding exposed chassis-connected metal parts in the finished Rx. This includes the coaxial aerial socket, which must be fitted with the appropriate isolating components (Fig. 2).

If it is desired to earth the chassis, a suitable mains isolating transformer can be used.

Improvements

A transistor pre-amp. gives appreciable signal-noise improvement. No more than one stage of pre-amplification should be necessary, as the system has a very high gain. Gain at IF can be enhanced by using frame-grid valves, EF183 and EF184, in place of the EF80's, with suitable bias adjustment. The vision IF should not be peaked, as the degradation of picture quality is not worth the extra gain.

If desired, the VHF tuner in the TV set itself

can be modified (by simple adjustment of the coils) to cover the 2m. and 4m. bands—but on these ranges the lack of selectivity is a major problem, due to the high-power transmissions in adjacent radio-telephone bands.

Results

This system as described here has been used successfully by the writer since early 1965. Several local amateurs have also modified tuners on the same lines and have received pictures from the writer's QTH, good pictures being obtained at up to 40 miles, under normal conditions. This has also enabled local two-metre stations to work G8AKQ cross-band, with TV sets in use at both ends. AT G6ABK/T, amateur TV has been received consistently at up to 75 miles under normal conditions—and EDX has been worked on 430 mc—using no other Rx.

With the increasing activity on 70 cm. it is hoped this article will suggest a simple means of getting started on the band before progressing to more ambitious types of receiver.

ASSISTANCE REQUIRED

We are asked by G3NRU to mention that, in connection with a Scout Rally station to be established in Buckinghamshire for the weekend July 23-24, the loan of gear and operator assistance would be very much appreciated. The station is to be at R.A.F. Halton, near Aylesbury, and the address for getting in touch is: D. Foster, G3NRU, Alma, Grigg Lane, Headcorn, Ashford, Kent. He will be glad to give full details of the event.

DISCUSSING SINGLE SIDEBAND

MORE ABOUT FILTERS FOR SSB — COMMERCIAL AND HOME-CONSTRUCTED TYPES — THE COLLINS AND THE KOKUSAI — THE BRUSH CLEVITE — PRACTICAL CONSIDERATIONS

Part IV

B. A. WATLING (G3RNL)

This series was started in our issue for December last, with Parts II and III in January and February.—Editor.

BEFORE going on, it must be explained that in Part I, p.596, December, in the right-hand column for "10 watts" read "100 watts." And on p.598, it should be pointed out that slow-motion drive on the variable pitch control is not really necessary.

In Part II, Fig. 11, p.662, January, the connection from the two .01 μ F condensers should be through the primary of a transformer, with the secondary to Fc. And on p.664, January, D1, D2 in the main circuit diagram should be connected to show reverse polarity.

Then, as regards the caption to Fig. 17 on p.664, Part II, in fact *any* other arrangement might not "do as well"—because to get good carrier suppression it is advisable to keep the filter and balanced modulator sections in line, and to have the carrier generator as far from the filter amplifier as possible, with screening as shown.

Now to proceed. Last time, LF home brew filters were described. If you don't like the idea of making one (although you can be assured that it can be quite simple) then there are available commercial filters at reasonable prices—see p.79 for three types evaluated at G3RNL, two of which are mechanical (*Kokusai* and *Collins*) the other being a new type of filter using the piezo-electric effect of ceramics and produced by the *Brush Clevite Company*.

Mechanical filters are very popular these days because of their small size and excellent bandpass characteristics. Some people, however, have been heard to say that they would "never use a mechanical filter even if they were paid to"! They maintain that the quality of signal from a mechanical filter Tx is inferior to that using a crystal filter rig. When listening on the air one tends to agree with these opinions, but the reason for the generally inferior quality signal is usually because of the wrong positioning of the carrier crystal with respect to the passband. The sides can be very steep; therefore, slight wrong positioning of the carrier further down

the passband can cause drastic reduction in bass response. The other point is that most of the mechanical filters used in present rigs have a bandwidth of less than 2.5 kc, whereas crystal filters are usually 3 kc or a little above. Reducing audio bandwidth down to 2.5 kc has only a marginal effect on quality, whereas below 2.5 kc bandwidth the quality does deteriorate. Don't let this put you off. A signal with a bandwidth of 2.1 kc is still intelligible and very acceptable.

There are many types of mechanical filter available, but the most popular type in this country are the *Kokusai* range. Three versions are available, these being the MF 455-10K, with a minimum bandwidth at the 6 dB points of 2.1 kc; the MF455-15K with a minimum bandwidth of 3 kc; and the MF455-10CK with a minimum bandwidth of 2.1 kc but with far superior temperature characteristics than the previous two types.

These filters are all the same size, measuring 1½ in. diameter by about 2½ in. high, and are supplied with a screening plate to prevent the unwanted sideband leaking across. The nominal centre frequency is 455 kc but could vary by ± 0.8 kc. With each filter comes a data sheet quoting the deviation from the nominal centre frequency; the bandwidth at the 6 dB points in terms of *plus* and *minus* from 455 kc; the frequencies at the 30 dB points and the bandwidth at 60 dB, again in terms of *plus* and *minus* from 455 kc.

Fig. 2 shows a curve plotted from the information supplied with a filter used at G3RNL for some months, together with sideband attenuation figures for two different carrier positions. You will note that the shape is not quite symmetrical and that the USB figures are quite a bit better than those for LSB. As previously mentioned, the carrier positioning is very important. Some people make the mistake of selecting carrier crystals the same as the 30 dB frequencies and this is why so much variation in audio quality is heard on the air between rigs using these filters. The filter should allow an audio response of 300 c/s to, at minimum, 2.3 kc. The

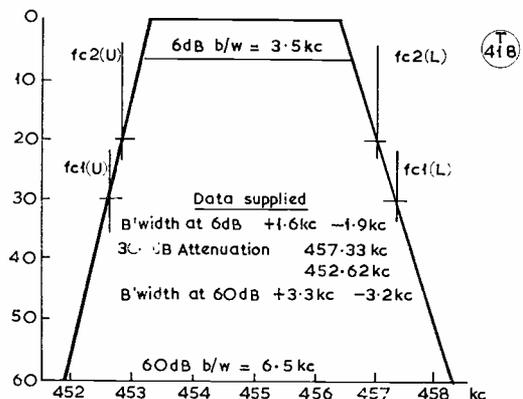
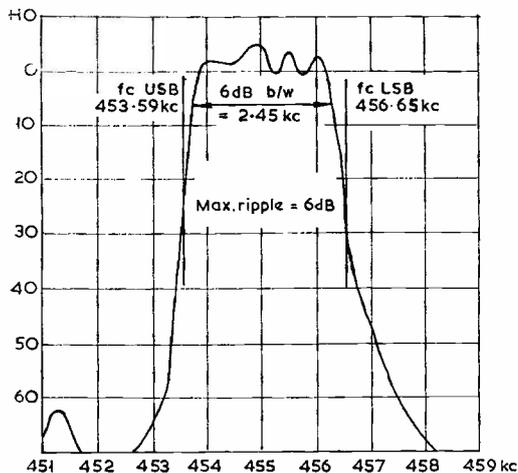


Fig. 2. Curve drawn for a Japanese mechanical filter Type MF455-15K from the information supplied on the data sheet provided.



Theoretical sideband attenuation

USB	fm	LSB
51dB	300cps	35dB
64dB	500cps	48dB
71.5dB	1000cps	62.5dB

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419

Fig. 3. Actual curve plotted for a Kokusai mechanical filter Type MF455-10K. This follows almost exactly the curve drawn from the information given on the data sheet.

lowest frequency is the important one regarding audio quality and should not be any higher than 300 c/s. The correct carrier positioning should therefore be 300 c/s beyond the 6 dB points.

Referring again to Fig. 2 and the sideband attenuation on USB for the two carrier positions shown: It will be seen that the difference is marginal but the audio response for *fc1* is about 475 c/s to 3.975 kc, compared with 300 c/s to 3.8 kc for *fc2*. For LSB the difference is even more marked, *fc2* being the correct figures of 300 c/s to 3.8 kc, with *fc1* being about 750 c/s to 4.25 kc.

From such figures one can appreciate the opinions of operators who say that they would "never use a mechanical filter." However, it is certain that they would not be able to tell the difference between mechanical and crystal filters with identical characteristics and the carriers positioned correctly. In fact, the writer is prepared to bet on it!

At Fig. 3 is shown the response of a Kokusai MF455-10K filter. This particular specimen is an excellent example of its type. Don't expect them all to be quite as good as this one, but even the worst unit can produce a very good signal.

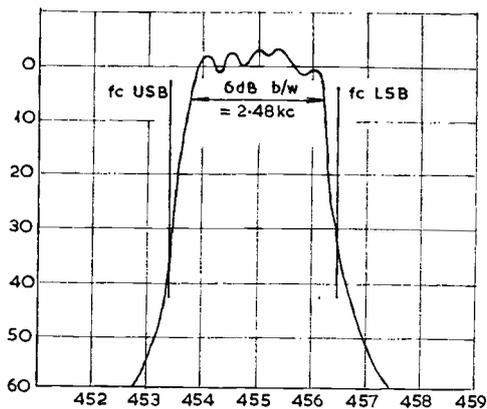
One of the filters in use at G3RNL at present is a Kokusai MF455-10CK which has recently become available in this country. It is a little more expensive than the other type but is far superior as regards temperature stability. The plot of this filter, together with its sideband attenuation figures, is shown in Fig. 4 opposite.

Mechanical Factors

It is interesting to consider how these mechanical filters work. They comprise several metal discs resonant (physically) at the passband frequency. In order to make these discs vibrate the electrical signal must be converted into a mechanical movement. Any device which changes one form of energy to another is called a *transducer* and the type used in the Kokusai mechanical filter is a piece of quartz. We all know that when energised at its resonant frequency, a piece of quartz will vibrate. This mechanical movement is transmitted to the resonant discs by means of a coupling rod. The conversion process at the output is inverted to provide an electrical output. Fig. 5 shows the circuit of a Kokusai mechanical filter. You will note that the input impedance at the resonant frequency is high (the actual figures are not quoted; the only reference is that they have less impedance than an IF transformer), while the DC resistance between the input terminals is low, about 1.8 ohms. This means we cannot follow a two-diode shunt-fed balanced modulator directly with the filter firstly because the output impedance of the balanced modulator is low, and secondly (the really prohibitive reason), because the low input resistance of the filter will short circuit the audio.

Fig. 6 shows the arrangement for using this filter in the sideband generator described on p.664 of the January issue of SHORT WAVE MAGAZINE. An alternative method of feeding this filter is to follow the balanced modulator with a valve amplifier and fit the mechanical filter in its anode circuit. Fig. 7 shows the circuit for this arrangement.

[over



Theoretical sideband attenuation

USB	fm	LSB
45dB	300cps	40dB
55dB	500cps	50.5dB
>60dB	1000cps	>60dB

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420

Fig. 4. Another very good example of the excellent Sideband attenuation that can be achieved using the Kokusai filters. This is an actual plot taken on a Type MF455-10CK component.

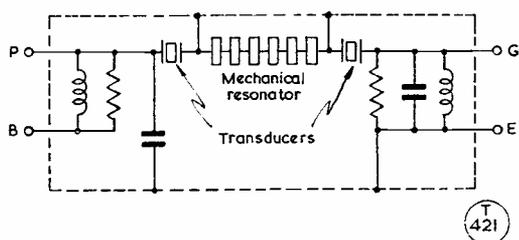


Fig. 5. Diagram to show the general arrangement of the Kokusai range of mechanical filters.

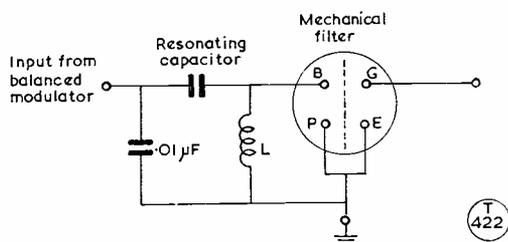


Fig. 6. Showing how a Kokusai mechanical filter can be used to follow a shunt-fed balanced modulator.

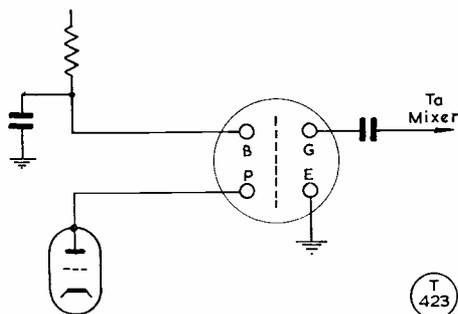


Fig. 7. Another method of using the Kokusai filters in a Sideband transmitter.

An Alternative Design

The other manufacturer of mechanical filters available in this country is *Collins*. The transducer elements are of a different type to those used by *Kokusai*. They rely on a phenomenon called *magnetostriction*, meaning the effect of some magnetic materials have to change length as a result of being placed in a varying magnetic field. This mechanical movement is transmitted to discs, and at the output

end the process is reversed to provide an electrical output. Fig. 8 shows the make up of the *Collins* range of mechanical filters.

Many types are available in the *Collins* range. However, one particular type, namely F455-FA-21, has been developed as a low-cost filter specifically for the amateur market. Unfortunately, the writer has not yet had the opportunity of evaluating the performance of this filter, so only some specifications available from the data sheet can be quoted. Table I lays these out (see below).

These *Collins* types are a little more expensive than the *Kokusai* range, but it is understood that price reductions are imminent. The size of the *Collins* F455-FA-21 is 2½ in. long, slightly more than half-an-inch wide by ¼ in. high, and it can be plugged into three-pin transistor sockets.

The type of *Collins* filter checked out at G3RNL was the F455-H-31, as shown in Fig. 1. This retails somewhat higher than the amateur filter, at about £21. The specifications quote centre frequency of 455 kc ± 0.5 ; 6 dB bandwidth 3 kc nominal; 60 dB bandwidth 6.5 kc maximum, and a maximum top of the passband ripple of 3 dB. Fig. 9 is an actual plot of the specimen worked over at G3RNL. The only criticism the writer has of this particular filter is that the input and output pins are very close together and therefore screening is a little awkward. This can be overcome though and the filter's small size makes it very attractive.

The smallest and most remarkable filter tested is the *Brush Clevite* ceramic ladder device. Fig. 1 shows its size in comparison to the other two. Various types are made with bandwidths varying from 2 kc to 45 kc with a centre frequency of 455 kc ± 1 kc. The particular specimen suitable for use in amateur SSB work is the TL-2D5A, which has a minimum bandwidth at the 6 dB points of 2 kc and a maximum bandwidth at 60 dB of 5.2 kc. The input impedance is 1.5K, the maximum ripple 3 dB, with an insertion loss of 10 dB. Fig. 10 shows the plot of the one used at G3RNL for some time.

The steepness of the sides and hence the theoretical sideband attenuation figures are quite remarkable

TABLE I

Sample of specifications for the *Collins* Mechanical Filter type F455-FA-21 produced for the amateur market.

Centre Frequency	455 kc nom.
6 dB Bandwidth	2.1 kc nom.
60 dB Bandwidth	5.3 kc max.
Top of passband ripple	3 dB max.
Transfer Z	6.75K ohms \pm 2.25K ohms
Resonating Capacity	130 μ F \pm 5 μ F
Insertion Loss	9.5 dB
Spurious Response Attenuation (440 kc to 470 kc)	60 dB min.
Signal Input Voltage	0v. to 2v. RMS

Shunt feed is necessary to eliminate DC through transducer coils which would alter filter characteristics.

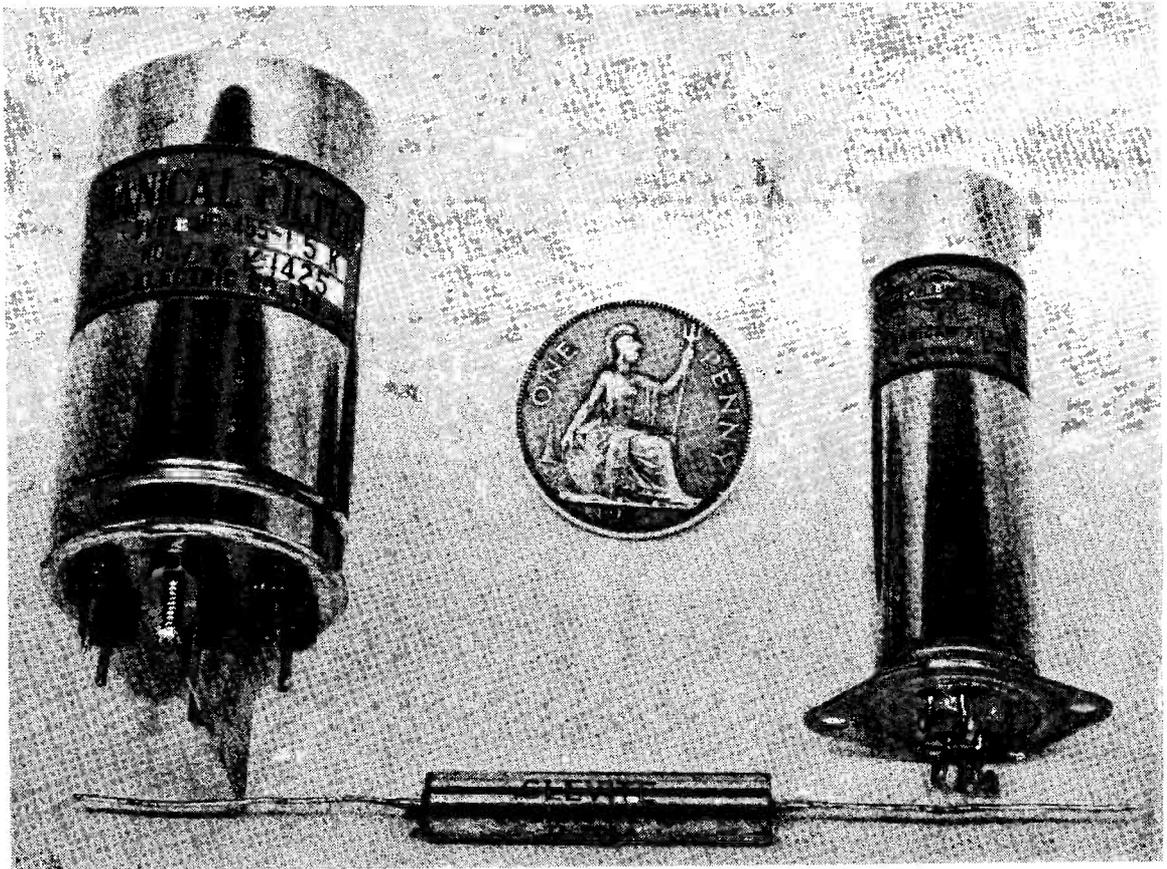


Fig. 1. Three of the commercial filters discussed in the article.

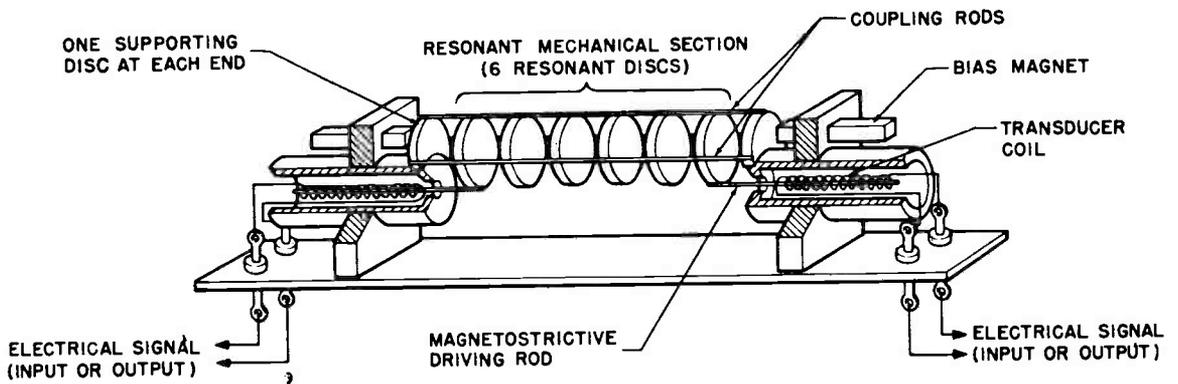
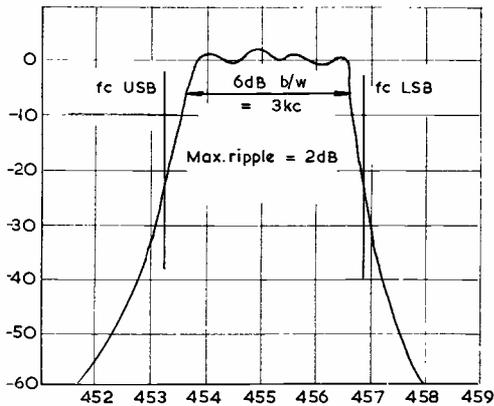


Fig. 8. The physical arrangement of a Collins mechanical filter.

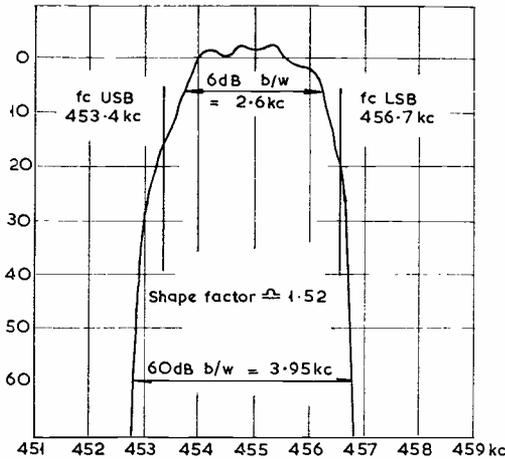


Theoretical sideband attenuation

USB	fm	LSB
27dB	300cps	32dB
38dB	500cps	46dB
51dB	1000cps	60dB

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424

Fig. 9. The curve and Sideband attenuation figures for a Collins mechanical filter Type F455-H-31. This is as plotted by the author.



Theoretical sideband attenuation

USB	fm	LSB
14dB	300cps	>>75dB
37dB	500cps	"
>>75dB	1000cps	"

T
425

Fig. 10. The plotted passband of a Brush Clevite ceramic ladder filter Type TL-2D5A. This is a particularly interesting design of mechanical filter — see text.

for its size. Matching into the circuit was no problem ; in fact, the output of the shunt-fed balanced modulator was fed straight into the filter, the output of which went to the grid of the filter amplifier via a 500 μF capacitor.

Thinking About HF Filters

Let us now consider HF filter design. If you remember from the February issue, the design of a crystal filter required that the resonant and anti-resonant frequencies of two crystals had to be juggled about to provide a flat top and steep sides for a filter. It was shown that because the two resonant frequencies were so close together with LF crystals these had to be shunted with an inductor to produce another resonant frequency. With HF filters this is not necessary as the poles and zeros are spaced such that the bandwidth of the filter will be acceptable for SSB use. Fig. 11 shows how a two-section filter is derived. Fig. 11 (A) shows a standard half-lattice configuration, while (B) shows two sections turned around and cascaded : (C) shows two sections again, the first back-to-front while the second section is back-to-back with the first and inductively coupled. This is easily evolved into (D) where the coupling inductor L is untuned and centre tapped, its inductance being made so high as to not resonate anywhere near

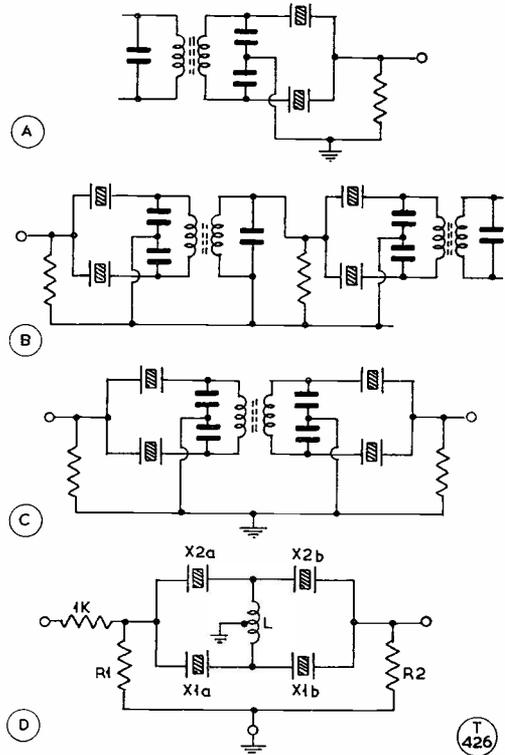


Fig. 11. The derivation, from (A) to (D), of the most common form of HF crystal filter in use—that is, two half-lattice sections back-to-back, as shown in (D).

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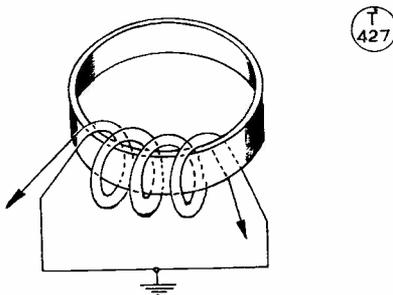


Fig. 12. The method of winding the coil L on a ferrite ring for use in the HF crystal filter shown in Fig. 11 (D).

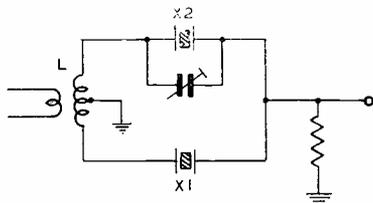


Fig. 13. A half-lattice HF crystal filter. X2 should be about 1.7 kc higher in frequency than X1. Coil L is wound on a ferrite ring as described in the text — and see Fig. 12.

the passband of the filter. The important point about L is that the coupling between sections must be very high. It can be a standard coil wound on a core but an easier method with more consistent results is to use a core of ferrite. A ferrite ring is the most popular choice. The coil should be bifilar wound as shown in Fig. 12. About 30 to 40 turns (60-80 total) is required, but this is not at all critical providing the coil does not resonate near the passband. The pole-zero spacing of the crystals for a bandwidth of 3 kc should be about 1.7 kc. However, the important thing is to get the parallel resonant frequency of the lower crystal to line up with the series resonant frequency of higher one. Exact coincidence will provide a flat top to the passband. Differences of 100 c/s or so will produce a dip in the centre of about 3 dB which is acceptable. The carrier frequency again should be placed 300 c/s beyond the 6 dB point and will come out very close, probably within 100 c/s of the higher frequency filter crystal for LSB and the lower frequency filter crystal for USB.

The great advantage with this type of filter is that once the crystals have been selected no adjustment is needed unless an asymmetric filter is required, when a small capacity should be placed across the higher frequency crystal and adjusted as for the LF filter. The terminating resistors (R1 and R2 in Fig. 11 D) are quite important. A nominal value is 5K but could vary and should be selected to provide the best shape to the passband.

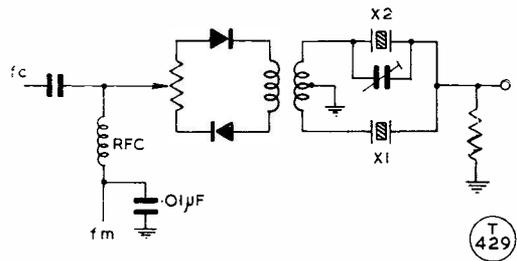


Fig. 14. Method of connecting a half-lattice HF filter to a two-diode balanced modulator.

The filter shown in Fig 11 (D) is a suitable configuration for the popular range of HF filters between 8 mc and 9 mc.

For those with really tight purse strings a half-lattice version of this filter is shown in Fig. 13. The secondary of the coil should again be about 30-40 turns bifilar wound, while the primary link winding should be about 5-6 turns. However, as it is it cannot be connected straight into the SSB generator section described on p.664, January, but should be used as shown in Fig. 14. It could be turned back-to-front and thereby present a higher impedance to the audio signal to prevent it being short-circuited to earth.

The same sort of configuration can be used for medium frequency filters of about 5 mc. However, the pole-zero spacing of crystals around this frequency is generally not quite enough to provide a usable bandwidth. The inductor L should be tuned to provide other resonant frequencies of the crystals which will then produce a flat top. Tuning of the inductor should be carried out by placing the tuning C across the outer ends of L.

(To be continued)

HENRY'S RADIO—New Catalogue

A well compiled and illustrated new catalogue, listing no less than 5,000 stock lines, is now available from Henry's Radio, Ltd., 303 Edgware Road, London, W.2. The 1966 edition also includes a separate Hi-Fi section and an enlarged transistor and associated components list, together with a supplement incorporating (from the catalogue) the full range of transistors, valves, crystals, zeners and rectifiers. The catalogue costs 6s. post free to readers, but vouchers to this amount fully offset its cost when a purchase is made. The 16-page supplement is free of charge, and the catalogue itself is also issued free on request to all industrial users, research establishments and wholesale buyers.

"RTTY TOPICS"—Next Appearance, June

Those who follow our regular "RTTY Topics" feature are asked to note that its next appearance will be in the June issue, thus restoring the alternation with "SWL," the regular Listener feature. For various reasons, these two features coincided with the last (March) issue, which made the allocation of space for other technical material rather inconvenient.

Do You Know That—

— The performance of high-impedance phones can be checked by making a small cell consisting of a silver and copper coin with a slip of newspaper between them; moistened *with the tongue*, this forms the electrolyte. If the phone leads are then touched across the coins, a click will be heard; its intensity will depend upon the sensitivity of the phones. If the phones are really good, it should be possible to hear a click merely by tapping the leads on the tongue! (G3PDX.)

— A very useful coil-doping varnish, suitable for all usual HF applications, can be made by dissolving scraps of *Trolitul* or *Distrene* in carbon tetrachlorine (*Thawpit* again!)—but don't use perspex chippings. The solution thus derived should be kept in a stoppered glass bottle (the *Thawpit* container in which you carried out the process, of course!). (G3KH.)

— Nylon cord drives on receiver tuning assemblies, VFO controls and such that may have gone slack with slipping on the drive spindle can be made positive by using violinist's resin (obtainable from any music shop) powdered down and brushed on to cord and spindle. Commence with a small amount and use a little more as the grip tightens. This will save a lot of time and effort which might otherwise be involved in trying to re-fit a complicated cord drive. (G3MBL.)

— A corner reflector for UHF transmission and reception can easily be contrived by forming chicken wire-netting on an ordinary domestic clothes-horse. For best results, small-mesh netting should be used and the wooden frame may need strengthening to maintain the correct aperture, especially in exposed locations. All the ingredients are obtainable from your local ironmonger or hardware store. (G8AKR.)

— The metal inserts, usually of brass, from the multi-way flexible connector blocks (obtainable at your local *Woolworth's*) make very effective anode and grid pin connections for VHF valves having a stiff-wire terminal, such as the QQV0 types. These inserts will accept up to 10g. wire and will permit rapid cut-and-try modifications. They are also very suitable for aerial jointing or connection—all you have to do is to tighten up on the grub screws. (G8AGN.)

— A sloppy variable condenser, which tends to fall shut by the weight of its rotor plates, can be made positive by fitting a rubber grommet on the shaft between the knob and the panel, and pushing the knob on till firm movement is obtained. This "loose-ness" is a common experience with PA tuning and load condensers, and is easily overcome by the method suggested. (G13NZZ.)

— The sensitivity of P.O. Type 3000 relays, when mounted in the upright position, can be considerably increased by weighting the armature. This is done by sticking a bit of something heavy on its tongue,

using *Bostik* as the adhesive. A relay so treated will work accurately in a Vox circuit. (GW3UCJ.)

— A 12-volt in, 300-volt out, rotary converter can be modified to run as a useful, fast revving motor simply by re-routing the field winding so that it is in series with the armature. Operation is obtained by applying the 230v. AC mains to the 300v. side. You then have a powerful mains-driven motor, which can be geared down for beam rotation or fitted with a driving belt by removing the original 12-volt brush assembly. (G3JEQ.)

— You can make an anvil for next to nothing by going to your local car-breaker's yard and finding an old engine block, which he would be glad to part with for a shilling or two. It is ideal for cutting, forming or drilling out aluminium chassis as used in radio work. Such an anvil is far more secure for metal-bashing than using the edge of the kitchen table. (G3OGQ.)

— You can get rid of TV-whistle QRM on Top Band by putting RF chokes in series with the mains supply leads to the TV/Rx. These chokes can consist of 300 turns on a one-inch former, two in series in each of the *line* and *neutral* supply leads. From the junction between the chokes, on each side of the mains, take a .005 μ F condenser, rated 1000v., to earth. This will form an RF impedance network to keep QRM out of the mains. If your shack is on a separate mains lead from the fuse box (as it should be), put a similar filter into the power supply for the shack—in this case using something like 18g. for the chokes, to carry the full-load current. (If you are in the kilowatt-linear category, use 14g. with fuses in each pole!) The choke units should be in earthed metal boxes, and make sure you have sorted out LNE. (G3TFM.)

— Any RF transistor can be made to squegg around the two-metre region. This means that, in the usual super-regen. circuit, it can be used as a noisy signal generator for lining up two-metre converters. Any super-regen oscillator can be calibrated to the band by the Lecher-line method, and can be tuned over a range of about 125-155 mc using a 10 μ μ F condenser, with a 7-turn collector coil of about $\frac{1}{4}$ in. diameter. Such an oscillator will produce a noisy RF output of sufficient bandwidth to make lining-up relatively easy. (W. Puffet, *Upstreet, Kent.*)

— If you are really genned up in Amateur Radio, you can produce a Tx and an Rx for next to nothing—from a few discarded TV and BC chassis, which between them would provide all the parts you need. And then you apply the know-how!

Readers with ideas they think might be worth half-a-guinea are invited to send them in for this space. Payment is made by P.O., immediately on publication, and the address is: Editor, SHORT WAVE MAGAZINE, Buckingham.

OSCILLOSCOPE FOR THE AMATEUR STATION

FURTHER NOTES ON THE Y-AMPLIFIER—REST OF THE CIRCUIT—CONSTRUCTIONAL POINTS—POWER SUPPLY

Part II

C. BOWDEN (G3OCB)

The first part of this article appeared in our March issue. The treatment is concluded here, leading up to the completion of the instrument. It is hoped in a later issue to discuss its applications, use and operation on the amateur workbench.—Editor.

IF we accept one inch as a reasonable deflection then we must provide an output of some 5v. r.m.s. to each plate. Some minimum value of input signal must be determined. In wideband work it is unlikely that the signal to be viewed will be smaller in amplitude than about 0.25v. When the required signal is smaller we can usually use a narrow band amplifier external to the main amplifier to boost the input. Our r.m.s. signal is therefore required to develop 5v. at the anode (or cathode) of the first push-pull stage. This is a gain of 20.

We have already seen that it is desirable to use cathode followers to drive the tube. It is also a good idea to adopt DC coupling for the Y-plates in order to preserve IF response.

The table Fig. 10 on p.84 outlines the capabilities of certain types of valves in conjunction with certain load resistors. (It is assumed that the strays are about 8 μ F and valve has a *Gm* of 10.) Obviously the last case is useless as there is no gain. The second and third cases are of interest, however, because the gain and bandwidth are acceptable. The 6CH6 valve is designed for use as a video amplifier and its characteristics make it suitable for operation in this way. It is cheap and easily obtainable.

Now we still have to decide on circuitry for the

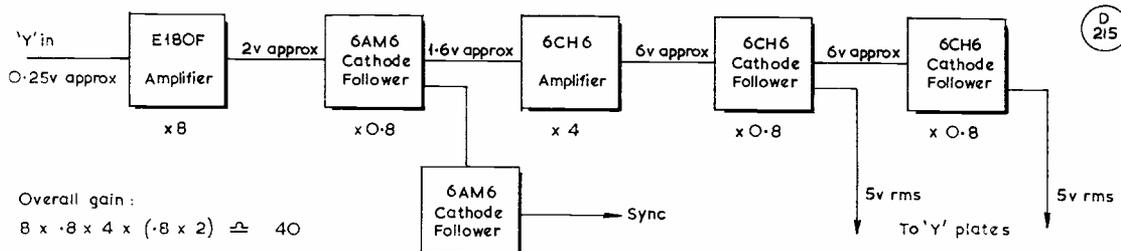
cathode follower output stages and we also have the problem of phase splitting. The "split anode load" type of phase splitter (Fig. 3, p.25, March) is a good choice as it enables us to combine the job of phase splitting and the cathode follower in one stage. If the anode load of the phase splitter is low enough we can ignore any effect it may have on the cathode follower action of the valve. A second cathode follower, driven from the anode load of the phase splitter, provides the complementary signal for the push-pull output.

Circuit Calculations

The second cathode follower must deliver 5v. r.m.s. As the gain is only about 0.8 its input must be about 6v. r.m.s. The load on the phase splitter must therefore be sufficient to develop this output. The output from the cathode of the phase splitter must again be 5v. and as the gain of this stage is also about 0.8 the input will likewise be about 6v. r.m.s. Hence, the input to the phase splitter grid and the output from its anode must be the same, i.e., a gain of 1. The anode load of the phase splitter must be selected for this result and the resistor used will be somewhat larger in value than the total cathode load as the former is not carrying any screen current.

With a standing anode current of between 30 and 40 mA the 6CH6 will easily give this voltage from a load resistor of about 400-500 ohms without having to drive the grid too hard. The makers of the 6CH6 recommend that a grid resistor larger than about 220K should not be used. This decided DC coupling between the 6CH6 and the cathode follower stage immediately preceding it in order to improve the LF response—so the cathode bias resistor to the 6CH6 stage must be about 380 ohms in order to bias the valve correctly. If such a large resistor were left un-bypassed the stage gain would be very low, so it is necessary to decouple it. However, in order to provide a degree of negative feedback and thus reduce distortion at large signal inputs, a portion of the cathode resistor (made up of two resistors in series) is left unbypassed, resulting in a net circuit gain of about 4. The time constant of the bypassed portion is roughly one second and therefore results in about 1 per cent "droop" on a 50-cycle square wave (see discussion Part I, March).

The HF bandwidth of the circuit is over 20 mc. A .01 μ F capacitor is wired in parallel with the .0025 μ F decoupling capacitor C13 in order to overcome



Overall gain :
 $8 \times 0.8 \times 4 \times (0.8 \times 2) \approx 40$

BLOCK SCHEMATIC DIAGRAM OF 'Y' AMPLIFIER

Anode Load	Stage Gain	Anode Current Swing	Min. Anode mA	HF 3 dB Point
10K	100	7 mA	1 mA	20 mc
1K	10	7 mA	10 mA	20 mc
500 ohms	5	14 mA	20 mA	40 mc
100 ohms	1	70 mA	100 mA	200 mc

Fig. 10. Performance of the Y-Amplifier under various load conditions. This table assumes $G_m = 10 \text{ mA/V}$, $C_s = 8 \mu\text{F}$, and an output of 5v. r.m.s. See text for discussion. Values "Anode Current Swing" are plus or minus, and in Col. 4, "Minimum Anode mA," values are for good linearity.

any inductive effects which might occur in the latter at HF.

As the phase splitter stage must develop 6v. r.m.s. into a low value load resistor in the anode circuit, a 6CH6 is necessary in this position. In order to balance stray capacities a further 6CH6 is used as the final cathode follower output stage as well. This results in a fairly high power requirement but is well within the capabilities of the power supply unit.

In order to preserve the HF bandwidth a cathode follower stage is necessary between the 6CH6 and its preceding amplifier. Assuming a gain of 0.8 from this stage the preceding amplifier must give about 2v. r.m.s. Our original input was 0.25v. r.m.s. and hence a gain of 8 is required from the preceding amplifier. As the signal level is now lower a high gain, low current valve is preferable. One of the better types that is easily obtainable is the E180F, which has a mutual conductance of 16.5 mA/V, although types with much higher conductances than this are obtainable at a price. The correct bias resistor for the

Table of Values

Fig. 13. Circuit of the Amateur Station Oscilloscope

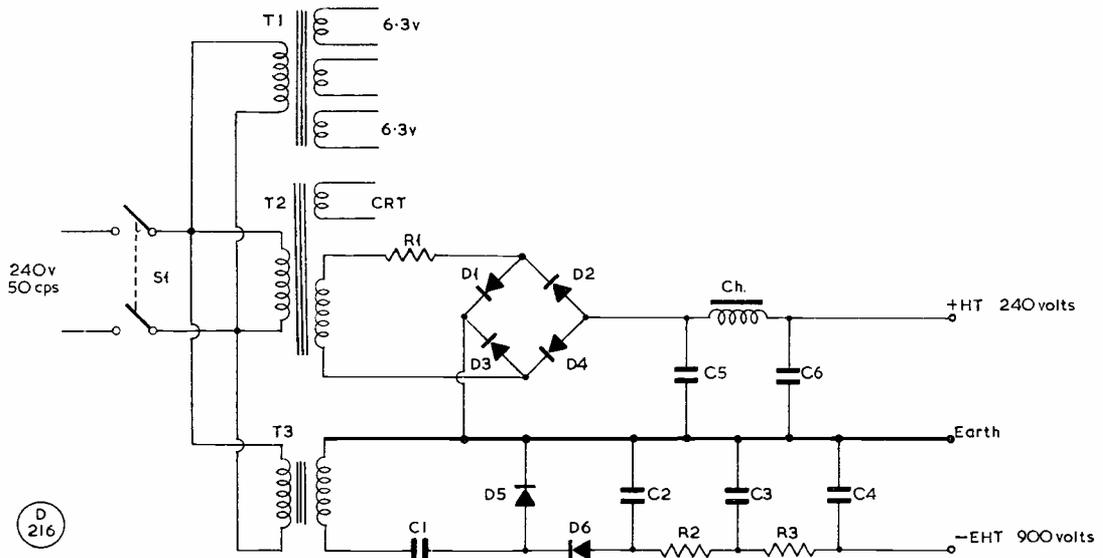
- C1 = 16 μF , 450v.
- C2 = see below
- C3 = .05 μF
- C4, C17 = 0.1 μF
- C5, C14, C15, C16 = 1 μF
- C6, C9 = 0.25 μF
- C7 = 32 μF , 450v.
- C8, C12 = .01 μF
- C10, C11 = 0.47 μF
- C13 = 3500 μF , 25v.
- R1 = 100,000 ohms (fine speed control)
- R2, R27 = 330,000 ohms, $\frac{1}{2}\text{w}$.
- R3, R15, R16, R20 = 6,800 ohms, 1w.
- R4, R5 = 20,000 ohms, 5w. wire-wound
- R6, R10 = 470 ohms, 1w.
- R7, R30 = 1,000 ohms, 1w.
- R8 = 68,000 ohms, 1w.
- R9, R42 = 1,800 ohms, 5w. wire wound
- R11, R14, R19 = 2.2 megohms
- R12, R33, R36 = 620 ohms, 1w.
- R13 = 20,000 ohms, 1w. (time base ampl.)
- R17, R18, R22 = 100,000 ohms, 1w.
- R21, R45, R48 = 100 ohms, 1w.
- R23 = 100,000 ohms (astig. control)
- R24 = 1 megohm (focus)
- R25 = 100,000 ohms (brilliance)
- R26, R31, R34 = 1 megohm
- R28 = 68 ohms, $\frac{1}{2}\text{w}$.
- R29 = see below
- R32, R35 = 150 ohms, $\frac{1}{2}\text{w}$.
- R37 = 47 ohms, $\frac{1}{2}\text{w}$.
- R38, R46, R49 = 330 ohms, 1w.
- R39 = 5,000 ohms (sync. control)
- R40, R47 = 220,000 ohms
- R41 = 4,700 ohms
- R43 = 560 ohms, 2w.
- R44 = 820 ohms, 2w.
- R50 = 100 ohms (calibration control)
- V1, V4, V5, V7, V8 = 6AM6
- V2 = 12AT7
- V3 = 6C4
- V6 = E180F
- V9, V10, V11 = 6CH6
- CRT = VCR-138, or as required

Values for C2, on Time Base Range S2

- 0.5 — 25 c/s = 0.25 μF
- 17 — 100 c/s = .05 μF
- 80 — 800 c/s = .01 μF
- 400 c/s — 4 kc = .002 μF
- 1.4 — 14 kc = .0005 μF
- 5 — 50 kc = .0001 μF
- 20 — 200 kc = 200 μF
- 500 kc — 1 mc = strays

Values for R29, on Attenuator Switch S3

- 1 = zero
- 3 = 47 ohms
- 10 = 500 ohms
- 30 = 1,500 ohms
- 100 = 4,700 ohms
- 300 = 1,500 ohms



D 216

Fig. 11. Power supply section for the Oscilloscope. Values are: C1, C2, C3, C4 0.1 μF , 1500v. wkng.; C5, C6 40 μF , 350v.; R1 8 ohms 2w. wire-wound; R2 47,000 ohms $\frac{1}{2}\text{w}$.; R3 100,000 ohms $\frac{1}{2}\text{w}$.; T1 6.3v. 3A, three times; T2 200v. 200 mA, 4v. 1A.; T3 500v. 5 mA; Ch 5Hy. 250 mA LFC; D1, D2, D3, D4 BY100 or similar for voltage-doubler circuit; D5, D6 J50 or similar rated 500v. at 5 mA.

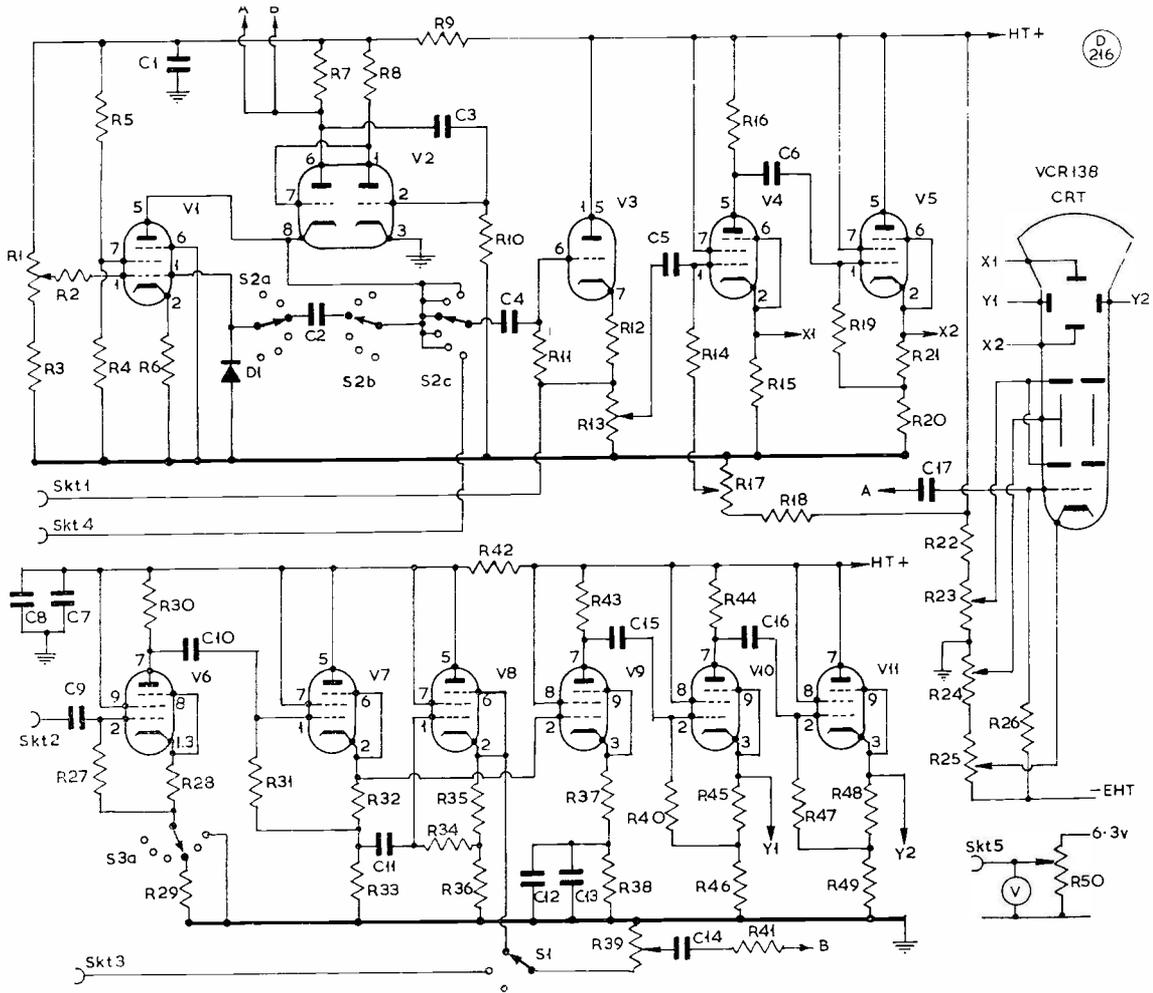
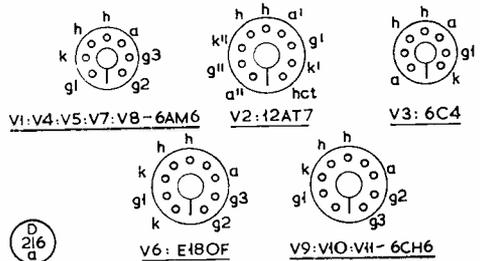


Fig. 13. Circuit complete of the Oscilloscope described in the article by G3OCB. The design principles are fully discussed, and it would be possible to vary these within certain limits (as explained) to meet individual requirements.

E180F is about 68 ohms. As this would require many thousands of microfarads of decoupling for a good LF response, the resistor was left unbypassed. The resulting negative feedback effectively halves the stage gain and thus the mutual conductance appears to be about 8. It is therefore necessary to use an anode load of 1,000 ohms to obtain a gain of 8. Despite this relatively high anode load the HF 3 dB frequency is about 15 mc.

It has already been pointed out that when several identical stages are connected in cascade the overall bandwidth is severely reduced. Where one of the stages has a bandwidth considerably less than the others, then the overall bandwidth will still be about that of the worst stage. In this case the figure of 15 mc is considerably lower than the 3 dB point for the 6CH6 amplifier or any of the cathode followers and

Notes: S1, sync. control, 1-pole, 3-way, 1-bank; S2, 1-p, 12-w, 3-b, time-base speed; S3, attenuator, 2-p, 6-w, 1-b. D1, OA81 or similar; V, 10-15v. AC voltmeter; Skt1, time-base waveform, out; Skt2, Y-input; Skt3, external sync. input; Skt4, external X-input; Skt5, 50-cycle calibration, out.



thus the overall response will be about 15 mc for the complete circuit. HF compensation could be applied by wiring a small condenser across the 68 ohm bias resistor R28 if it were desired to increase the 3 dB point of the E180F stage.

A 6AM6 was chosen for use as the first cathode follower as this valve could provide adequate output voltage and ample bandwidth (about 50 mc). Fig. 12 shows in block diagram form the line-up and voltage distribution in the Y-amplifier.

Originally it had been anticipated that a special synchronising circuit would have been necessary, involving a multivibrator, and holes for two valves were provided at the front of the time-base chassis. In practice, however, it was found that adequate sync. could be obtained by feeding Y signals directly into the time-base. In order to isolate time-base waveforms from the Y-amplifier another cathode follower is included in the Y circuitry. This valve is fed from the cathode of the 6AM6 stage, where it causes least disturbance to the display signal, and its output is passed *via* a 5K sync. control R39 and switch on the front panel, to the time-base circuit. If the extra cathode follower is omitted and the sync. signal is taken direct from the cathode of the first 6AM6 cathode follower stage there is some loss of displayed signal at high frequencies, possibly due to the additional stray capacities. The switch S1 enables the sync. facility to be switched off or selected to internal or external sync. signals at will.

The HT supply to the E180F amplifier is decoupled by a 32 μ F capacitor C7 and a 1800 ohm resistor R42 which results in adequate decoupling and improved smoothing. In order to keep signal leads to the tube short and help heat dissipation the X and Y circuits are built on long sub-chassis mounted beside the tube—see photographs. The only remaining feature of the Y-amplifier circuit to describe is the attenuation control.

Attenuation Control

As we have designed our circuit to provide a minimum of gain we cannot cope with signals of much less than 0.1 volt r.m.s.—they just would not give a large enough deflection to be of use. But many signals will be much larger than this and if we feed in a signal above about 0.25 to 0.5 volt we will overload the amplifier and cause distortion. We must therefore ensure that the effective input to the grid of the first valve is not more than this. There are two ways of ensuring this: Either use a potentiometer in the input circuit (*not* a conventional variable resistor as the strays would completely wreck the HF performance) or properly compensated switched attenuator is necessary; this method is commonly used in commercial equipment but the setting up of the compensating capacitors is difficult without special test equipment. So the alternative circuit shown here has been adopted. The switched attenuator with compensation is, however, capable of showing a better performance than the alternative described (at high signal inputs) and where means of setting up the former are available it is to be preferred.

In the circuit used here resistors are switched (S3)

into the cathode lead of the E180F stage, resulting in a variable degree of negative feedback. As the feedback is increased the gain of the stage is reduced and its signal handling capacity is greatly increased because the major part of the signal is developed across the cathode resistor. (Switched resistors are used but a variable resistor could be substituted with good results. A value of about 15K will be satisfactory.) Strays in the circuit result in a certain amount of decoupling at higher frequencies and this effect is far more pronounced when high values of cathode resistor are involved. To offset this effect as much as possible it is preferable to obtain signals at the *lowest* practicable level and to use as much *gain* in the 'scope as is possible. However, the effect should not become troublesome until attenuations of more than 30 are reached. For example, if we assume strays of 10 μ F and we have an attenuation of 100, the cathode resistor is about 5K. The strays would begin to decouple this resistor at frequencies above about 3 mc. If cathode compensation is deliberately introduced in order to increase the HF 3 dB point of the stage the necessary small capacitor should be connected in parallel with the 68 ohm resistor R28 which is in circuit at all settings of the attenuation switch, and not connected directly from cathode to chassis. The former connection will provide the desired amount of compensation with the attenuator set to the $\div 1$ position but the compensation will be much less as higher attenuations are chosen—but the latter connection would give the desired amount of compensation in the $\div 1$ position though it would result in increasing HF compensation as larger attenuations are selected.

As the usable deflection is only about 1 to 1½ inches, which is well within the confines of the screen, Y-shift control has not been provided. As DC coupling is used it is possible to centre the trace by selection of the cathode load resistors R46 and R49 in Fig. 13, p.85.

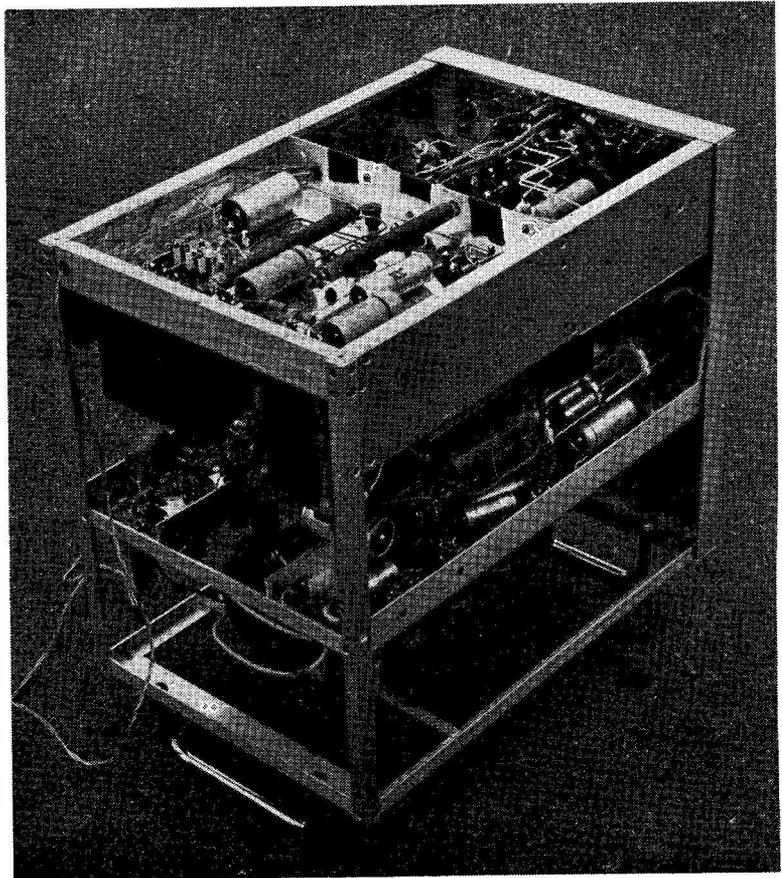
This completes consideration of the factors affecting the design of the Y-amplifier. It has been thought desirable to give it this full treatment because of its importance for the best results. Provided care is taken to keep leads short and tidy the performance should come up to expectation.

Time-Base Circuit

The Miller Sweep Generator is capable of providing a very linear sweep but the flyback is rather slow. The Puckle circuit has a fast flyback characteristic but the sweep is not so linear. The circuit used in this 'scope (Fig. 13) is in fact a combination of the Miller sweep generator and Puckle flyback multivibrator and results in a very linear sweep and fast flyback over the range from about one cycle to 200 kc. Provided values are followed there should be no difficulty in getting the circuit to operate correctly. As there is little point in the constructor changing values in the circuit the mode of operation is not described here. A full explanation can be found in most advanced text books.

One or two points will be of interest, however. Unless V2 is a type having good heater-to-cathode insulation it is advisable to use a separate heater

Inverted half-rear view of the Amateur Oscilloscope designed and described by G3OCB. This shot shows the general arrangement of the X-chassis, the power supply section and the rear of the Y-chassis. The tube is in the lower compartment. Note that the assembly is in unit form.



winding for it. The author has used one half of a 12AT7 in this position for a long period on a common heater chain without failure.

The Miller circuit can only give a linear sweep if it feeds into a high impedance, so again a cathode follower isolates the stage. The push-pull amplifier used is very similar to that described for the Y-amplifier and many of the reasons for its use are common to both amplifiers.

Normally the amplitude of the X-waveform is controlled by variation of R8 (Fig. 13) but as this also varies the time-base speed this form of control was unacceptable. A conventional type of volume control potentiometer connection was also unsuitable as it introduces non-linearity. It was found essential to use a low impedance connection for the X-amplitude control and the obvious place was in the cathode of one of the cathode followers. It was still necessary to use a value of 25K in order to allow the desired voltage to be developed but, as the maximum frequency normally passing through this part of the circuit was below about 1 mc, strays were of little consequence. The control S2 enables the time-base sweep to be varied from zero to wider than the tube face without impairing linearity.

X-shift is obtained by varying bias, R17, to V4.

This provides sufficient shift for normal purposes.

The last position on the time-base speed switch selects instead of the sweep generator a socket on the front panel. This enables external waveforms to be fed to the X-plates if desired. The time-base waveform is also fed to a socket on the front panel (Sk.1) so that it may be used for external purposes.

It is not intended to go into any detail on the tube circuitry as this follows common practice but one or two points will be mentioned as they may be of interest.

A pulse is taken from the flyback generator valve and fed to the grid of the CR tube in order to blank out the flyback trace. The circuit works well but the capacitor C17 must be of very good quality and high working voltage or the circuit will not function properly.

The DC voltages on the X and Y plates are not equal. In order to prevent defocusing of the spot in one plane (astigmatism) the potential of the final anodes of the tube is made variable by means of a front panel control, R23. This is set in conjunction with the focus control for the clearest trace and its effect is quite noticeable.

When the circuit and layout was being developed it was impossible to find one transformer which would

fulfil all the needs of the circuit so three small ones have been used. As these were not all of potted construction it was thought that hum modulation of the trace might be a problem. Experiments were carried out in positioning these transformers for minimum hum effects before their final position was selected. Although potted transformers would be preferable there was no noticeable hum modulation of the trace in the finished 'scope. A mumetal screen for the tube is however most essential if hum is not to be troublesome.

Power Supply

HT for the valves in the 'scope is derived from a 200v. 200 mA transformer of rather ancient construction but solid design. A bridge rectifier of four semiconductor devices is used—see Fig. 11—and the output is well smoothed. The HT voltage is about 240 volts. An 8-ohm surge limiting resistor R1 (Fig. 11) is included in series with the transformer secondary in order to protect the rectifiers. Heater supplies are provided by a separate small transformer.

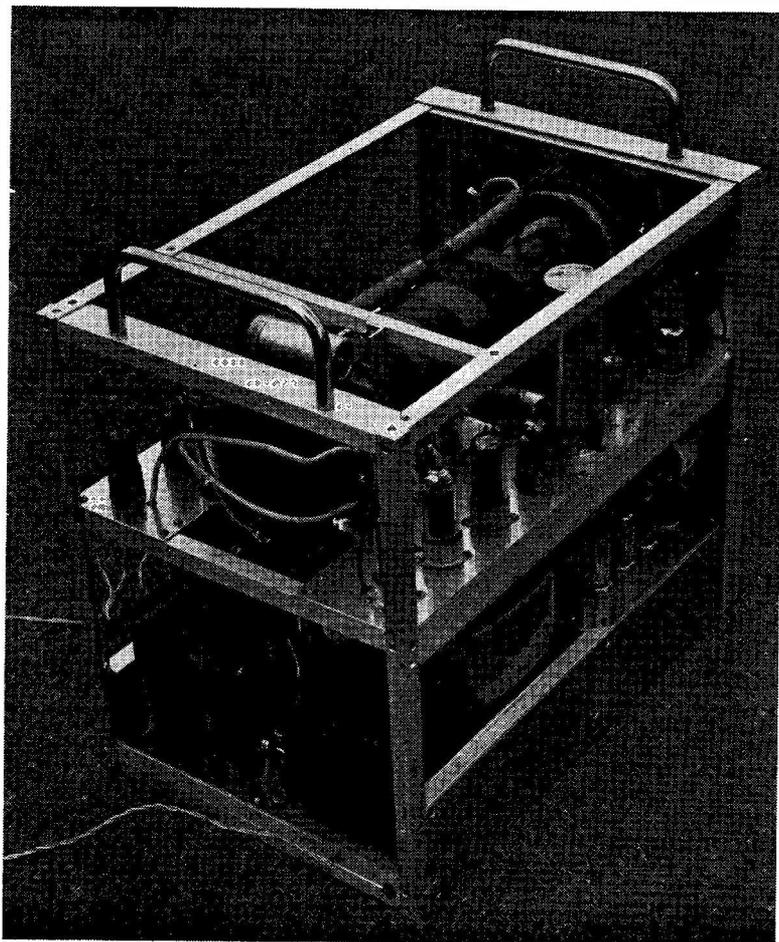
The VCR-138 tube only requires about 900 volts

HT, obtainable from a simple voltage-doubler circuit. A small potted 1:2 transformer was available which gave an output of about 500 volts across the secondary. This was rectified and doubled by a pair of J50 rectifiers which were available. Any 500v. 5 mA rectifiers would be suitable. The output from the doubler is smoothed by a double section RC filter before application to the tube—see Fig. 11.

The power supply is built on the rear half of the lower chassis and this section is mounted at a lower level than the front half in order to give more space and greater isolation between the tube and transformers—see photographs.

Some General Points

The front half of the lower chassis was well provided with holes for valve bases and crystal sockets. A number of auxiliary circuits were built on this chassis including a Wobbulator unit and crystal or multivibrator oscillators operating at 1 mc, 100 kc and 10 kc. These outputs are available directly at a front panel socket, or can by suitable switching be squared and/or differentiated so that outputs of sine



Top half-view of the Oscilloscope, showing the positioning of the cathode-ray tube, the Y-amplifier assembly, and the PSU in the lower compartment. The completed appearance was shown on p.23 of our March issue, in which Part I of the article was published.

waves, square waves or pips can be obtained for calibration of the trace or external equipment. 50-cycle sine waves, square waves and pips are also available.

As these circuits will be of limited interest or may even be incorporated partially or in full in other equipment owned by the reader it is not intended to go into any further detail except in the case of the 50-cycle calibrating signal, the circuitry for which is shown in Fig. 13. It is advisable to obtain a reasonably accurate meter to monitor this calibrating voltage. (The meter that can be seen in the photographs proved to be rather inaccurate. Its origin will probably be obvious from its appearance!) A B7G valve holder is fitted on the front panel in order to allow for the possibility that a probe unit may sometime be required.

The chassis shown in the photographs is constructed from aluminium alloy angle and sheet, and constructional details are not given as this will depend to a large extent on the power supply components and cathode ray tube used. The photographs will illustrate the general method of construction. For guidance, the overall dimensions of the 'scope are

15in. long, 10in. wide and 13in. high. The aluminium angle used was 16-gauge in $\frac{1}{2}$ x $\frac{1}{2}$ in. and $\frac{1}{2}$ x 1in. The front panel was sprayed green using one of the *Aerosol* cans available from garages and Do-it-Yourself stores. A stencil set was used to complete the lettering of the controls. Ventilated panels (not illustrated) complete the case for the 'scope.

Future modifications will probably include the fitting of a terminal board at the rear of the instrument so that large waveforms can be fed directly to the tube, in particular VHF/SSB signals. A more modern tube may ultimately be tried and also some of the newer very high gain valves. The possibility of using transistors is also becoming increasingly attractive although information on the application of transistors to oscilloscope circuitry is still rather scarce.

Although the Oscilloscope described in these notes represents a personal approach to the problem, it is hoped that the information given will enable more constructors to design and build their own instrument—and thereby gain more enjoyment from, and a fuller understanding of, modern Amateur Radio.

MOBILE RALLY CALENDAR

Latest bookings are as listed below, from which it can be seen that there are not many dates still left open for the coming Mobile season. Organisers are asked to let us have details by *April 18 latest* for publication in this space in the May issue.

April 24 : North Midlands Mobile Rally, at Trentham Gardens, near Stoke-on-Trent, on the A.34, with Bob Palmer, G5PP, as chairman of the organising committee. This is always one of the biggest Rally events of the year, with valuable raffles, an exhibition section, closed-circuit amateur TV, an RTTY demonstration, fully licensed catering, ample parking on hard standings, and plenty of covered accommodation in case of bad weather. Official opening at 12 noon by the Lord Mayor of Stoke-on-Trent. Talk-in will be by G3GBU/A on 1920 kc; G3COY/A and G3UD/A (3720 kc) on 80m. SSB; and by G3MAR/A on two metres, supported by G3HVI (Stoke, 1890 kc) and G3OOA (Crewe, 1950 kc) as out-stations on Top Band. For enquiries or further details, write G5PP, *QTHR*.

May 1 : RSGB Rally at Texas Instruments, Bedford.

May 1 : Medway Amateur Receiving and Transmitting Society Mobile Rally at British Uralite Works, Higham, Rochester, Kent, with talk-in by G2FJA/A on 160m.; G3TVH/A on 4m.; and G3TXS/A on two metres. Refreshments available on site and plenty of under-cover room. Details : S. Barker, G3CHD, Merston, Green Farm Lane, Shorne, Gravesend, Kent.

May 8 : Thanet Mobile Rally.

May 22 : Annual A.R.M.S. Rally at Barford St. John, near Deddington, Oxon.

May 30 (Whit Monday) : Saltash & District A.R.C. Mobile Rally and exhibition at Calstock, near Saltash, Cornwall. Talk-in will be given on 160-80-4-2m., with a DX station operating on 20m. Details : D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.

June 12 : RSGB booking.

June 26 : Hunstanton (Norfolk) bucket-and-spade party. Details from J. G. Taylor, G3SAW, 42 Station Road, Heacham, Kings Lynn, Norfolk.

June 26 : Ninth annual West of England Rally at



“... Fortunately, the rig was quite untouched ...”

Longleat House, near Warminster, Wilts., with talk-in on 160-4-2m. Details from: G3PQE, 6 Plumtree Close, Winscombe, Somerset.

July 10: Wessex Amateur Radio Group Mobile Rally at Hurn Airport, near Bournemouth, in conjunction with the British Aircraft Corporation Radio Club. There will be plenty to see and do, as this is also the B.A.C. Open Day. For information apply: W. G. West, G3MKN, 23 Palmer Road, Poole, Dorset.

July 10: South Shields (Co. Durham) Mobile Rally (*details later*).

July 17: Worcester & District Amateur Radio Club

Mobile Picnic (*details later*).

August 29 (*Bank Holiday*): Peterborough Mobile Rally.

September 11: RSGB booking.

September 16-18: International Amateur Convention and Mobile Rally at Knokke, Belgium, with three-day programme of meetings, demonstrations, parties and tours, at all-in prices. Further details later. U.K. amateurs will be able to obtain full information in due course from: J. C. Foster, G2JF, Wye College, near Ashford, Kent.

September 25: Harlow Mobile Rally.

Miscellany

ANOTHER LOOK AT SOME OF THE STRANGE HAPPENINGS AROUND US

Recent notes on meters with strangely-calibrated dials have brought the following from G3RDX:— K6---: "What is your output?" G3RDX: "My output meter is reading 9.5 kilowatts." (It happens to be a surplus type 100 μ A meter calibrated in kilowatts for some particular use!)

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A device now in use in the U.S. Army is a Visual Morse Code reader, which transforms incoming code into single letters on an illuminated read-out comprising 17 miniature bulbs. It also contains, by the way, 350 diodes, 70 transistors and a power-pack of four nickel-cadmium cells. It weighs less than a pound, is "about the size of a pack of cigarettes"—and our guess is that it must cost about the same as a trained W/T operator!

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Suggestions (in *Collector and Emitter*, Oklahoma) concerning the well-known "we" phenomenon:— (1) Perhaps he's Siamese twins; (2) He shows he's a member of the damp-diaper brigade by "we-we-ing into a microphone"; (3) It may be the Imperial We, and he's a megalomaniac strutting around with a three-cornered hat and his hand stuck in his waistcoat; (4) Perhaps we should address him as "little Mother-to-be" and treat him as one in a delicate condition; (5) Most likely he just senses what a sorry excuse for a radio operator he is, and is unwilling to bear the shame alone.

— • • • —

"My 'shack policy' is to clear up at the end of each constructional project (this can be a real treasure hunt), being one of those who prefer to concentrate on the job in hand, rather than to spend endless

hours sorting one's entire stock of bits and pieces into the overflowing miscellaneous bin. The system would still be working well, were it not for the fact that the current project is 2½ years old."

(G2HIF, in QAV, AERE)

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Heard On the Air (I): "Why is it that every time I put up a new antenna it's a lot better than the previous one? This still applies when the new one is one that I had up years ago and discarded in favour of something else." (*Suggested answer:* Imagination is a wonderful thing.)

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Everyone outside our charmed circle asks "Well, what do you talk about?" There doesn't seem to be a suitable reply, but a ZS amateur frightened some Dear Old Ladies by replying "Well, OM, the rig here is a pair of 6GJ7's in the final with an input of 100 watts, so QRU now, 73 and hope to CUAGN soon, and if you hear me on give me a call, and I'll do the same here, by the way the Wx here is fair and warm so 73, best of DX, good luck, and I'll be seeing you again and . . ." (In other words, he told them "We discuss the weather, exchange names and addresses, give signal reports, tell them about our equipment, discuss the weather, and . . .")

(Radio ZS)

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Anyone want a linear with a bandwidth of 2-30 mc? In other words, no band-switching at all? You can buy such a thing, in the U.S.A., from Telco Inc.—but there is one slight snag. The SWR on the output side "should not exceed 1.2:1" . . . in other words you must present it with a properly matched aerial

system for whatever frequency you elect to work on. Still an interesting idea, though, and a low-voltage device at that (the power supply is rated at 600 volts, 5 amps).

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A few strange new words and names to add to the long list mentioned here about a year ago : Tunaverter, Teleplex, Tymeter, Instructograph, Aermotor, Automatch, Vibratrol, Swantenna, Mor-Gain, Echoplex, Tenna-Bal, Penta-Beam, Slimpac. You could probably guess roughly what most of them are. If you can't, you will find full enlightenment in the pages of *QST* for February 1966.

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Heard on the Air (2): "Thanks for 5 & 9 report; you're the same with me. Name here is Bill—repeat—Bill; Boston, Italy, Lima, Lima. Will you repeat the last two letters of your callsign?"

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Eyeball QSO's? Always seems to us a rather revolting phrase. But, according to K3VCH, quoting in *QST* from a book of Psychology, of all things, a former Army officer from a Communist country asserts that one of the things he had to learn was independent control of his eyelids, so that he could send a dash with the right eye, a dot with the left, and manage a Morse "QSO" in silence with barely perceptible flicks of this kind.

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Another intriguing adv. in some of the American magazines is for a device called a "Sub-Carrier Detector" with which you can receive "Programs of commercial-free music through your FM tuner".



"... and then I hit on the idea of using the old cans for a vertical..."

We must have a real blind spot here . . . it adds "Receive famous background music now transmitted as hidden programs on the FM broadcast band from coast to coast." By whom? And why? And do we start getting hidden programmes of Muzak in the VHF bands or even some of the amateur bands? *Note.* Must find out more. But the thing costs \$75-00, so it's no trivial matter.

RECIPROCAL LICENSING

We are informed by the Post Office that reciprocal licensing agreements have now been concluded with the following countries: Austria, Belgium, Luxembourg, Monaco, Netherlands, U.S.A. and West Germany. An informative and fully detailed pamphlet is available from the Radio Services Dept., Radio Branch, Hq. Building, General Post Office, St. Martins-le-Grand, London, E.C.1. This sets out the terms and conditions under which reciprocal licences are granted in the U.K. Callsigns, of which several have already been issued, are in the sequence G5AAA-G5ZZZ, suffixed by the applicant's own home call, e.g., G5AAY/W1MEM. This becomes G15, GM5, etc., as appropriate, and can also be suffixed /P or /M—for example, GW5AAY

/W1MEM/P. Rather a mouthful, but there it is! The fee is £2 on issue and £2 on renewal, as for U.K. permits.

ALWAYS WANTED, AND PAID FOR

Good photographs of Amateur Radio interest—of stations, equipment and personalities. The picture can be any size, within reason, about postcard being preferred, and should be a clear, sharp print. The details should be given on a separate sheet, *not* on the back of the photograph itself, which need only have some light pencilling to identify the sender. Payment is made for all pictures that we can use, immediately on publication, and the QTH is simply: *Editor, SHORT WAVE MAGAZINE, BUCKINGHAM.*

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

INTERESTING MARINE TRANSMITTER

NEW REDIFON G.341 SSB
EQUIPMENT FOR SHIPS

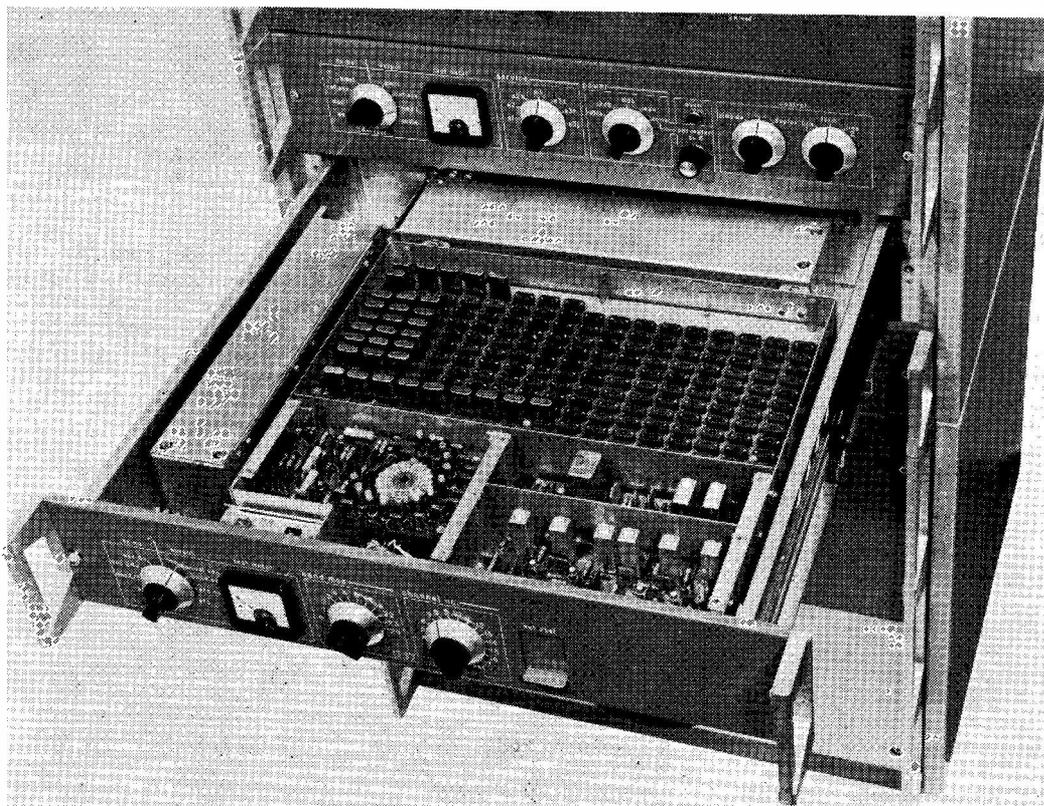
Another in our series of occasional general-interest articles outside the strictly Amateur Radio context, the notes following discuss a new commercial Sideband transmitter, for CW/MCW as well as DSB/SSB operation in the twelve marine bands from MF to HF.—Editor.

THE Redifon G.341 transmitter gives full coverage of the marine bands MF to HF, offering when fully crystallised-up a choice of no less than 195 spot-frequency channels between 400 kc and 26 mc. It

operates on DSB and SSB, as well as in the usual telegraphy modes, CW/MCW.

Having a power output of 1.2 kW p.e.p., the G.341 carries the punch required for long-distance radiophone working, though this high power can be reduced by preset adjustment to comply with particular national regulations for certain bands and localities—for instance, full power would not be used to pass traffic to GLD on MF when a few miles off Land's End.

By introducing the G.341 as a companion to Redifon's R.408 receiver—illustrated, with notes, on p.543 of the November issue of SHORT WAVE MAGAZINE—a basic installation is provided that not only fulfils the main-station communications requirements of compulsorily fitted vessels but at the same time constitutes a complete SSB ship-station without the need for any additional Tx or Rx for this purpose. The bringing into service of this new range of main-station equipment is at a time when the firm is also increasing its sea-going radio officer staff, thus



Behind the band- and channel-selector panel of the Redifon G.341 1200-watt Sideband transmitter, which gives the choice of 195 crystal-controlled frequencies from 400 kc to 26 mc — just look at that flock of crystals and crystal mountings in the rear section of the chassis! The wide frequency range provides for complete coverage of all marine bands from MF to HF, with the necessary power reduction facilities to comply with the local requirements of some administrations when working short-haul. The G.341 conforms with the latest regulations covering ships' radio equipment for SSB operation, and is type-approved by the Post Office. This Tx and the new Redifon R.408 (see p.543, November "Short Wave Magazine") are matching items.

ensuring that the gear will be correctly operated and properly maintained. Needless to say, the G.341, like the R.408, is type-approved by the G.P.O. and conforms with the latest official requirements in respect of SSB apparatus for marine use.

Today's trend towards ever faster turn-rounds at terminal ports, particularly for tankers or bulk carriers (where a day's delay can cost owners thousands of pounds) coupled with the increasing complexity of ship-borne radio equipment, presents a maintenance problem that demands speedy servicing. To meet this need, modular construction is very largely used in the G.341, and modules such as the SSB generator can be rapidly changed without any realignment procedure being involved. Ease of access is ensured by the use of glide-out chassis-panel units, as shown in the picture at lower left.

For data circuits or R/T working from locations in the ship outside the radio office, additional line inputs are provided. CW can be worked in the 1.6-2.0 mc band, as well as on the usual MF/HF ranges.

The G.341 can be deck- or bench-mounted, the Tx and its PSU being constructed in separate housings which can either be combined or separated, as convenient. The power supply circuits are fully protected against damage under fault conditions, and even a short-circuited or open-circuit aerial connection will not damage the transmitter itself. The Ae. output is for low-impedance, unbalanced, over all ranges. Receiver muting and side-tone outputs from the transmitter are accepted by the R.408, and the two are styled to match.

It is of interest to add that the actual frequency areas over which the G.341/R.408 installation operates for marine communication purposes are 400-535 kc, 1.6-3.8 mc and in the following megacycle ranges: 4.0, 6.0, 8.0, 12.0 16.0, 22.0, 23.0 and 25.0 mc. In each of these band areas a number of channels can be selected for different transmission modes—for instance, in the range 3.0-3.8 mc there are



Part of the radio-room of the new Shell tanker "Drupa," showing the main Tx, a Redifon G.341, being set up by the radio officer on one of the many channels and several modes this transmitter provides. To the immediate right of the R/O, on the operating table, can be seen the matching Redifon R.408 receiver.

17 selectable telephony channels, and in the 12 and 16 mc bands (much used by ships for long-distance working), there are 13 telephony channels and four for CW. In the 23.0 and 25.0 mc bands, there are 17 CW-only channels.

FOREIGN VISITOR OPERATORS

Licensed U.K. amateurs, entertaining a guest from overseas who holds a licence in his own country, may apply to the G.P.O. for authority for the visitor to operate the station "in his presence and under his direct supervision," and there must be in force a reciprocal licensing agreement with the visitor's own country. Apply to Radio Services Dept., Radio Branch, for the appropriate form (which is quite short and simple) and the permit is issued free for the concessionary period of seven days.

OBITUARY

We very much regret to have to record the passing of the following amateurs:

— P. J. Crosbie, G3NMQ, of Croydon, Surrey, suddenly on February 27, at the early age of 29 years. He was well known under a variety of overseas

callsigns and was a keen DX operator. He leaves a widow and two young children, who will have the sympathy of all "Bing's" friends.

— Jack Cunningham, G3HPE, of West Wickham, Kent, who died at his sister's home at Brixham, Devon, on February 25, having been in failing health for some time—however, he had maintained his interest in Amateur Radio to the end.

— R. H. Greenland, of Hornsea, Yorkshire, on February 17 at the age of 63. Though he never held a callsign, he will be well remembered by many of our older readers as the contributor of the regular BC/DX news feature in the *Short Wave Listener*, which he built up into the authoritative column on the subject during the years when we published the *Short Wave Listener*. He was a valued colleague, always reliable, with a wide following of SWL's interested in SW/BC reception. A widower, he leaves a married son.

MOVING QUARTZ CRYSTALS ABOUT

INTERESTING PRACTICAL DISCUSSION ON GRINDING AND PLATING

R. F. C. BENNETT (G3SIH)

RECENTLY the writer was confronted with purchasing three brand-new crystals or three surplus ones, for a Sideband exciter. Eventually, the decision was made in favour of the latter, which, if necessary, could be moved to the correct frequency by plating or grinding. The crystals were required for the Sideband selection oscillator, 2453 kc. The frequencies of the purchased surplus crystals were 2315 kc, 1506-875 kc and 452-777 kc (Channel 326, FT-241A). All three crystals have been moved to the desired frequencies and following is an account of how this was done.

General

Most surplus crystals can be *increased* in frequency by grinding; conversely, *plating* them will lower the frequency. The 10X, 10XJ and FT-243 types can be ground on their faces. The FT-241A crystals, by virtue of their construction, require *edge* grinding. A crystal must be scrupulously clean before it will oscillate and this necessitates washing in carbon tetrachloride after grinding, polishing or plating. The crystal should also have square sides, uniform bevelled edges (if any) and preferably, lapped faces.

Grinding the Crystal

The materials necessary to grind a crystal are: One piece of plate glass; some paraffin; Carborundum Paste No. 360; Carbon Tetrachloride; three pieces of soft cloth, or one box of paper tissues.

Place the piece of plate glass on a firm surface. Pour one half-teaspoon of paraffin on to the glass and mix with it a small amount of carborundum paste (a "bead" of 1/16in. diameter is adequate). When the paste has completely diffused with the paraffin, place the crystal face down in the mixture and commence grinding by moving the crystal in a "figure of eight" direction. The crystal should be rotated through 90 degrees after every four or five strokes, as this will ensure even grinding of its face.

Table of Values

Fig. 2. Harmonic Oscillator for Crystal Checking

- | | |
|-----------------------|---------------------|
| C1 = .01 μ F | Sk3 = FT-243 socket |
| C2 = 30 μ F | S1 = C/O toggle |
| C3, C5 = 100 μ F | L1 = 3-10 mc., |
| C4 = 500 μ F | Wearite |
| R1 = 47,000 ohms | L2 = 10-30 mc., |
| R2 = 56,000 ohms | Wearite |
| RFC = 2.5 mH RF choke | V1 = 6AM6, EP91, |
| Sk1 = 10X socket | Z77 or similar |
| Sk2 = 10XJ socket | |

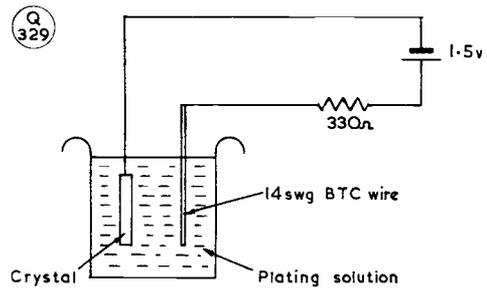


Fig. 1. Circuit used for plating the crystal — see text. The materials should be carefully handled, and it is also necessary to keep a close check on how the frequency change is progressing.

It is important that only *one* face of the crystal be ground and for identification purposes the other face should be lightly marked with a pencil in one corner. The grinding mixture should be replaced when it becomes tacky. When the crystal is approaching its final frequency (e.g. within 2 kc at 3 mc) extreme care is necessary in order to avoid exceeding the desired frequency, and it is wise to check the crystal frequently. As a guide, the writer ground an FT-243 3498 kc crystal to 3500 kc, and this required ten light strokes on the crystal face; the final adjustment of 200 c/s was achieved with a stroke of one quarter inch. The carbon tetrachloride (obtainable at any chemist's shop) and paper tissues are used for cleaning the crystal.

The table opposite is a record of the progress of grinding a 10X 2315 kc crystal to 2453.2 kc.

The whole process took two hours. A second crystal was ground from 1506-875 kc to 1547 kc in twenty minutes.

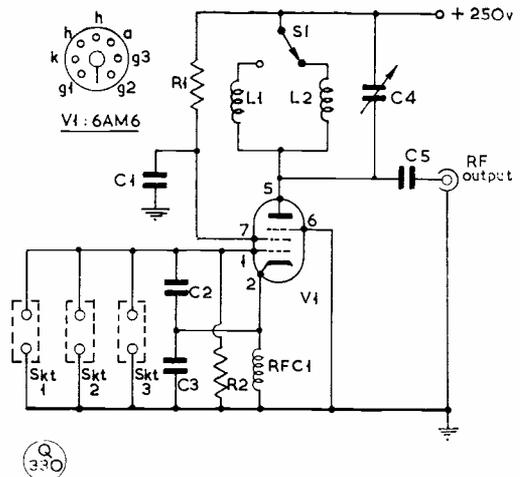


Fig. 2. A harmonic crystal oscillator for checking crystals. By using commercial coils (see table of values) and fitting sockets to accommodate various types of crystal mount, a useful wide-range oscillator results.

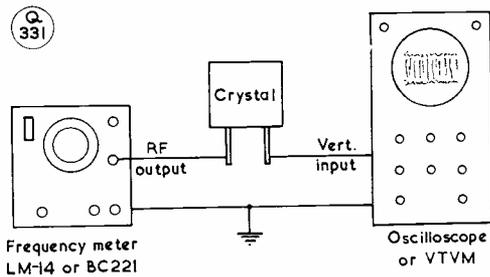


Fig. 3. The equipment set-up for checking crystal frequency where an accurate frequency meter and oscilloscope are available.

The use of household scouring powders (*Vim*, *Daz*, etc.) for grinding purposes should be avoided because they are too coarse and the resulting paste too thick. Similarly, *Three-in-One* oil should not be used in preference to paraffin, otherwise uneven grinding of the crystal will certainly result.

Plating

The frequency of a crystal can be lowered by plating one or both faces. The materials necessary for plating are: 100 cc of distilled water; 15 gm of copper sulphate; 5 cc of concentrated sulphuric acid. This solution can be obtained from any chemist's shop, made up as specified.

The crystal can be plated using the circuit shown in Fig 1. The plating current is 3 to 3.5 mA. If the plating process is carried too far, then reversing the battery connections will cause shedding to remedy the situation.

Unfortunately, all crystals cannot be plated without an additional process being involved. FT-241A 54th and 72nd harmonic types are easily plated because they have been treated to enable the support wires to be soldered, by a blast of hot air, to the crystal faces. On the other hand, plain quartz crystal, e.g. the 10X, 10XJ and FT-243 crystals, must have an electric conducting material attached to the face

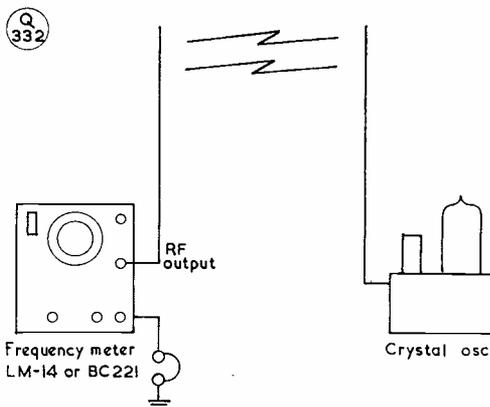


Fig. 4. Another equipment arrangement, with the crystal oscillator shown in Fig. 2 working with a suitable frequency meter.

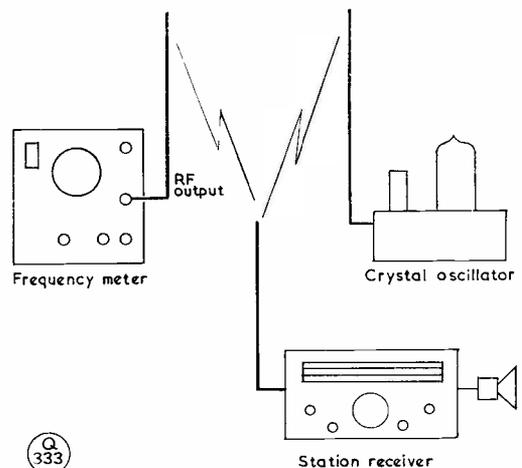


Fig. 5. The station receiver can also be brought in to check on crystal frequency and activity, but an accurate frequency meter is essential for final frequency determination.

which is to be plated.

One method is to apply a coating of soft pencil lead to the faces requiring plating. The pencil lead, which should be B or 2B grade, will lower the crystal frequency slightly and at 2.5 mc a frequency reduction of approximately 1 kc can be expected. Alternatively, solder can be rubbed into the face requiring plating. Ordinary cored solder should be used but care is required to avoid flux deposits on the crystal face.

The third method is to vaporize gold on to the surface requiring plating. This technique will of course result in perfect plating but unfortunately

TABLE OF PROGRESS

Freq. kc	Remarks
2315	Original Frequency
2316	First Check
2325	Second Check
2330	Third Check
	Crystal stopped oscillating because of grease on its faces
2354	Crystal resumed oscillating
2385	
2403	
2410	
	Crystal not oscillating because the grinding mixture contained too much paste; so faces were polished and edges were bevelled approximately .010in.
2432	Crystal resumed oscillating
2440	
2443	
2447	
	All steps here are not listed but frequency increments were about 1 kc.
2453.2	Final desired frequency

most amateurs are not likely to have access to a gold vaporizing process!

If the crystal has been coated with pencil lead, plating is inclined to be patchy and is sometimes difficult to start. A 2.5 mc 10X crystal was lowered 25 kc using this method of plating. The crystal should be held in a crocodile clip, around which, the plating will concentrate.

The solder coated-crystal plated evenly over its surface and the thickness was uniform, but the plating process persisted in ceasing after about 30 seconds. This resulted in very thin plating and was certainly not more than .0002in.

Testing Crystals

A simple harmonic oscillator is invaluable for checking crystals, and Fig. 2 shows a suitable circuit covering 3 to 30 mc. The output from this oscillator is very strong and any crystal will function in the range 1 to 30 mc. The range could be extended to cover lower frequencies if desired. A 3.5 mc crystal will provide very powerful band edge markers on all amateur bands from 80 metres to 10 metres, and possibly further. Figs. 3, 4 and 5 show various methods of checking the frequency of a crystal. The oscilloscope used in Fig. 3 can be replaced by a vacuum-tube voltmeter; in either case, when the frequency meter is tuned to the crystal frequency the VTVM reading will increase or the oscilloscope trace will broaden.

Fig. 4 shows the harmonic oscillator in use, and with this arrangement, the frequency meter is tuned to zero beat with the crystal and the frequency read off in the normal way.

Fig. 5 is similar to Fig. 4 except that the station receiver is used to determine zero beat. The crystal frequency could be read from the Rx dial but this will be inaccurate and the frequency meter must be consulted.

Repairing Damaged Crystals

The writer, unfortunately, damaged his 453 kc FT-241A carrier crystal. The accident resulted in one of the fine wires becoming parted from the crystal face. However, a crystal damaged in this way can be persuaded to function again, as follows:

Remove the fine wire which was attached to the crystal face, using an *Antex* or similar soldering iron with the $\frac{1}{16}$ in. bit. Then wrap a piece of 5 amp. fuse wire around the main crystal support wire. (Do not solder in position yet.) Trim the length of fuse wire between the crystal face and main support wire to approximately $\frac{1}{16}$ in. Now comes the tricky part of the operation: The end of the fuse wire must be bent back so that it remains in contact with the solder blob in the centre of the crystal. When this is achieved, the soldering iron should be held in a vice and the main crystal support wire, where the fuse wire is attached, lightly touched on the $\frac{1}{16}$ in. bit. Heat will be conducted along the fuse wire and after approximately five seconds the wire will be permanently attached to the crystal face, and the heat source is then removed. The fuse wire can now be soldered to the main support wire—and, if all is

well, the crystal will oscillate normally again.

Conclusion

These notes have been presented in the hope that amateurs can utilise the large range of surplus crystals more efficiently. A point worth remembering is that while modern evacuated quartz crystals may be superior to the surplus types, in 90 per cent of cases for amateur work a surplus crystal is adequate. So start using the rocks in your junk box and have fun!

References

- Short Wave Magazine*, December 1962, June 1963.
- Single Sideband for the Radio Amateur*, ARRL.
- New Sideband Handbook*, Stoner, W6TNS.
- Short Wave Wireless Communication*, Ladner & Stoner.
- The Amateur Radio Handbook*.

MORE ABOUT MARITIME MOBILE LICENSING

Further to the note on p.43 of the March issue of *SHORT WAVE MAGAZINE*, the Post Office ask us to make it clear that /MM permits are now available to British amateurs who have passed the R.A.E. and the Morse Test, irrespective of whether a U.K. station licence has already been issued to them. The bands open are 7-14-21-28 mc, two metres and certain UHF bands. There are various requirements to be met in the way of permissions and inspections, and in the case of /MM licences the issue fee is £6. All is explained on the appropriate form, available on request to: Radio Services Dept., Radio Branch, Hq. Building, General Post Office, St. Martins-le-Grand, London, E.C.1.



"... H'mm—I make it 9.999 watts ..."

COMMUNICATION and DX NEWS

L. H. Thomas (G6QB)

ANOTHER interesting month, with conditions variable, but good on the whole. Even a word or two from *Ten metres*, on which the East Coast W's burst through with full force one weekend, although the band soon reverted to normal. *Fifteen* was wide open for more than half the time, even to the West Coast of U.S.A. *Twenty* was always lively for DX of all kinds—and sometimes for sixteen hours out of the twenty-four.

Forty produced better DX in the early mornings than in the previous month; *Eighty* gave the CW toilers at the LF end a few nice surprises, and the "sewing-circle" up the other end managed to net quite a lot of DX.

Finally, *One-Sixty* awarded its ultimate accolade to the chosen few, in the shape of contacts with ZL3RB, as was hoped for when his regular sked was announced last month. For them, it seems, there is little more to conquer.

Future prospects? Well, good, of course, for those who have learnt to live with the eternal QRM and to realise that it's never going to be less—always more. The sunspot number continues to climb. Smoothed figures of 28, 30 and 32 are predicted for May, June and July.

At this point we might comment on a letter from D. Gardiner (Harrow), who has kindly extracted some information from the well-known work *Short Wave Radio and the Ionosphere*, by the late T. W. Bennington. He points out that the running average maximum for 1947 (over which we enthused last month) was only 150—not very much higher than the 140 predicted for 1968. The 1937 peak was only 115, but the F-layer critical frequency for the two years was almost identical.

SWL Gardiner says that the 1947 and 1958 peaks were both "before his time," but stories and rumours about 10-metre conditions have fascinated him so much

that most of his listening is done on that band, on which he logged 78 countries during the last year. So don't scrap any of that 10-metre gear on the strength of gloomy predictions! It's the state of the F-layer that matters, whatever the actual sunspot number may be.

The Windbags

We have been accused of making too many references to the long-winded procedure prevalent on the bands. One reader, in fact, says "You're a bit of a windbag yourself on this subject." Unabashed, we continue, but mostly on the strength of a letter from another reader, who says "Keep my call out of this, or some of my regular friendly contacts will be ruined for ever."

He has a theory, and it seems a very sensible one. Thuswise he speaketh: "Hasn't it occurred to you that a large proportion of

people who take up Amateur Radio do so because they *like* the idea of spouting into a mike? In fact you could justly say that for a few of them that is the *only* reason. It is a hobby based on communication, and, by golly, they mean to communicate and nobody's going to stop them.

"Having once tasted blood and found that, mike in hand, they can (they think) command the attention of all others on the frequency, they really go to town. Eventually they find that they can practise a kind of one-upmanship by using more words and longer words than the others. So when 'A' tells 'B' that he has a bit of QSB, in comes 'C' and says 'Yes, your signals are certainly showing a tendency to go into a fade, but this only occurs intermittently and most of the time they are free from any kind of variation.' And so on. The seed has now been sown, and the mythical 'C' becomes a com-



Station of Mike Eccles, G3PPE, 185 Mosslands Drive, Wallasey, Cheshire, where the main interest is CW working on the 160-metre band. In fact, all the gear in view is for Top Band and, with the exception of the modified Command Rx, is home-constructed. The transmitter runs 10w. to a 6V6 PA and the aerial is a 200ft. inverted-L at about 38ft. To date, 17 countries have been worked on 160m., with a heard-report from 9M4 as the best DX so far. More than 80 British counties have also been booked in. Under construction at the moment is a transistorised 160-metre Sideband transmitter for use during the summer months.

pletely different person when he goes on the air. Normal enough when met face to face, on the air he will eventually become a home-brewed pundit, prepared to air his long-winded but not very valuable opinions on any subject under the sun. And you can always count on him to natter non-stop for ten minutes, even on SSB with a push-to-talk switch in his hand. Some of my best friends are like this, hence what they would probably call 'My request for anonymity.' So far I *think* I've resisted it, but you can never tell how you really sound to others."

By the way, the operator who wrote these words is well known to your conductor, both in person and on the air, and we are pleased to state that he has *not* been infected, and that he sounds as natural and un pompous on the bands as he does off them.

One more word concerned with this same subject, from G3LCZ, who works mobile only. "I was standing outside my garage, having just put the 80-metre coil on my antenna, and listening to a net. Of course no call signs were given; another station joined in (again no call sign) and there was the usual highly technical (?) discussion with lots of advice being freely given. So just for fun I threw my call sign in. I was greeted with some disbelief because I was apparently putting a pretty strong signal down, and the chief pundit who was giving all the advice told me I had very bad frequency modulation (SSB, of course). When I told him that he was 5 and 9, with a 5 and 7 signal on the other sideband I was thereafter ignored . . . There's more tripe on Eighty than in a Northern butcher's shop!"

The DX Nets

While on the subject of Eighty we may as well deal with opinions on the DX net that inhabits the 3800 kc region most nights. Previous comments from readers have all been "anti," but this month there is one reasoned reply in favour.

It is from G3PQF (Farnborough), who points out that the space occupied is about 3 kc, and inside the band, despite a number

of high-powered DL's who operate on the band-edge and above; that "mutual protection" from RTTY, service stations and AM stations is one of the objects; and that DX can still be found and worked solo on other spots "after the Old Timers and Committee Nets have closed down."

G3PQF goes on to say that misguided wrath against the DX net might well be turned on worthier

targets, such as those who tune up on top of QSO's; pre-arranged skeds with DX stations, after which both parties close down, leaving the frequency a mess of Europeans trying to raise the DX station who is QRT; the strange types who follow stations around the band and deliberately blot out the DX; the "old gentlemen with two-letter calls" who inform one that it's no good calling DX, it's

FIVE-BAND DX TABLE

(All Time)						
Station	All-Band Total	28 mc	21 mc	14 mc	7 mc	3.5 mc
G2DC	328	170	291	316	169	112
G1IVJ	325	181	263	319	103	83
G3NOF	284	132	193	267	33	39
G3KMQ	237	10	99	212	101	55
G3UML	206	32	95	195	42	33
G3IGW	194	123	129	155	112	70
G3LZQ	178	53	114	127	54	26
VP8HJ	174	6	56	169	25	11
G8DI	156	67	90	135	74	42
G3UDR	146	4	116	74	28	37
G3RJB	120	11	26	113	50	2
GM3RFR	111	7	53	94	37	15
G3UBI	103	10	22	79	10	42
G3IDG	101	60	70	54	27	18
G3PQF	83	8	25	39	56	44
(New Cycle)						
Starting Date: January 1, 1966						
Station	All-Band Total	28 mc	21 mc	14 mc	7 mc	3.5 mc
G3UML	91	2	27	81	11	20
G3NMH	83	11	28	69	0	0
G3LZQ	69	0	5	59	10	13
G3UDR	55	1	14	35	2	15
G3UBI	49	2	10	26	5	25
G3IGW	43	0	17	10	8	20
G3PQF	26	1	3	1	9	18
G1GTR	15	1	3	10	6	7



Now back from leave, MP4TBM — J. N. Dunn, International Aeradio, Ltd., P.O. Box 8, Sharjah, Gulf of Arabia — is operating regularly on 20-metre SSB, and looking for U.K. contacts. In fact, Nigel says he would be delighted to arrange skeds with G stations; he can come on nearly every day and runs 1 kW p.e.p. MP4TBM is also on 80m. occasionally and later in the year hopes to be in Doha, Qatar, under callsign MP4QBQ.

too early—meanwhile blotting out the DX that one is trying to copy.

Meanwhile there are plenty who agree with G3UDR's statement that the nets are a menace, and their point of view is put up by G3UBI, whose interest in the band has been killed. He tried the technique of "If you can't beat 'em, join 'em," and, in return, got a 30-second QSO with an exchange of name and RST, and that was all. "Was that a true QSO?" he asks.

Ah well—everyone to his taste. If you don't like the DX-net business, ignore them. But it seems to us that if all the high-powered stations forming such a net were to spread out and do their hunting independently, the QRM situation would be worse, not better.

Around the Bands

A very brief survey of the bands in general, has already been made

but there are many more letters this month from readers who have spread their activities over four or more bands, so we shall have to dissect them and try to sort out a picture of each. Starting, then, with:

Ten Metres: March 13 was the big day, according to G3UML, who found *Ten* full of South Americans, Africans, FS7RT, KS4CA and a lot of W's. G3NOF reports a sudden opening to the U.S.A. on February 19, with S9 signals from W1, 2, 4, 9, VE3 and VP9 (roughly from 1700 to 1930). On March 6 he worked 9J2DT, and on the 13th he confirms G3UML's findings. But the openings are still very irregular and only those who spend a lot of time on the band are likely to strike them. This probably accounts for the small number of correspondents who mention 10 metres at all. What we need now is some people with lots of

patience, who would sooner strike a chance opening on *Ten* than just continue working routine DX on the other bands.

Fifteen Metres

If you move over from the incessant short-skip QRM on *Twenty*, you are more than likely to find 15 metres wide open these days. Instead of the odds being about 5:1 *against* the band being in good shape, they are now more like 5:1 *on*!

G2DC remarks that VK, VS6, 9M2 and the like have been coming through quite early (around 0730), and conditions follow the normal trend with Africans available all the time, and all W districts in by 1730-1800z. In the ARRL test he worked all W districts, and all VE except VE8 with a "limping" valve in the PA, so he thinks the band should give a lot of real

DX this year.

G3LCZ/Mobile worked several W's (1445-1625); G3LZQ had one solitary SSB contact with VS9KRV (Kamaran); G3IGW worked VQ8AR on CW; GM3JDR raised UW9CC, ZB2AM on SSB and ZB2AM, 7X2AH, KV4CI and a couple of /MM's in the Arabian Sea on CW.

G3NOF confirms G2DC's comments on the band, and adds that the Caribbean area is good around 1130 before the W's start coming in. Others heard included XW8AX and 8AZ, ZD7RH, and those worked were KS4CA, MP4TBO, VS9KRV, ZD8PI and 4U1SU—all on SSB.

G3UML, in the A.R.R.L. Contest, made 200 QSO's on the band in rather less than two hours; and at other times he netted PZ1AW, VS9's, MP4TBO, 9J2VX, 9M2DQ, 9X5VF, 9Q5CZ and many W's, PY's, ZS's and the like.

Many others have dropped casual remarks to the effect that "Fifteen has been good," but haven't bothered to discuss what was worked, so it is obviously becoming a matter of routine once again.

Twenty Metres

The one band that doesn't seem to change a lot, except seasonally, is *Twenty*; but the constant increase in occupancy has now made DX-chasing on this band almost like it was on 40 metres a few years back. The DX is there all the time, broadly speaking, but there's more and more dirt to sift through before you find it. This applies even more to the CW part than the rest of it, and there's no doubt that SSB DX'ing is now easier than the CW variety (*see* later paragraph).

G3NOF found Oceania and Asia good *via* the long path around 0800z switching to short path later. There were also good

openings to KH6 and KL7 by 1800. His best of the month were CR6's, FS7RT, HM9AB, KG6APD and 6IG (Iwo-Jima), UA1KED (Franz Josef) and ØYE (Tannu Tuva), VK9DR, VP2AA, 2DAG and 5RB, VS9KRV, ZD5D and 8RD, ZF1BP and 1RX. 6O1AU, 6O1AU/5R8, and 9V1ME. in the crush he missed FK8AT, FB8WW and 8ZZ.

GM3JDR worked both CW and SSB mostly on this band; the former caught UAØ's, KL7's, JA's, EP2BQ, CO's, FL8MC and 8RA, VP2MU and UM8KAA. SSB netted EL2AK, KW6EK, VK's, OA4KY, VU2CK, VS9KRV, VE8 and ZS. The best for G3UML, also on SSB, were KG6IG, 6O1AU/5R8, HS1AK, FB8XX, FP8CY, FG7XX, YS1AG, ZF1DG, VR2EK and many VK, ZL, JA, HL and 9M's, which, he says, "are as easy as working up the road in these days of DX affluence."

G3LZQ worked some KG6's and XW8BM on CW; KL7's, KR6, KS4CA, TG8CJ, FG7XL, VP7NA, FS7RT and VK's, ZL's and so on on SSB. A11, by the way, with a ground-plane.

G2DC thought the band still a little below par in the early mornings, but found the Far East good after midday. 9V1MT and XW8BM were both consistent and easy to work, and W6 and 7 were "sitting ducks."

The only cloud on the horizon, in fact, is that almost any DX contact is liable to be flattened by (say) a UB5 and an LZ, both RST 597, each urgently praying the other to "Pse QSL." It happened to your commentator at least ten times in a week.

Forty Metres

In fact, it's much easier to brave the perils of Forty now that Twenty is so much a place of short skip. The pleasure of pulling some DX out of the hat is much greater on an unlikely band—not that 40 metres is "unlikely" these days, for it seems to carry some sort of DX at all hours of day and night.

G3SYC (Normanton), having started up on 80m. CW and worked 42 countries thereon during his first year on the air, turned to Forty CW and has already totalled 66 countries in

11 months. (On 100 per cent home-brew gear, including receiver, and 60 watts input). He finds QSL returns very poor, though, and can't even claim his WAC, having no cards from Africa or Australia!

G2DC is glad to welcome the VK's back in the early mornings, and recently had a long chat with VK2EO, not signing off until 0845, when they were both still 569. During the ARRL Contest he worked all W districts, but mostly before midnight, after which they were far more difficult. Also raised during the late evenings were ZD8, ZD7 and 5N2.

G3IGW reports one QSO—with ZD8AR on CW. G3UML represents the SSB fraternity on Forty, of whom we don't usually hear very much. He raised "numerous American," PY1TX and ZB2AJ, as well as some East Coast W's on CW.

Eighty Metres

Apart from the DX SSB Net, already referred to in slightly pained accents, but not heard from in person, we have quite a few successful 'chasers on this band. G3UJE (Orpington), running 120 watts to a modest piece of wire only 20ft. high, worked CW with VP2MU, H18XAL, 4X4DC, UJ8AC (0005), KZ5JF (0625), ZL4IE, CO2BO, ZP9AY, 7X2AH and VS9KRV (Kamaran). Heard, but not worked, were ZD8J (0100), YK2AA (2200), FG7XX (2330), TA2AM, TF3ST, CN8CY, 9Q5RD and VK2AP (both 2300).

G3UML, on SSB, raised VS9KRV, OHØNI, LX2UW, ZS1B/MM, CN8AW, 9H1AB, ZB2AJ and many VE's and W's, including W5KFD. G3IGW, on CW, reports working VK2AP, UJ8AD and ZD7IP.

G2DC unfortunately lost his 45ft. loaded vertical, but put his temporary 160-metre half-wave into use, and was pleased to find it putting a potent signal into ZL (it runs North/South, by the way). He also worked all W districts except the 7th on it. (Maybe wires will come back into fashion down Ringwood way?).

And So to Top Band

Of course the big subject on One-Sixty is the fact that con-

TOP BAND LADDER

(G3T-- and G3U-- stations only)

Starting Date, January 1, 1965

Station	Counties	Countries
G3UBW	55	13
G3TXZ	53	11

tacts with ZL are occurring once more. ZL3RB has been strictly adhering to his sked (as mentioned last month) and has worked, to our knowledge, G3RFS, 3RPB and 3SED, and maybe quite a few more.

G3RFS runs an aerial which starts off with 58ft. of vertical, and the capacity hat (if you can call it that) is a further 80ft. of horizontal. With this are 14 radials of various lengths from 50 to 250ft. This useful radiator got him not only into ZL, but accounted for 5N2AAF, 6Y5XG, KV4CI, ZB2AM, 9L1HX and 9V1LP, to say nothing of 52 different W/VE stations. Heard, but not worked, were HK4EB, ZD7IP and 7RH, and HI8XAL. G3RFS is now up among the top DX'ers on the band, having worked 29 countries.

G3SED has an 80ft. vertical and half a square mile of "earth mat" which he says was already laid down when he got there. It includes a selection of copper sheeting, spikes, copper gauze, aluminium and other oddments of metal at various depths below ground. He, too, worked ZL3RB and says that on March 9, just before he wrote, the ZL was peaking at 56/79, so he thinks many others will have worked him before now.

G3IGW found conditions to North America rather disappointing, after their good start. But he was consoled by QSO's with 5N2AAF, ZD7RH and EP2BK/MM (Persian Gulf), plus 18 countries, mainly in Europe, during the CQ Contest.

6Y5FH reports hearing DL1FF, DL9KRA, OK1ADM, OK1AEG, G3RPB, G3RAU, G3PQA and G3TLY, but he can't raise them, and even reception is difficult because of QRM. Other interesting (non-European) stations logged include VP7NY, HK4EB, YV9AA, CX3BH, KZ5TW, HI8XAL and many W's and VE's. 6Y5FH has now moved up from 1805-10 kc to a new frequency around 1820 kc, but we doubt whether that will improve his chances of being heard in Europe—out of the frying-pan of W QRM into the fire of European ditto!

G3PLQ had a fine time up and down the East Coast of U.S.A., which included many personal

QSO's with the Top Band gang. No Europeans were heard during this time, but after leaving Halifax, N.S., for Dakar, they began to reach him once again. On many occasions he logged G's working each other as early as 2000 GMT, but the same old handful of G's had outstanding signals, most of the new ones heard being around 339 compared with 579's of the big boys.

Once more off the African coast, John was hearing many more G's, together with such exotics as ZB2AM, ZD7IP and the 9L1's. And he reports that ZD9BE has been trying his luck on the 160m. band, but with no results as yet.

GW3TLW reports very good results with the 6BW6 transmitter (as described by G3RBH in the January, 1964, issue of *SHORT WAVE MAGAZINE*), but asks where all the GM's have disappeared to. They may be getting into Southern England all right, but don't seem to penetrate into Wales!

Grafton Radio Society asks us to make it clear that the Phone Section of their Top Band Contest is on April 2 from 2130 to midnight GMT; and that logs, with the usual signed declaration, must reach G2CJN (QTHR) not later than April 12.

General Chat

G3LCZ/M reports one of the "happenings" which liven up our existence on the bands from time to time. He was working VE3CYL on 14 mc Phone, when the VE told him that OZ1BC was breaking in. The same OZ1BC was an old personal friend, but inaudible to G3LCZ/M because of skip. So he had to renew his acquaintance over the "long path" via Toronto!

VS9ABL (G3TXH) has ideas of operating from the Sheikdom of Mukulla, which is "only 500 miles away," but only if it's likely to be credited as a "new one." We can't answer for this, but we do imagine that the DX'ers would soon be swarming around—just in case.

G3UML thinks G3LIQ missed the point concerning the "Grandad's Band" jibes about One-Sixty. They are not aimed at the minority who chase DX (and make some of the Herculean

TOP BAND COUNTRIES LADDER

Station	Confirmed	Worked
<i>Phone and CW</i>		
G2CUZ	98	98
G2NJ	98	98
GM3KLA	98	98
GM3IKD	98	98
G3PLQ	92	95
G3SED	82	92
G3NTI	80	81
G3SWH	70	80
G3PPE	67	80
GW3PMR	66	75
G3UBW	61	78
G3SVW	57	75
G3IDG	55	59
GW3TLW	55	70
G3SHY	53	71
G3TSS	43	53
G3KPT	41	70
G3UVR	42	63
G3SQX	34	64
<i>Phone only</i>		
G2NJ	61	61
G3PLQ	55	58
G3MDW	44	64
G3RTU	35	37

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

efforts described by G3LIQ!) but at the Sunday-morning waffling brigade, which seems to contain more teen-agers than Grandads anyway. And he asks whether G3LIQ, working that W1 for the umpteenth time, spares a thought for those around the frequency who are trying to raise a W for the first time.

Don Wallace (W6AM of the fabulous rhombics, of course) now checks in the DXCC lists with 342 worked, 338 of them on Phone . . . and even with that score he's not at the head of the list!

G3RNX (Chesterfield) has a grouse: While working mobile on the HF bands he has had several DX contacts wrecked by other G stations calling in and proceeding to take over the QSO. When this happens, he now pulls out immediately, because "it is rather tempting to say something one

might regret." He appeals for better manners, and says "By all means, let the other station know you are standing by, but do wait until the QSO is finished unless specifically requested to join in." (As we see it, the position nowadays is that many QSO's do not "finish." Two or more of the stations in a net may keep the net alive after others have pulled out, and the QSO just goes on, maybe for hours. There are always breakers, and if they are given the slightest encouragement they will join in. A polite hint like "No breakers, please, for a few minutes" will keep all but the worst-mannered types quiet . . . and, of course, there's no obligation on any two stations in QSO to let anyone else in.)

Lip-Artists and Brass-Pounders

No, this is not a move to drag out the weary old CW/Phone controversy; long ago we agreed to let the warring clans battle it out among themselves without wasting valuable space. This is to give an airing to GW3AHN's view that it is now easier to work DX on Phone than on CW. He suggests that probably many of the Phone men have better aerial systems than the CW enthusiasts, though why this should be we can't quite see.

Maybe the more relevant fact is that more of the Phone people have commercial gear—is this a fair assumption? It might well be, because, after all, you can't buy a CW transmitter (or can you? we don't know of one), and if you have spent £200 on a set-up which makes SSB operation possible, you have to be a pretty rabid CW fan if you don't use the microphone most of the time.

The relatively small proportion of CW men who are among the top DX'ers are obviously using very efficient aerial systems, whether their rigs are commercial or home-brew; those among them who have SSB gear are doubtless using it on that mode as well, and they are probably very highly-placed Phone DX'ers too.

Quoting our statement that "If all the CW men were to change their spots and use Phone . . . etc." GW3AHN suggests that if all the Phone operators were to

change to CW, that would also cause a shock, since many of them are highly-efficient CW operators!

But he adds a comment that is, unfortunately, all too true: "To hear two efficient CW operators 'conversing' is a joy to listen to, but so much of it is poor in the extreme, and it often amazes me that operators I have known for the last 20 years or so have not improved one iota over the period."

So we'll let it rest once more . . . but what do readers think? Is it really easier to pull in the DX on SSB than on CW? And, if so, why? Could the fantastic number of European CW stations, most of whom sound like novices, be the main reason? And are their numbers due to the fact that they have found that their usual primitive forms of AM Phone are simply no good nowadays, while the complexity and expense of SSB keeps them away from that mode? Worth a thought, anyway . . . but it is a fact that you will find a howling pack of European CW stations chasing a solitary VK or ZL who shows up, whereas you can go up into the SSB band and work one with comparative ease.

QRM and Contests

G3IDG brings up an aspect of contests which hadn't really occurred to us. There are many, he says, like himself, who go on "just to give the boys a point," but find, when the results are published, that "the boys," like himself, haven't entered anyway! This adds up to a waste of time and an unnecessary cluttering of the bands.

One feels that there must be a high proportion of people who show up during a contest simply because they like a number of short-snappy contacts with all parts of the world (if they're lucky) to show how the rig is performing. Among them are

many who find the average ten-minute QSO a bore, because it yields nothing except an exchange of RST, QTH, name and the inevitable "Pse QSL" and a good-bye that adds at least another two minutes. (Remember the six-year-old quoted here years ago as asking "Daddy why do you always take so long saying good-bye?" Out of the mouths of . . .)

G3IDG, on another subject, suggests that Awards and the like might be organised on a military basis, so that someone working his 200th country could call himself "Fred Drip, DXCC and Bar." WPX with Oak Leaves, Swords and Diamonds . . . and we might add (on our own account) WAZ with Purple Hearts. These high awards, says G3IDG, would be worn on all ceremonial occasions, such as Exhibitions, Mobile Rallies and the like.

Geoff Watts, organiser of the Islands-on-the-Air Award (to return to serious and more worthy matter) asks us to mention that there will be a further one month's grace for getting the necessary QSL's for the 1965 award. Amateurs and SWL's anywhere in the world may enter for this—simply forward a list of the QSL's for 1965 concerning different islands worked or heard. Mark the IOTA Directory-of-Islands reference against each, and multiply the total by the number of continents. Do not send the QSL's. The attractive IOTA Award will be sent to the top-scoring amateur and SWL in each continent, who will then be asked to produce the QSL's.

Lists, by April 30, to Geoff Watts, *DX News-Sheet*, 62 Belmore Road, Norwich, Norfolk, NOR.72.T, from whom copies of the 18-page directory may be obtained (2s. or four IRC's . . . proportionately more for air mail).

Strange QSO's

A recent series of 10-metre contacts between G3OOQ/A and

Reporting the HF Bands

G3RPJ was unusual, to put it mildly. G3RPJ was in bed with flu and G300Q/A was in Stratford Hospital, incapacitated after an operation. The hospital bed proved a successful aerial, resonated via a croc. clip and a 50 μF capacitor. Full co-operation was provided by Matron, and much interest by the other patients! (It also proves that you can make anything radiate—provided you can resonate it.)

Enter the G3V's

G3VAJ is the first of the new series to write in, and his life-story is practically the classical one: Enthusiasm fired by hearing a local on the broadcast receiver, about four years back . . . R.A.E. in December, 1964 . . . Morse test February 22, 1966, and ticket collected same day. Aged 18, still at school, just as your conductor was when the mystic letters "6QB" first saw the light of day (devoid of the "G," of course). G3VAJ, from Ipswich, wants to thank many local amateurs for their help before the event, and their friendly welcome afterwards—and you can't say fairer than that.

DX Shorts

Rumours that DL7FT was going to Albania this year are now off. . . . Other reports that G3NAC and an R.A.F. gang hope to operate from Rockall are on. "Some time in April or May," and the trip will probably only last for a matter of hours.

Lloyd, W6KG, and Iris, his XYL, will be in the U.K. this spring and hope to operate from GD and both the GC's (still quite rare for hundreds of W's). They will then be touring Europe. . . . Lots of W's now have their G5/3 calls under the reciprocal licensing scheme, and can be encountered on most bands. Welcome to them all!

W9WNV is carrying on with DX'ing, although all hope of his ex-partner, Chuck (K7LMU) having survived must now be abandoned. Don plans to work from Manihiki (ZK1), then Nauru, then a couple of "new ones"—probably reefs. Also hopes of Heard and/or Macquarie.

EA2CA and others may be re-



“. . . Still using the old pump-handle here, OM . . .”

activating Rio de Oro, around April 2-10 on SSB . . . Kusaie Is. (KC6FM) and Kuril Is. (UAØFC) are two new ones for the IOTA Award.

FW8RC is a new one from Wallis Is. (14246 kc SSB) . . . TG8CJ and 8FA are delighting the prefix-hunters . . . IC1KDB (Isle of Capri) is now expected in May . . . ZD7IP's frequencies (all crystal) are 1822, 3501, 7006 and 7040 kc—all CW.

Late Flashes

From Gibraltar ZB2AM reports increasing activity, with ZB2AR, 2AS, 2AT and 2AU the latest additions. ZB2AT is the first Gibralterian to pass the R.A.E., and uses the old rig of ZB2I. The local Sea Scouts are using the call ZB2SS on 160 and other bands. Mike himself wishes the Europeans would spread out more on to Fifteen and Ten—they make the abundant DX on Twenty a real ordeal!

ZB2AR/MM (ex-G3TIF) is aboard H.M.S. Puma in the South Atlantic, and will be visiting ZD7IP and ZD9BE. Meanwhile

he can be found on 14050 kc CW most evenings.

G3NMH (Swindon) reports a good session on Ten (March 13), when he worked EL2AP, CE6EZ, FS7RT, KS4CA, KP4CKU, ZE, PY and some W's. He also heard YV5BPJ, HR1JMF, LU1DTJ and OA1W, all giving 599 reports to W's and VE's. On the following day he raised VP8HZ on 28600 kc SSB, and he also remarks on VP8HZ, 8IA, 8IH/MM and 8CW, all on Twenty, which also produced a good list of miscellaneous DX.

Sign-Off

The "New Cycle" Five-Band Table is going very well, but no takers have been received for the G3T - /G3U - - Top Band Ladder, apart from the original two who initiated it last month. If no more entries arrive, this will have to be allowed to die from lack of interest. Deadline for next issue is first post on April 18. Address everything to "Communication and DX News," SHORT WAVE MAGAZINE, Buckingham, England. Good Hunting, 73 and—BCNU.

VHF BANDS

A. J. DEVON

THERE have been one or two nice uplifts in conditions during the period, first in the early part of March and then again just as this was being got ready for the printer—when the glass went almost abnormally high, and anti-cyclones developed over the U.K. and Northern Europe. The latter condition was well shown by the sky and the weather charts, as well as the barometer, from about the middle of the week ending March 20. This later opening came too close to the deadline for it to be fully covered here.

However, during the earlier part of the month, Northern Europe was workable from the Midlands south, and for G3LTF (Galleywood, nr. Chelmsford) it brought in some distant DL's, as well as many stations heard and worked in DJ/DL, F, ON and PA; Peter also mentions two useful beacons—DLØAR on 144.00 mc and DLØRG, 144.007 mc.

Latest news on the *ARTOB* balloon—see this space last time out—is that there are to be tests every Sunday at 1030z and on Tuesdays at 1700z. Presumably, these flights will be from Aachen and the balloon will only go up if there is to be an easterly drift. In spite of what was said here about its potential usefulness for U.K. operators, it is worth watching for—but remember that it receives on 144.08-144.12 mc and retransmits over 145.88-145.92 mc. In fact, for anyone wishing to use the device correctly on the transmitting side, the segments are 144.08-144.10, CW only; 144.100-144.115, SSB and CW; and 144.115-144.122 mc for DX stations ("over 600 km. from the launch point").

Conventions

Following the London VHF Convention on April 2 (which is "tomorrow," for those who get their copies on time), there is the GM event on Saturday, April 30, at the Mill Hotel, Rutherglen, Lanarkshire, for which the booking fee is 27s. 6d. inclusive, with the arrangements in the hands of

GM3PMB and GM6ZV, both *QTHR*. They are hoping for good support from the South, with the opportunity of meeting many GM's.

Then there is the newly-conceived and launched Midlands VHF Convention and Dinner, on Saturday, May 14, at the Park Hall Hotel, Goldthorn Park, Wolverhampton, with Tom Douglas, G3BA, in the chair for the dinner, and F. T. Smith, G6FK (*QTHR*) in charge of the arrangements—which are to include talk-in on 2m. and 4m.; presentations by G3KMT and G3LLJ on the applications of commercial measuring equipment; lectures on Varactors (G8AKM), RF Cables (G2JT), and on Colour TV; a commercial equipment display; tape-record playings of outstanding happenings in the VHF/UHF world, presented by G3JZG and G3KFD; an exhibition of VHF station equipment, for which prizes are to be awarded, and for which entries are invited (form from G6FK); an on-the-air A/TV station, by the Slade Radio Society; and a raffle to be conducted by G8KL. The inclusive charge is 30s., with the opening at 1.0 p.m. and the dinner timed for 7.0 p.m. This sounds to be a pretty ambitious programme, and should be of great interest to those able to be in Wolverhampton on May 14.

Notes and News

OK1DE writes from Prague to say that he is now at 21C in Countries, the point of particular interest about his claim being that all 21 were worked by tropo. during the openings of last autumn, when he had contacts with UB, UP, UQ and UR. European activity on VHF is now very high, and all countries within EDX range by any propagation mode are represented by efficient and well-operated stations, always on the watch for the right conditions to develop.

Starting right away, EI2W (Sandyford, 6m. south of Dublin) will be on 432.3 mc regularly, and every evening 1800-2000z when conditions are good, using a 96-element beam and a PA running 20w. This mighty aerial array is made up of four 24-

element sections and, as the QTH is 1,000ft. a.s.l. and nicely in the clear, Harry should be a pretty potent signal on the 70-centimetre band. He already holds five 430 mc "Firsts" for EI, and his two-metre record of "Firsts" includes 12 countries in his 15 years on that band, from April, 1951. He also has ten other EI "Firsts," covering the 50 mc and 70 mc bands. Harry is not idle on VHF, and has a wonderful record of achievement—all on Phone, too!

A call likely to be heard out-and-about during the coming /P./M season is GW3ITZ, of the R.A.F. Sealand Amateur Radio Club; they plan participation in all contest events on the four VHF bands from 4m. to 23 cm., for which they have marked down a site 1,500ft. a.s.l. near Wrexham in North Wales.

Talking of 23 cm., G3LTF reports a good 35-mile contact

TWO METRES

COUNTRIES WORKED SINCE

SEPTEMBER 1, 1965

Starting Figure, 14

From Home QTH only

Worked	Station
52	G3DY (215)
51	G3TLB
44	G3HRH
40	G3TQZ
39	G3UFA
36	G2AXI, G3FIJ (98)
35	G3UFQ
33	G3FNM (65)
32	G3IOE
31	G3AHB
30	G5UM
23	G3KQF
19	G2CDX, GW3CBY
18	G3THC
17	G3BNL

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

FOUR METRES

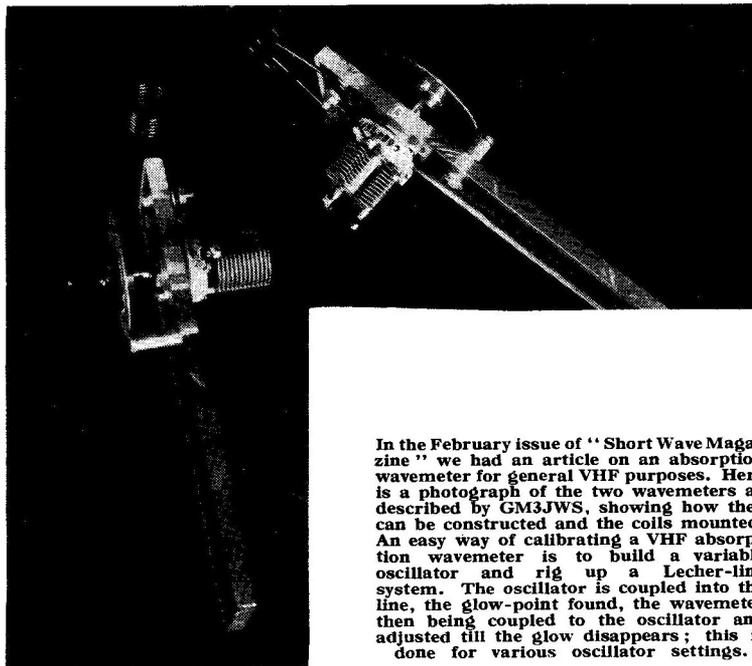
ALL-TIME COUNTIES WORKED
LIST

Starting Figure, 8

From Home QTH Only

Worked	Station
56	G3EHY
52	G3IUD
50	EI2W, G3OHH (284)
49	G3SKR (430)
42	G3MOT
41	G3OWA (444)
40	G2OI
39	G3PJK
38	G3JHM/A
35	G3BOC
34	G5FK (300)
33	G2BJY, G5JU
32	G3NUE
31	G3PPG, G3PMJ
30	G3BNL, GM3EGW
29	G3AYT
28	G3OJE
27	G3RDQ
26	G3LAS, G3LQR, G3LZN, G3HXV
25	G3FIJ, G3HRH
24	G2AXI
22	G3HWR (245), GC3OBM
20	G3EKP, G5UM (190)
17	G5CP
16	G3BJR, G3FDW
15	G3TOT
14	G3OKJ
12	G3TKQ, G5DS
11	G3LHA, G3PRQ, G3SNA, G3UYB
10	G2BDX, G3ICO
9	G2DHV
8	G3NNO, G8VN

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



In the February issue of "Short Wave Magazine" we had an article on an absorption wavemeter for general VHF purposes. Here is a photograph of the two wavemeters as described by GM3JWS, showing how they can be constructed and the coils mounted. An easy way of calibrating a VHF absorption wavemeter is to build a variable oscillator and rig up a Lecher-line system. The oscillator is coupled into the line, the glow-point found, the wavemeter then being coupled to the oscillator and adjusted till the glow disappears; this is done for various oscillator settings.

with G8AEJ, with R5 signals both ways. Peter's 23 cm. Tx gives 35w. output (from a 2C39A) into a 30in. diameter dish at a height of 50ft. For this band, he also has a parametric amplifier showing a noise-factor of about 4 dB.

G3NNW (Rochdale) writes that he has "now gone completely VHF," the inspiration coming from a friend with a G8/3 call. His Rx for two metres takes a pair of A.2521's, and the Tx under construction will have a 6146 in the PA and should be on the air by about June. On 70 cm. he is already radiating QRP, about 2w. from an A.2521 into a slot-fed 8/8 at 20ft., and a fully-transistorised converter is under construction, together with a rather more hefty Tx arrangement taking a DET-24 in the PA; this will be on 433-664 mc (checked by a 500 mc electronic counter!). Other projects include getting the antennae up higher and fitting the mast with rotary control.

G13HXV (Belfast), who sticks so faithfully to 4m., goes up another two in the All-Time for that band, having had contacts with GM3HLQ for Lanarks. and EI7AF in Co. Louth.

There is greatly increased

activity on four metres, partly due to the release of another lot of (ex-BBC type) gear which can easily be modified for 70 mc. At the moment of writing, we have not got full details of what this apparatus is, nor where you can get it—but if you are interested in the 70 mc band, keep an eye on the advertising. And, incidentally, don't forget the 4-metre Set Listening Period, on Easter Sunday, 10th, during the periods 1000-1300z, and 1500-1900z. We look forward to seeing a good batch of logs for this. Though intended primarily for the interest of our VHF/SWL's, entries will be welcome from any quarter. (What we want to find out is how the 4-metre activity goes in different parts of the country.) Notice some of the totals in the current All-Time, with G3OWA showing no less than 444 different stations now worked from Coulsdon, Surrey.

G3PPG, of the BBC (Evesham) Radio Group, is regularly on the 4-metre air, running 50w. with a four-ele Yagi at 234ft. a.s.l. and a good take-off in all directions except the North; and from that direction they would welcome skeds (write G3PPG or G3DEF,

QTHR).

G3KMI (Southampton Univ. Club) can get up one of the University towers, giving them a take-off from 140ft. above ground. Using this enviable facility for both 70 and 144 mc, and with five operators available, they have been doing very well on both bands. For 4m., the gear is a much-modified B.44 with 20-watt PA, into a 3/3 Yagi. On two metres, an E88CC converter feeds into an Eddystone 680X tuning 2-4 mc, the Tx runs 25w. in the

PA, and the aerial is an 8/8 slotted J-Beam. One of their two-metre QSO's was with G5AAY/W1MEM—who we welcome to VHF in the U.K.

For EI6AS (Dublin) conditions have been poor and activity low—however, he would welcome skeds with the G-fraternity any evening after 8.0 p.m. and all day at weekends, on any of the three VHF bands, for which his frequencies are 70-227 mc., 145-854 mc and 432.5 mc.

G3EDD (Cambridge) remarks

that "conditions on two metres have been slightly up, but nothing desperate." The G3PYE group provided most of the gear for the GD6UW expedition, on which we hope to have notes for a future issue. Incidentally, Brian is now out of his 4-metre doldrums—he has pushed the beam up far enough to look over the lip of his saucer.

The latest report from G5UM (Knebworth, Herts.) shows that he has now worked the astonishing total of 1,307 different stations all-time on two metres. He also shows healthy totals for 4m. (190S) and 70 cm. (158S). G3UFQ (Sutton Coldfield) can claim four more counties for the Annual, and G3AHB (Slough) five more, including GW3RUF/P when this well-known Birmingham group came on from Monmouthshire. G3UFA (Digswell, Herts.) also moves up in the listings.

We show as many of the Tables as there is space for this time, with about 40 movements recorded (several correspondents make claims only, with no comment about their activity or equipment). One reader takes us up on what he calls the logic of the multiplier system now running (but only till the end of May); the brief answer is that anyone with long VHF experience will know that it is about three times as difficult to produce comparable results on 70 centimetres as it is on two metres, and that since 4 metres has until lately been a much less-populated band than two metres, a temporary loading of x2 for 70 mc was justified. The two-metre loading can be adjusted on some future occasion, remembering that it is on two metres that most VHF operators start and many remain.

Dead Line

Which brings it to an end for this time. For our next showing, on May 6, the closing date for this piece is **Friday, April 22**—by which time quite a lot can have happened. Look both ways and tread warily over Easter, keep on the air instead of on the roads, and send all your results, claims, news and views to: A. J. Devon, SHORT WAVE MAGAZINE, BUCKINGHAM. 73 de A.J.D.

THREE-BAND ANNUAL VHF TABLE
September 1965 to August 1966

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL pts.
	Counties	Countries	Counties	Countries	Counties	Countries	
G3EDD*	29	3	51	18	16	4	193
G3LAS*	21	1	41	10	17	3	155
G3AHB*	6	1	39	11	20	3	133
G5UM*	15	2	30	7	16	2	125
G3HRH	23	2	44	12	14	2	98
G3FIJ	18	2	36	12	19	4	91
EI6AS*	12	5	29	7	4	3	91
G3OWA	24	3	36	7	14	1	85
G3RST	8	1	49	17	—	—	75
G3TLB	8	1	51	13	—	—	73
G2AXI	14	2	36	10	7	1	70
G2CIW	—	—	14	9	32	6	61
G3UFA	8	1	39	10	—	—	58
G3KMI*	15	1	18	4	—	—	54
G3KQF	—	—	23	7	21	2	53
G3FNM	2	1	33	8	—	—	44
G5FK	20	2	7	3	10	1	43
G3UCS	—	—	34	5	—	—	39
G3UFQ	—	—	28	8	—	—	36
G3EKP	8	5	6	3	5	2	29
G3HWR	10	1	8	1	8	1	29
GW3CBY	2	2	19	4	—	—	27
G8ACB	—	—	—	—	22	4	26

Scores are since September 1st, 1965, and will accrue until August 31st this year. Position is shown by last-column total, as aggregate of all scores. Own county and country score as one each. Entries may be made for a single band, any two, or all three. From time to time, multipliers will be announced (with at least one month's notice) to give a loading in favour of some particular band. Points so earned will be taken into the aggregate and carried right through till the end of the VHF year. N.B. *Multipliers Announced:* With effect from April 1st until May 31st, all aggregate 4-metre scores can be multiplied by two and all 70-centimetre totals by three. As an example, at his present standing in the Table above, G2AXI could claim 32 points for the 4-metre column and 24 pts. on 70 cm., making (with his x 1 two-metre score of 46) a total of 102 points. New entrants on either band within the April-May period may claim multipliers accordingly.

*Indicates multipliers claimed and taken in.

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.

G3UCV, R. Cartwright, 617 York Road, Leeds 9, Yorkshire. (Tel. Leeds 21284.)

G3UNR, R. A. Calder, 14 Brackborough Road, Louth, Lincs.

G3URI, K. S. Franks, 251 Queens Road, Londonderry, Smethwick 41, Staffs.

GW3UUL, T. H. Jones, Gwen-draeth Stores, Kidwelly, Carmar.

G3UVT, R. V. Gelsthorpe, 40 Macaulay Drive, Balderton, Newark, Notts.

G3UWG, R. W. Buckley, Highfield, Beech Hall Drive, Tytherington, Macclesfield, Cheshire. (Tel. Macclesfield 5909.)

G3UXK, D. Bell, 14 Aireworth Road, Keighley, Yorkshire.

G3UYC, J. Peirson, 11 Cavendish Place, Newcastle-on-Tyne 2, Northumberland.

GM3UZB, J. Shewan, 22 Strachan Street, Arbroath, Angus.

G3VAC, C. T. Hanley 81 New Road, Chilworth, Guildford, Surrey. (Tel. Guildford 67613.)

G3VAD, R. A. Sinclair, 29 Meadowside Close, Newton Road, Birmingham 22A. (Tel. Great Barr 9271.)

G3VAJ, I. L. M. Gray, Swithlands, Falkenham, Ipswich, Suffolk. (Tel. Kirton 324.)

G3VBM, P. J. Cox (ex-MP4KAT/9K2AX), 22 Crestwood Park, Brewood, Staffs. (Tel. Brewood 420.)

G5AAD/W6DLX, F. P. La Fantasie (3A0DU/4X4VO), Parkcourt, Queen Mary's Avenue, Watford, Herts.

G5AAJ/K6GFH, Jeannette La Fantasie, Parkcourt, Queen Mary's Avenue, Watford, Herts.

G6SC, S. R. Chapple (ex-G3OSC), 7 Rutherwyke Close, Stoneleigh, Epsom, Surrey. (Re-issue.)

G8AMK, L. J. Parry, 13 Cannon Hill, Easthampstead, Bracknell, Berks.

G8AMV, A. J. Beaman, 33 Wayland Close, Harmanswater, Bracknell, Berks.

G8ANU, C. P. Howard, Heather House, Brocton Road, Milford, Stafford.

CHANGE OF ADDRESS

G2ADR, E. Parvin, M.B.A.A., A.Inst.E., M.S.E.R.T., Cherry Croft, Beechway Close, Upper Poppleton, York. (Tel. Upper Poppleton 680.)

G2AFN, G. H. Wilkins, 29 Pine Court, Cubbington Road, Lillington, Leamington Spa, Warks.

G2BQC, L. J. Coupland, 117 Burgh Road, Skegness, Lincs.

G3AQX, S. Roberts, Cottage Farm, Wessington, Derbyshire.

GM3CFS, J. M. Robson, 6-A Lochlea Road, Cumbernauld, Glasgow.

G3COY, V. J. Reynolds, 25 Yoxall Avenue, Hartshill, Stoke-on-Trent, Staffs.

G3ENB, W. E. Gates, 1 Stonecross Road, Castle Park, Whitby, Yorkshire.

GD3FBS, H. Grist, Ravenscroft, Greeba, S. Johns, I.O.M.

G3HGY, J. E. Francis, 12 Clivesway, Hinckley, Leics.

G3HMB, I. E. Elliot (ex-GM3HMB), 4 Clifton Wood, Holbrook, Ipswich, Suffolk.

G3JTO, R. F. Griffiths, 63 Fifth Cross Road, Twickenham, Middlesex.

G3KRU, H. Gates, 16 Tytherington Drive, Tytherington, Macclesfield, Cheshire.

G13KVD, D. M. Jones, 6 Mullagh Place, Limavady, Co. Derry, N. Ireland.

GW3LJN, E. A. Herbert, 124 Garth Owen, Newtown, Montgomeryshire.

G3LPS, E. Pickering, 7 Hob Green, Mellor, Blackburn, Lancs.

G3LQP, R. Brown, 56 Combe Road, Tilehurst, Reading, Berks.

G3MDD, B. S. Mudge, 20 Cripsey Road, Botley Road, Oxford.

G3MGL, A. V. H. Davis, 16 Newmarket Road, Furnace Green, Crawley, Sussex.

G3NAU, Rev. P. R. Heath, The Presbytery, 22 Cobham Road, Halesowen, Worcs. (Tel. HALesowen 1256.)

G3NML, M. E. Slater, 15 Castle Lane, Chandlers Ford, Hants.

G3NRW, A. I. H. Wade, 56 Noakes Avenue, Great Baddow, Chelmsford, Essex.

G3OCS, O. H. Kennedy, 77 Seaview Road, Brightlingsea, Colchester, Essex.

G3ODC, D. A. G. Martin, 7 Sea View Avenue, Eastham, Wirral, Cheshire.

G3ORK, R. A. Talbot, 9 Waltho Avenue, Maghull, Liverpool, Lancs. (Tel. MAG 4502.)

G3PNU, E. M. Clark, High Kiskin, Bootle, Cumberland.

G3PNQ, A. Floyd, 72 Englefield Avenue, Red Hall Estate, Connah's Quay, Flintshire.

G3POF, R. E. Whiting, Bretton, Munday Dean, Marlow, Bucks.

G3RFH, K. J. Randall, 6 Mortimer Close, Woolavington, Bridgwater, Somerset.

G3RTJ, G. R. Henderson, 64 Douglas Drive, Stevenage, Herts.

G3RWI, P. H. Cross, Glendalough, Moss Lane, Manley, Warrington, Lancs. (Tel. Manley 221.)

G3SDJ, H. A. H. Jefferies, 23 Carlton Road, Gidea Park, Essex.

G3SVF, J. W. Mitchell (ex-4S7WM/VSIGW/ZC5ML), 6 Carey Place, Longhoughton, Alnwick, Northumberland.

G3TKP, M. Evans, 116 Stockport Road, Bredbury, Stockport, Cheshire.

G3TZQ, S. G. Ridgway, 87 Greasby Road, Liscard, Wallasey, Cheshire.

G4OK, H. Bailey, 35 Chapel Street, Wath-on-Dearne, Rotherham, Yorkshire.

G6NM, E. G. Houldsworth, Riversdale, Davylands, Wilmslow, Cheshire.

G8AKM, G. B. Roper, B.Sc., 19 Normay Rise, Andover Road, Newbury, Berks.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for May Issue: April 15)

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

ACTIVITY reports are so numerous this month—no less than 75!—that the traditional "preamble" has to be brief. One subject must, however, be mentioned.

We are always being asked by club secretaries if we can help to provide, or at least put them in touch with, lecturers. Generally they add "We don't mind what the subject is."

It seems that this is a matter in which we might be able to help, provided that all those gentlemen who are prepared to give talks to clubs will notify us of the fact; and, of course, that all club secretaries who would like to be put in touch with a lecturer will do likewise.

We are willing to act as clearing-house for such a scheme, so we appeal here and now for *post-cards* (not letters, please) from possible lecturers, stating (a) their particular subjects; (b) how far afield they are prepared to travel at their own expense; and (c) how far they would go if their travelling expenses were paid by the Club concerned.

From club secretaries we also ask for *post-cards* stating (a) any particular preferences for subjects; and (b) whether they would pay reasonable travelling expenses and supply the customary hospitality to attract visiting lecturers.

The scheme is probably worth a trial, at all events, and we will report on what happens in due course. Address *post-cards* as at the head of this page, marking them "Lecturer."

ACTIVITY REPORTS

Wimbledon meet on April 1 (publication day) for a lecture by a G.P.O. representative; their May meeting will be on the 13th, with a talk by G3OLM on Quartz Crystals.

South Shields gather every Friday (7.30 p.m. at the Trinity House Social Centre, Laygate). An R.A.E. Course is running at the local Technical College, supplemented by instruction at the Friday meetings. The Club also has a constructional project on hand—a G2DAF-type converter. And they are also involved in a lot of work for the 7th Mobile Rally, fixed for July 10.

Northern Heights meet at the Sportsman Inn, Ogden, Halifax, on alternate Wednesday evenings, and their AGM will be held on April 13. On the 27th G3IKS will talk about the Design and Construction of Small Mains Transformers, and May 11 is booked for another Junk Sale.

Shefford report some interesting evenings, and

future events also promise well. During March the subjects were Command Receiver mods, Crystals and a Film Show. Weekly meetings continue, the next being on April 7. **South London Mobile Club** will be holding their AGM on April 23, 8 p.m. at Clapham Manor Baths, S.W.4. Over the Easter weekend members will be running an expedition to Wales.

Weston-super-Mare will assemble for a lecture on Hi-Fi and Stereo on April 1, and their next meeting, on May 6, will be devoted to Test Equipment. One notes that the hon. secretary here is G3GNS, who has already put in many years of work for the R.A.F. Amateur Radio Society. **Thames Valley** will hear a talk by G2ANX on Mobile Operation on April 6, and on May 4 the subject will be Nuclear Power, and the speaker Tony Taylor.

Spenn Valley hold their Annual Dinner on April 2, at the Kingsway Cafe, Dewsbury. The guest speaker will be G3CJD (of Holme Moss BBC/TV), and entries for the Swindon Cup (best-built piece of equipment) will be judged the same night. **Acton, Brentford & Chiswick** will be meeting on April 19 (66 High Road, Chiswick) for a discussion on "Transistors—Where are We Going?" Visitors will be welcomed, at 7.30 p.m.

Basildon report a successful Junk Sale at their March meeting; their next is on April 20 in the restaurant of the Van Gogh, Paycocke Road, when G3ORT will talk on SSB, with a rig working on 80 and 40 metres. Visitors welcomed, and the meeting starts at 8 p.m.

East Lancashire report the happy state of having 75 members, with new faces still appearing at each meeting. So many people turned up for the recent Junk Sale that an adjoining room had to be used for the overspill! On April 7 they will be discussing NFD arrangements, and on May 5 there will be a Film Show, with the accent on transistors. Visits have been arranged to Preston Air Traffic Control and to the

IMPORTANT NOTICE

Club secretaries and others concerned are reminded that the address for this feature is: Editorial Department, Short Wave Magazine, Buckingham, England, with the letter marked "Club Secretary." Reports must reach us by the date given at the head of the article each month, and must also include the QTH of the hon. secretary for the address panel. Some reports are still being sent to our London office, causing delay, and others do not give an address for the hon. secretary.

The first annual dinner of the Fareham Amateur Radio Club was supported by 42 members and friends, and we are informed that it was "a really wonderful evening." At 5th from the left, standing, is the president, Douglas Briggs, G2OK, with his wife, and G3ORR on her left. The youngest Fareham Club member, Alan Brains, aged 13 (right foreground) was called upon to propose the loyal toast.



R.N. W/T station at Inskip—both should be very interesting. Meetings are at 7.30 p.m. in the YMCA, Limbrick, Blackburn.

Purley report an increasing membership and a good average attendance, as a result of which they are reducing their subscription to 5s. per annum, and also providing free tea-and-cakes on future occasions. On April 15 they will welcome G3LXN, secretary of the South London Mobile Club, who will talk about Mobile Operation; on May 20 their chairman, G3GKF, will give a talk and demonstration on SSB.

Loughborough University have acquired an

NCX-5 transceiver, and hope to be on all bands using their own call G3RLC. They have also found themselves a shack, but are in difficulties about a location for the aerial. They would be glad to arrange contacts with other Universities and Colleges, and also to hear from past members of the Club.

Durham City have settled in their new Hq., at the Bay Horse Hotel, Gilesgate, where they meet on alternate Thursdays. In March they held a Top-Band CW Contest, and the Bridge Trophy was awarded to the winning team, and also a prize for the best SWL log. New members (especially SWL's) will be welcomed.

Crawley will get together on April 27 for a talk on Wired TV, by Mr. E. G. James. NFD plans are going ahead, with regular meetings of the sub-committee. **Civil Service** continue their sessions at the Science Museum with a lecture and films on The Linear Accelerator, by Mr. Atherton (Mullard) on April 5. On the 19th they will hold their AGM, followed by an informal evening.

Chiltern are due to meet on April 28, but the subject was not fixed when their secretary sent particulars. **British Legion Club**, St. Mary Street, High Wycombe, 7.30 p.m.

Chesham report a certain lack of enthusiasm, and a poor turn-out for meetings. They feel that the chief trouble is that their premises lack amenities, but a nucleus of stalwarts continue to turn up. **Bristol** will meet on April 14 for a lecture on Power Supplies (Valve and Transistor, by G3OLB). April 21 is the date for their Junk Sale, and on May 5 the subject will be "Understanding Interference," by G3OUK.

Basingstoke recently had a demonstration on receiver alignment, using a wobulator, by G8AKM. At their next meeting, on April 16, the NFD plans will be discussed, after which the G.P.O. Film "Ship to Shore" will be shown. 7 p.m. in the Immanuel Hall, Wote Street.

The **Pathfinder Radio Group** reports that their announcement in our December issue brought such an influx of new members that they have had to appoint regional secretaries for Middlesbrough and



"... Sorry, chaps, I'll have to go QRT for a while—but I'll be back shortly..."

Berkhamsted! They are seeking suitable premises at Hemel Hempstead, the central Hq. Mansfield held their AGM in March and re-elected their officials; meetings are to continue on Friday evenings (7.30) at the New Inn, Westgate, with a programme of discussions, talks and Junk Sales. Visitors and SWL's always welcome.

Harlow have their headquarters at Mark Hall Barn, First Avenue, whence they now operate under the call of their late president, G6UT, which they applied for and intend to use as a memorial to him. Stratford-upon-Avon will be holding a mobile picnic on April 23 (Shakespeare's Birthday), starting at 3 p.m. at the Wilmeccote Working Men's Club, with talk-in on Top Band and possibly Two as well. The agenda is "ragchew and disposal of junk." On April

29, G3BA will talk about "Going VHF the Modern Way"—this meeting will be at the Union Club, Chapel Lane.

Saltash will have a talk on "TV DX," by Reg Roper, on April 8, and the 22nd is a Film and Supper Night (7.30 p.m. sharp). And their next major concern is their Mobile Rally on Whit Monday, at Calstock. Guildford will be meeting on the same two dates, with a tape-lecture on VHF, by G2UJ, on the 8th, and their AGM on the 22nd.

Coventry continue their Friday sessions at the Civil Defence Hq., Drapers Fields (off the Foleshill Road); old friends and new members will be welcomed any Friday. During the month they hope to meet ZL3RW and ZL3VP, the two New Zealanders who will be touring England with their mobile (see

Names and Addresses of Club Secretaries reporting in this issue :

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London, W.3.
A.E.R.E. (HARWELL): V. J. Galpin, Building 347.3, A.E.R.E., Harwell, Didcot.
A.R.M.S.: N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10.
BASILDON: C. Roberson, G8AAO, Milestone Cottage, London Road, Wickford, Essex.
BASINGSTOKE: P. J. Sterry, G3CBU, Ashley, Orchard Road, Basingstoke.
BLACKPOOL & FYLDE: J. Boulter, G3OCX, 175 West Drive, Cleveleys, Blackpool.
BEDFORD: K. Hatton, 49 The Briars, Kempston, Beds.
BRIGHTON TECHNICAL COLLEGE: R. A. Bravery, G3SKI, 7 Copse Hill, Withdean, Brighton 5.
BRISTOL (A.R.S.): E. J. Davis, G3SXY, 72 North View, Westbury Park, Bristol 6.
BRISTOL (GROUP): J. Thorn, G3PQE, 6 Plumtree Close, Winscombe, Som.
BURSLEM: C. J. Sutton, G3UHV, Braehead, Old Lane, Brown Edge, Stoke on Trent.
BURY & ROSSENDALE: K. Drinkwater, G3RHR, 75 Woodville Drive, Marple, Ches.
CARDIFF: E. F. Taylor, GW3SQX, University Hall, Penylan, Cardiff.
CHESHAM: D. Kind, 19 Hollybush Road, Chesham.
CHESHUNT: A. Webb, 3 Rosenearth Walk, Cheshunt.
CHILTERN: G. Leonard, 13 Priory Road, High Wycombe.
CIVIL SERVICE: G. Lloyd-Dalton, 2 Honister Heights, Purley, Surrey.
CLIFTON: J. Rose, G3OGE, 63 Broomfield Road, Beckenham, Kent.
CORNISH: M. J. Harvey, Oak Farm, Carnon Downs, Truro.
COVENTRY: W. F. M. Hahn, G3UOL, 11 St. Patricks Road, Coventry.
CRAWLEY: R. G. B. Vaughan, G3FRV, 5 Filbert Crescent, Gossops Green, Crawley.
CRAY VALLEY: S. W. H. Harrison, G3KYV, 30 Plaistow Grove, Bromley.
CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
DURHAM CITY: D. Hampton, G3UHU, 4 Ferens Close, Gilesgate, Durham.
EAST LANCES: J. Simpson, 1 March Terrace, Darwen.
ECHELFORD: A. G. Wheeler, G3RHF, 88 Village Way, Ashford, Middx.
EDGWARE: G. S. Fitton, G3RAA, 18 Beverley Drive, Edgware.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill Road, Wembley Park, Middx.
GUILDFORD: M. Birch, G3KMO, Sorrento, White Lane, Ask Green, Aldershot.
HARLOW: G. O'Donah, G3TLJ, Great East Roydon Road, Harlow.
HARROW: R. C. Ray, G2TA, Wintons End, Springfield, Bushey, Herts.
IPSWICH: J. Rhind, G3UJR, 67 Rosecroft Road, Ipswich.
LOUGHBOROUGH UNIVERSITY: I. Wicks, G3SYQ, Faraday Hall, Ashby Road, Loughborough.
MAGNUS GRAMMAR SCHOOL: R. Wallwork, B.Sc., G3JNK, Magnus Grammar School, Newark on Trent.
MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead.
MANCHESTER: K. Kahn, G3RTU, 12 Cliffdale Drive, Manchester 8.
MANSFIELD: F. N. F. Bewley, G8HX, 116 Westfield Lane, Mansfield.

MIDLAND: C. J. Haycock, G3JDJ, 29A Wellington Road, Birmingham 20.
MID-WARWICKSHIRE: K. J. Young, 180 Northumberland Court, Leamington Spa.
NEWARK: G. Francis, G3TUV, 93 Balderton Gate, Newark.
NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.
NORTH KENT: P. T. Baber, 64 Latham Road, Bexleyheath.
PADDINGTON: A. E. Copperwaite, 1a St. Mary's Mansions, St. Mary's Terrace, London, W.2.
PATHFINDER: A. Lex-Arnold, 13 Little Road, Hemel Hempstead, Herts.
PLYMOUTH: B. J. Curnow, G3UKI, 112 Mount Gold Road, Plymouth.
PORT TALBOT: H. G. Hughes, GW4CG, 20 Austin Avenue, Porthcawl, Glam.
PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Croydon.
R.A.F.A.R.S.: R.A.F. Locking, Weston-super-Mare, Som.
R.A.I.B.C.: Mrs. F. E. Woolley, G3LWY, 331 Wigan Lane, Wigan.
RADIO CLUB OF SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow.
REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash.
SHEFFORD: G. R. Cobb, G3IXG, 75 Amphill Road, Shefford.
SOUTH BIRMINGHAM: A. Bishop, 40 Cecil Road, Selly Park, Birmingham.
SOUTH YORKS: R. H. Jones, G3SFO, 5 Springcroft Drive, Scawthorpe, Doncaster.
SOUTH LONDON MOBILE: B. Negri, G3LXN, 17 Voltaire Road, London, S.W.4.
SOUTH SHIELDS: D. Forster, G3KZZ, 41 Marlborough Street, South Shields.
SPEN VALLEY: N. Price, 100 Raikes Lane, Birstall, Leeds.
STRATFORD-UPON-AVON: M. Webb, G3OOQ, 14 Townsend Road, Tiddington, Stratford-upon-Avon.
SURREY (CROYDON): R. Morrison, G3KGA, 33 Sefton Road, Addiscombe, Croydon.
SUTTON & CHEAM: P. J. Ball, G3HQT, 55 Maycross Avenue, Morden, Surrey.
SWINDON: D. J. Goacher, G3LLZ, 51 Norman Road, Swindon.
THAMES VALLEY: K. A. H. Rogers, G3AIU, 21 Links Road, Epsom.
TORBAY: Mrs. G. Western, G3NQG, 118 Salisbury Avenue, Barton, Torquay.
VERULAM: G. Slaughter, G3PAO, 6 Leggats Wood Avenue, Watford, Herts.
W.A.M.R.A.C.: Rev. A. Shepherd, G3NGF, 1 North Street, Crewe, Ches.
WELWYN: J. Hum, G5UM, Bulls Green, Knebworth, Herts.
WESTON-SUPER-MARE: A. E. Seymour, G3GNS, Manor Farm, Hillend, Banwell, Weston-Super-Mare.
WIMBLEDON: E. G. Allen, G3DRN, 65a Melbury Gardens, London, S.W.20.
WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington, Wirral.
WOLVERHAMPTON: J. Rickwood, G3JJR, 852 Stafford Road, Fordhouses, Wolverhampton.
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil.
235 & 238 SODNS. A.T.C.: V. J. Reynolds, G3COY, 90 Princes Road, Hartshill, Stoke on Trent.
AERONAUTICAL CENTER, OKLAHOMA: Postal Station 18, Oklahoma City, Okla., U.S.A.
FOUNDATION FOR AMATEUR RADIO: 2503 32nd Street S.E., Washington, D.C., U.S.A.

The licensed members present at the Plymouth Radio Club annual dinner on February 12. Seated front, left to right: G3TSE, G3SGV, G5ZT, G3BRJ, G3SVZ. First row, standing, left to right: G3SCW, G3UQS, G3SPI, G3SYV, G3SN, G3UJW, G6DF. Second row, standing, left to right: G3PGJ, G3HHV, G3UVS, G3RMZ, G3ULN. Back row, standing, left to right: G3LMG, G3KFN and G3LSD.



p.754, February).

Cornish announce the result of the first Enid Bottomley Contest, which was won by G3OFN, with G3GQS as runner-up. (The late Enid Bottomley, G3OHB, died in St. Teresa's Cheshire Home in 1964, after being actively on the air with a fellow-patient, G3OGT. This joint effort was the first example of an AT station to operate from a Cheshire Home.) The contest winner operated on 80 metres AM and SSB only, averaging nearly one QSO every five minutes for 11½ hours, and working all continents. Cornish, by the way, have available a quite surprising number of cups, shields and trophies for the various contests which they organise during the year.

Midland were very active with their station GB3BBS from the Birmingham Boat Show at the end of February, and their next big commitment is the Trentham Gardens Rally on April 24. **Mid-Warwickshire** will be visiting the Leamington Telephone Exchange on April 4, and on the 18th they will hear a talk on Frequency Modulation by Mr. R. J. Ward. The meeting on May 2 will be devoted to the subject of SSB, and the speaker will be G3LJW. They now have 45 members.

Surrey (Croydon) will have their AGM on April 12, at the Blacksmith's Arms, South Croydon, 8 p.m.; their March event was a Junk Sale. **Swindon** will be holding a Mullard Film Meeting at 7.45 p.m. on April 6; the 20th will be devoted to R.A.E. instruction, and the judging and prize-giving for the G3JO Cup Competition. On April 27 the local exhibition at the Town Hall opens, and May 4 will be the final R.A.E session.

235 and 238 Squadrons, A.T.C. (1st and 2nd Stoke-on-Trent) will be playing their part in the Trentham Gardens Rally on April 24. Apart from manning a stand demonstrating A.T.C. activities, they will provide the rally with the necessary manpower behind the scenes. And they will also give the talk-in, on 3780 kc SSB, from G3JGE/A. We

are glad to note that, since the appearance of last month's Editorial, several offers of assistance with signals instruction have been received by the Squadrons. Details of help required will be available at Trentham.

Grafton report that April is a slack month for them, because of the Easter closure of their premises (Montem School). No meetings on the 9th or 16th, but a Practical Evening on April 1, with G3AFT on the air, and a Natter Night on the 23rd, followed by SWL Corner on the 30th. All at 8.30 p.m. in Room 35, Montem School, Hornsey Road, N.7.

Maidenhead had a demonstration of two-metre working, operating as G3MEV/A, at their March meeting. On April 19 they will have a talk on Aerials by G3CAZ—7.30 p.m. in the Hall of the East Berks. College, Boyn Hill Avenue. **Port Talbot** will hold their Annual Social on April 5, 7.30 p.m. at Trefflins Workmen's Institute, 8-10 Jersey Street, Velindre, Port Talbot. An invitation is extended to other radio clubs in Glamorgan and adjacent counties.

Sutton & Cheam report that their Annual Dinner and Dance attracted a gathering of 101, including members from the Thames Valley and Crawley Clubs, as well as several honoured guests. On April 19 they will hold their AGM at The Harrow, Cheam. Note new secretary's QTH, in panel. **Yeovil** report that at their AGM they elected G3BEC president, G3NOF secretary, Mr. R. Woodward chairman and Mr. F. W. Parkhurst treasurer. G3TTC holds the post of press officer, and informs us that a Junk Sale has been

ROSS-SHIRE

It is intended to form a club in Ross-shire, but the organisers are finding it difficult to locate all the SWL's in the area, whose support they would welcome. All interested persons are asked to make contact with: Wm. J. MacDonald, Glentarra, Muir of Ord, Ross-shire.

arranged for April 27.

Newark have recently had talks on Masers and Lasers, and an interesting visit to a power station. Subjects for future talks are the Two-Tone Test on SSB, and DX-peditions by 9M4LX. **Ipswich** will hold their AGM on April 27, after a very successful year of regular meetings. They have planned a full programme for the coming season, catering for all tastes "from DC to UHF." Meetings are on the last Wednesday, 7.30 p.m. at Gippeswyk Hall, Ipswich.

Echelford have their AGM on the same evening (April 27), at the Links Hotel, Fordbridge Road, Ashford, Middx. **Clifton** have arranged four D/F events and one Transmitting Field Day for the coming months, and their demonstrations in the R.A.E. course have covered Tuned Circuits and the GDO.

Brighton Technical College A.R.S. is a newly-formed Club, whose meetings are to be held fortnightly in the College Engineering Dept. (Room G14). Next meetings are on April 20, and May 4 and 18th, when the College station G3TCB will be in operation. **Bedford** will hold a Social Evening on April 13, but the place has not yet been decided. Their meeting on the 28th will be devoted to NFD matters. Sessions are normally at Westfield School, Queen's Park, 7.30 p.m.

Bristol (RSGB Group) now meet in the new and luxurious Physics Lecture Theatre in Bristol University, Royal Fort, Tindalls Avenue, on the fourth Friday at 7.15 p.m. On March 25 they saw a Film Show, including the *première* of the G.P.O.'s "Ship to Shore Radio." On April 29, G3BGL will be lecturing on "Aerial Farming in a Monastery." On the 1st (publication date) they are visiting the atomic power station at Berkeley, meeting at the gates at 7 p.m. (The power station is just about opposite Berkeley Castle, which has been lived in by the same family for nearly 900 years.)

South Yorkshire elected new officers at their recent AGM (see panel for new secretary's QTH). Meetings are on Thursdays, 8 p.m. at the Stag Inn, Dockin Hill Road, Doncaster; alternate Thursdays are Beginners' Nights. The future programme includes an experimental local Field Day, and a Mobile Rally in competition with other clubs (dates not fixed). Meanwhile they are looking around urgently for a clubroom with lock-up facilities, and any help will be much appreciated.

Bury & Rossendale, at their March meeting, were treated to an interesting lecture-demonstration (subject not stated) by G8AGG of the Liverpool University Club. The Annual Dinner will be held at the Old Boar's Head (private room) on April 12 at 8 p.m. **Paddington** will hear a talk on Relays on April 13. The prototype of a Top-Band transmitter-receiver, designed by G3MHQ as a Club project, is now complete. Meetings are on Wednesdays at 8 p.m., with the Club Net on 14.2 mc on Fridays at 2330, and G3PAD is also active on Two.

Cheshunt held their AGM and elected new officers (see panel for secretary). The past year's activity was described as satisfactory. Meetings continue on the first Friday, 8 p.m. at the Methodist Church Hall, and always with a welcome for visitors. The May

lecture will concern the design of a single transmitter for Top Band and Two, by G3EOH.

Magnus Grammar School have held an "instructional net" on Eighty Metres, with members dispersed between three transmitting stations and three SWL's, and they report nearly a 100 per cent turnout for their AGM. In April they will be entertaining members of the Thieves Wood Short Wave Club.

Wirral, continuing fortnightly meetings, announce "Transistory" for April 6 (by G2FOS) and Transistor Transmitters for the 20th (by G3SXO). May 4 is booked for their Junk Sale. **Reigate** attracted 34 to their Dinner and Dance (more quality than quantity, they say!). April 21 is the night for their Junk Sale.

Edgware report that their recent return to these columns, after a longish absence, has resulted in increased membership and larger attendances—which is as it should be. Their March lectures covered Lasers (G.P.O. Research, Dollis Hill) and Oscilloscopes (G3SJE), and the latter will be continued on April 25. No meeting on April 11 (Easter Monday), but the Club Net will continue every Wednesday on 1875 kc.

Harrow also report good attendances and interesting lectures. April 1, 15 and 29 will be Practical evenings; no meeting on the 8th; G3LTF on Moonbounce and Oscar, on the 22nd; and a Mammoth Junk Sale on May 6. **Manchester** will hear a talk by G3RTU on the B.44 Mk III, on April 6; the 13th is Activity Night, and R.A.E. study; on the 20th there will be a lecture by G3IOA; and the 27th will be another Activity night. The clubroom has been re-decorated, and the Club station is now installed in the shack. Latest licensee among members is G8AOG. (There used to be a type of aerial called "the A.O.G."!)

South Birmingham will see, on April 21, Mr. F. F. Dodson's slides and films of scenic views and amateur shacks in the U.S.A. YL's, XYL's and other Clubs have been invited. On May 19 the half-yearly Junk Sale will be held. **Crystal Palace** will be meeting on April 16 for the second round of their Inter-Club Quiz with Clifton—question-masters will be G3FZL and G3JKY. Last year Crystal Palace

CLUB PUBLICATIONS

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

AERE, Harwell (QAV, February); ARMS (Mobile News, February); Bedford (In Circuit, February); Cornish (Cornish Link, February); Cray Valley (QUA, March); Crystal Palace (Newsletter, No. 124); North Kent (Newsletter, No. 97); Plymouth (QUA, March); Purley (Splatter, March); RAIBC (Radial, March); Radio Club of Scotland (GM Magazine, February); RAFARS (Newsletter, No. 17); Reigate (Feedback, February); Sutton and Cheam (Newsletter, February); Surrey (S.R.C.C. Monthly News, March); Swindon (Wiltshire Hams, March-April); WAMRAC (Circular Letter, No. 56); Wirral (Newsletter, February-March); Wimbledon (QRK-5, March); Wolverhampton (Newsletter, February); Foundation for Amateur Radio (Auto-Call, February); Aeronautical Center, Oklahoma (Collector and Emitter, February); South Birmingham (QSP, March); and Verulam (News Sheet, No. 23, March).

won by a small margin, so this will be a needle match.

Up at **Blackpool & Fylde** the AGM put in eight officials, with G3OPT as chairman, G3OCX hon. secretary, and Mrs. Sinclair (whose c/s as given us does not check with the *Call Book*) as a member of the committee. A programme is being worked for the coming twelve months.

Welwyn Garden City held its annual constructors' competition on March 10. The senior trophy was taken by G3AAZ, with a compact table-top SSB transmitter (we would like a photograph, with notes), and for the third year in succession the junior prize went to Trevor Baker, now G8ANS, with yet another piece of test gear to add to his already extensive collection.

The **Cardiff Radio Contest Club** will be joining Port Talbot A.R.S. for their April meeting, and their own next session will be on May 2—at the Griffin, Lisvane, for 8.0 p.m., as usual. Club activity is reported as very high, with much experimental work going on to find that "best aerial" to work as a reasonable all-band compromise; the Club is fortunate in having a disused farm building to accommodate their station—though this has its drawbacks, we are assured that the difficulties will be overcome.

Another active group is **Torbay**, who recently held their Annual Dinner, at which no less than five cups and two certificates were presented to the winners of various competitions, from the senior constructors' cup (G3LHJ) to the prize for the best SWL Log (J. Flegg). The proceedings terminated with a dance, and Torbay is now looking forward to another active season.

J-BEAM ENGINEERING, LTD.

This is the title of a new Company formed to deal with the development, production and marketing of specialised aerials and aerial systems for relay, marine and commercial communication purposes. The firm is, of course, an off-shoot of the well-known J-Beam Aerials, Ltd., established in the market for many years. One result has been the growing demand on them for specialised commercial antennae systems of every kind, until now handled by the parent Company—hence the formation of J-Beam Engineering, Ltd., to undertake this more specialised business. Fully equipped with a modern laboratory, a comprehensive technical advisory service is offered to deal with all sorts of aerial engineering inquiries. The address is Rothersthorpe Crescent, Northampton (Tel. 62147), and the directors are B. D. Sykes (G2HCG), V. R. Hartopp, already well known as a J-Beam executive, and J. L. Neal, who has been with the parent Company for many years.

SPECIALLY ON THE AIR

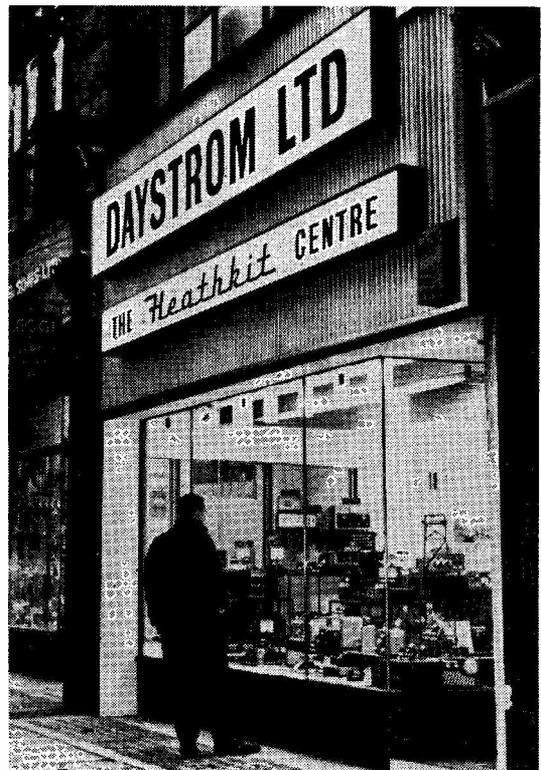
This space is available to Amateur Radio groups and societies intending to put a station on the air for some public occasion. Please set out your notice in the general form shown here, with full details.

GB3RCW, April 14-19: Arranged by the North Notts. Amateur Radio Society for the Hobbies

Exhibition organised by the Rotary Club of Worksop, Notts. The GB3RCW stand will include a display of early valves, back to 1913, and domestic BC receivers from about 1922, as well as more modern and sophisticated electronic apparatus to be lent by Standard Telephones & Cables, Ltd. Nine local operators will be on duty at various times, and one of the objects is to make contact with stations manned by members of Rotary Clubs the world over. All bands will be worked, including two metres, and the QSL address is: Rotarian H. S. Chadwick, G8ON, 25 Raines Avenue, Worksop, Notts.

GB3LRS, April 20-23: At the Hobbies Exhibition, Granby Halls, Leicester, where the Leicester Radio Society will be operating an AM/SSB station on 15-20-80 and 160 metres. The QSL address is: J. Ball, 45 Bryce Road, Leicester.

GB3PAS, July 19-21: At the Peterborough Agricultural Show, running 80m. and other bands as conditions allow. Address for QSL's and other details: D. Byrne, G3KPO, Jersey House, Eye, Peterborough, Northants.



The new Heathkit Centre opened by Daystrom, Ltd., at 233 Tottenham Court Road, London, under the management of Mr. H. Friedlander. The locality was chosen as the most suitable in London for U.K. and overseas visitors. A full range of Heathkit models is stocked, together with a selection of American Heathkit equipment, and there is also a Hi-Fi demonstration room.

A SCHOOL RADIO CLUB

SOME NOTES ON ORGANISATION AND PROGRESS

R. Wallwork (G3JNK)

We are glad to give space to this interesting article on the development of a well-known School Radio Society—in the certainty that it will inspire similar developments in other schools and youth movements generally. Magnus, one of the established grammar schools, is fortunate in having as a member of staff a licensed amateur who is not only active but—as is very evident from what he says in his

“Convince me,” said The Man.

Just like that. Terse and crisp, ‘Convince Me!’ I countered rather smartly, I think. “You tell me,” I said, “what you would look for in a club activity for boys.”

The Man sat back and then, as an efficient Youth Organiser should, he complied, briefly and to the point.

“It must be something that will engage and retain the interest of the boy. It should be constructive and encourage the art of work'n'g w'ih others. It should, also, be capable of development and extension into a wider field.”

He tapped each requirement on the fingers of a hand as he spoke and then added, “If it provided, in addition, an interest likely to last beyond club days into adult maturity, that would be a bonus.”

I smiled benignly and, as a generous bearer of good tidings replied.

“I will quote,” I assured him, “only from experience and not from theory. In fact I will quote from the record of an existing club.”

THE CLUB IN BEING

It is true, one is sure, that radio, in general terms, has held a fascination for boys since the earliest days when the “Marconi operators” on ship-board had the aura of heroes. The drama of the SOS signal and the stricken vessel with the lonely radio officer sending out his calls for help, as the water rose and the ship listed more and more steeply, has never died.

In the case of the Magnus School Radio Society at Newark-on-Trent, this interest was first organised and developed around 1920. The precise date is indefinite but, at that time, the Club members were in contact with other groups working in a similar way.

In 1960 the club was re-formed at the request of some enthusiasts in the school and has since become so popular with the boys that membership is limited to about 25. From an age range of 11 to 18 years there is considerable demand for inclusion as club members. Selection is, therefore, possible and the most promising candidates are accepted. This does not necessarily mean that technical ability is essen-

article—only too glad to give time and effort to help make the boys' own club the success it has become. It is on this single factor, more than anything else, that success depends—an inspired staff member who can channel and guide the boys' enthusiasm. In any school in the country, it can be taken for granted that there is a proportion of boys with a keen interest in radio, and only too anxious to “get something going.” If they cannot be helped from inside it would no doubt be welcomed from outside.
—Editor.

tial but real enthusiasm and interest are expected.

CLUB ORGANISATION

The Magnus School Society is largely self-organised by the members, from whose ranks a committee representative of all the age groups is formed. This committee is the mainspring of the club. A programme is drawn up which provides for the weekly meetings of the club. This development of responsibility on to the members is extremely valuable in fostering organising ability and in the exercise of fore-planning as the whole programme is arranged a term in advance of its operation.

The weekly meetings give opportunities, seized with enthusiasm by the boys, for constructional work, talks on radio matters, external visits, film viewing and some purely social activities.

Such a club attracts and welcomes help and interest from outside its own ranks and, besides talks and demonstrations given by its own members, there have been others enjoyed from local amateurs and other visitors from a wide area.

It is not essential to possess elaborate equipment in order to start a club. In the case of the Magnus School Radio Society, the early constructional work began with simple diode receivers and experiments with transistors.

The society was much encouraged by the response of local amateurs who welcomed members to their shacks and, perhaps impelled by this, interest moved toward short wave listening. Members then began to build receivers, test meters and Morse training equipment and made these pieces of gear available for practice at home, on loan.

By 1961, the annexe to a class-room near the School laboratory (where the weekly meetings were held) was taken over, to become the shack and clubroom.

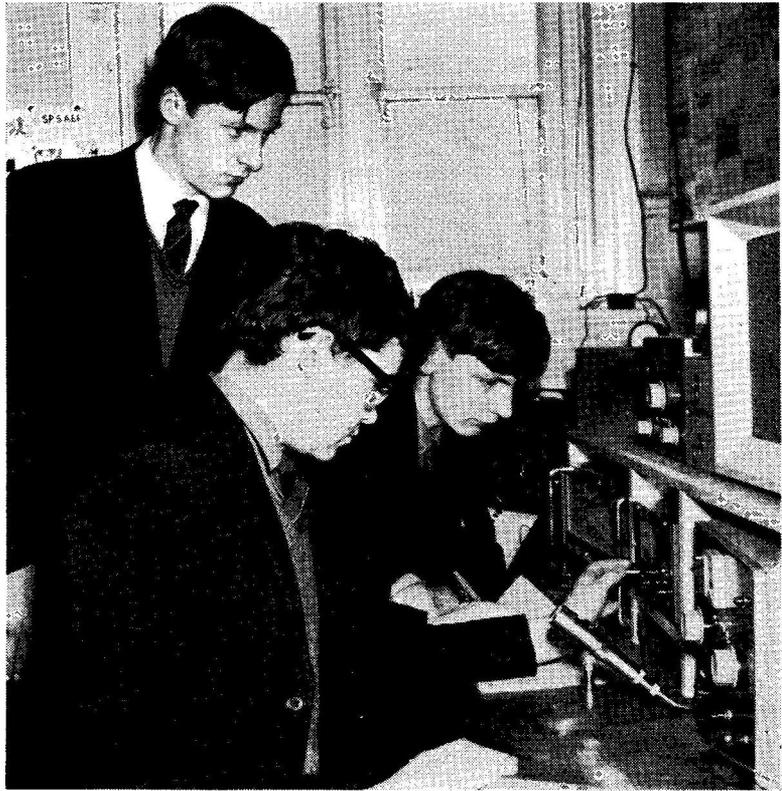
At first this was a receiving station only, using an ex-R.A.F. R.1155 but, by 1962, a Heathkit DX-49U (together with its VFO) had been constructed by the more advanced members.

Aerial System

Two flagpoles rising to 50ft. above ground level were rigged to support an aerial with a 90ft. top. Together with its down lead to the shack, it gave a convenient length of about 130 feet—that “magic dimension”!

By this time the more advanced listeners were

The Magnus Grammar School Radio Society runs its own amateur-band station and several of the boys are fully licensed. Here, G3UVT is at the controls, with G3UYU logging and SWL Orton looking on.



using an Eddystone 840C; a model just becoming available on the market; and, a complete station having now been assembled, G3PAW went on the air in February 1961.

It was necessary to build an ATU and this, together with a BC-221 frequency meter, completed the basic requirements.

Since then many refinements have been added, including a Minimitter converter and an RF tuning indicator, while a stick microphone replaces the original home-made crystal inset; a bug key is available for those members able to use it.

Originally intended for use on the Top Band, the club now has a Codar AT5. This has also been very satisfactory for outside activities and for loaning to members when they first obtain their licence.

Progress

Later, a signal generator was constructed and this, together with an AVO meter and a resistance capacity bridge, has provided better and more useful test facilities.

Classes for the R.A.E. were initiated quite early in the life of the club and are still held once a week between September and May. All licensed members help with Morse tuition and boys are encouraged to obtain their licences by the time they are 15 years old.

Eleven new callsigns have been launched on the air and seven members will be taking the 1966 R.A.E.

A library catering for all grades of ability is open at the shack at all meetings and at a break-period in the school week, too. Morse records are available on loan.

The shack, the hub of the club's life, is well equipped with shelves and cupboards for the housing of stores and surplus equipment and it is here, naturally, that the club atmosphere and spirit are most evident.

It is gratifying to find that other departments of the School have recognised the responsible attitude and the sustained interest of the radio club members and willingly give valuable assistance. Thus some boys have the privilege of using oscilloscopes, etc., from the Advanced Physics Dept. The metal workshops, too are available for use during club meeting hours. The Art Dept. has given practical help in the production of QSL cards by hand, but as a printing press has recently been provided, the boys will be able to set up and print QSL cards themselves. The club QSLs 100 per cent and this development will be a great advantage.

The Magnus Radio Society members are continuously in demand for other school activities as, for example, in assisting with lighting and sound effects for stage productions. They are, it will be seen,

well integrated into the whole life of the School.

WIDER HORIZONS

At this point The Man (still with us) fixed me with a kind but still rather stern eye.

"All is perfectly splendid," he said. "All my internal points are answered but I shall still be pleased to hear about wider opportunities."

"Fear not," I promised. "You shall hear of these in plenty."

The boys of a school club necessarily have a limited period of time for membership. They move on to University or to Industry or other spheres of working life. There, one may instance many examples of continued interest in radio as a hobby.

Even while still at school there is much opportunity for boys to join in helping others as well as to participate in events up to national level.

It is well known that the radio amateur generally is a responsive and generous individual who will willingly give assistance to others.

It is sometimes less well realised that official organisations and industrial concerns will often respond generously to what they believe is a genuine interest.

Other Club Activities

External visits made by the Magnus Radio Society have included the County Police Com-

munications Centre, a telephone manufacturing firm, telephone exchanges and similar extremely instructive organisations. One of the most exciting of these excursions was made, in 1963, to the B.B.C. Television Centre at White City. The G.P.O., the motoring associations, and Forces have also offered the club insights into the application of radio which may be reflected in their own careers or in later life.

Locally, some members of the Magnus Radio Society join the Newark and District Amateur Radio Society before or after leaving school. Joint activities have been enjoyed with this District Society as, for example, D/F contests. Outdoor activities are obviously arranged for the summer months as far as possible. Night expeditions are not unknown, however.

The Magnus Radio Society has been associated with other local organisations and, for the Hobbies Exhibition arranged by the Newark Rotarians in 1964, a special demonstration station was put on the air. Although subject to the usual background QRM inseparable from such exhibitions, the station created much interest and attracted many contacts both in the building and over the air.

A little wider, territorially speaking, the Magnus Radio Society was invited in September 1965 to operate a special station, GB3RH, at the Symposium on Amateur Radio held at Ollerton, Notts.

Two trips to the Communications Exhibition at

Boys of Magnus Grammar School, Newark, Notts., who are members of the School Radio Society have a variety of useful equipment at their disposal. Some are working for the R.A.E. and here they are seen plotting valve characteristic curves.



Seymour Hall, London, have been enjoyed by Magnus Radio Society members. The Society took part in National Field Day in 1964 for the first time. It has also entered for the Top Band Contest on two occasions and, for three years, has taken part in the Magazine Club Contest (MCC). For three years, '62, '63 and '64, a station was provided for the Scout Jamboree-on-the-Air event, the Magnus Radio Society acting as host to Scout Troops of Newark and the district.

One of the most enjoyable activities participated in by our members was a combined jamboree, when the Magnus Radio Society was associated with the Thieves Wood Short Wave Club at a Special School near Mansfield. This school club was helped in its formation by the Magnus Radio Society and has, therefore, a special interest for the boys of the Magnus.

A founder member of the Magnus Society, G3TBK, who left school in September last, together with G3UWB, were chosen to assist in the operation of GB3SBG at the *Daily Mail* Schoolboys' and Girls' Exhibition at Olympia.

From the working experience of the Magnus Radio Society it seems that, as an activity for boys, this is an ideal project to recommend to schools or Youth Groups.

The Man agreed. Distributing cigar ash in a prodigal manner, he rose to his feet groping hat-wards.

"I'm convinced," he said. "You'll hear more from me in the near future."

The present writer hopes that many others will also be moved to explore the possibilities of radio as an interest or hobby. They may be assured that any existing clubs or local amateurs will be found helpful if called upon for advice. G3PAW, for one, is always glad to hear from similar school clubs.

GM3BST RECEIVES SATELLITE WEATHER DATA

It may be remembered that some years ago—in the April, May, June and October, 1959, issues of *SHORT WAVE MAGAZINE*, with a further contribution in the January, 1964, issue—J. B. Tuke, GM3BST, described the construction and operation of a facsimile receiver for taking charts from the met. stations transmitting data of this sort. The gear has been progressively improved and he has now extended his operations (meteorology being another amateur interest of his) to the reception of weather charts from the American satellite *TOS/APT*, which transmits facsimile pictures of cloud cover as it orbits the earth. These transmissions are "free for all," and are not ground controlled. He writes as follows:

"The primary difficulty at the moment is that the transmission is a form of frequency modulation (plus or minus 10 kc) and I have not yet built a suitable FM/IF strip for this band-width; I am in fact demodulating by having the AR88 in its widest-selectivity position, and working on one side of the IF pass-band. The sensitive-paper I am using is not really suitable for intermediate shades of grey, and

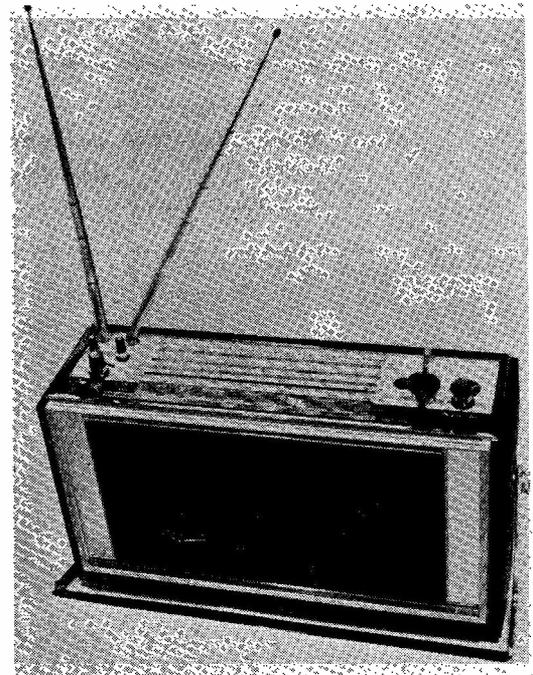
it will be necessary to construct a unit which will mark the paper on a black-white ratio dot system, rather like a newspaper photograph. Another snag is that if one uses a high-gain directive array to get a large signal input, it is necessary to have some method of following the track of the satellite—so that, at the moment, all that I am using is a GP and a dipole."

In spite of these practical difficulties, in process of being overcome, the charts GM3BST sent us to look at showed quite clearly that he is getting worth-while results, on which he is to be congratulated—his is the only amateur effort that we know of in this particular field. And the prospects are that the reproduction will be very much better as time goes on. The radio frequency, transmission characteristic and orbit data on the new American *TOS/APT* Wx satellite were provided by W3ASK, of *CQ Magazine*.

CORRECTION NOTE—

"Miniature Top Band Transmitter"

In the circuit diagram on p.715 of the February issue, no grid return resistor was shown for the buffer stage; accordingly, a 500K should be connected between pin 2 of V1 and chassis.



Something really special in the way of transistor receivers—the new 13-waveband "Radialva" has bandspread on several short-wave ranges; covers MW/LW and the Consol radio navigation band, also VHF 87-108 mc with AFC; has two speakers, two ferrite aerials and two telescopic antennae; incorporates a tuning indicator; has turret wave-change and a tuned RF stage; and has suitable sockets for auxiliary items such as radio compass or tape recorder. The circuitry involves 17 transistors, and the price is 149 guineas.

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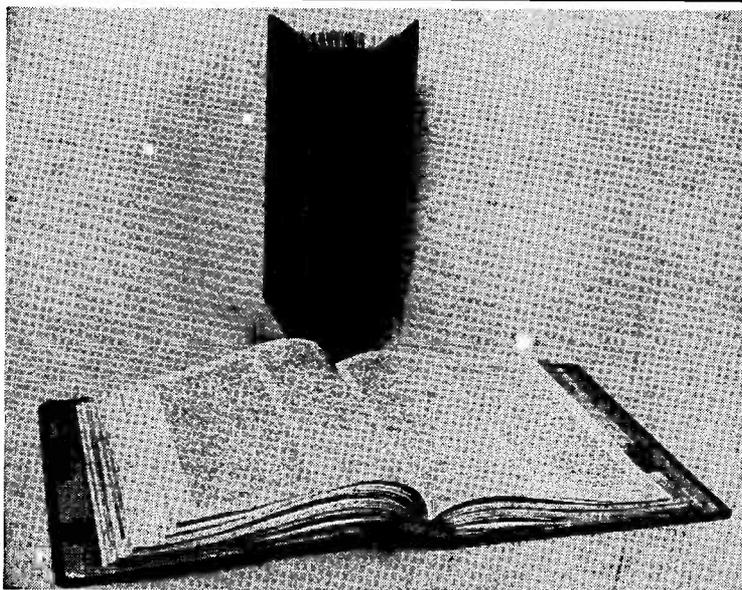
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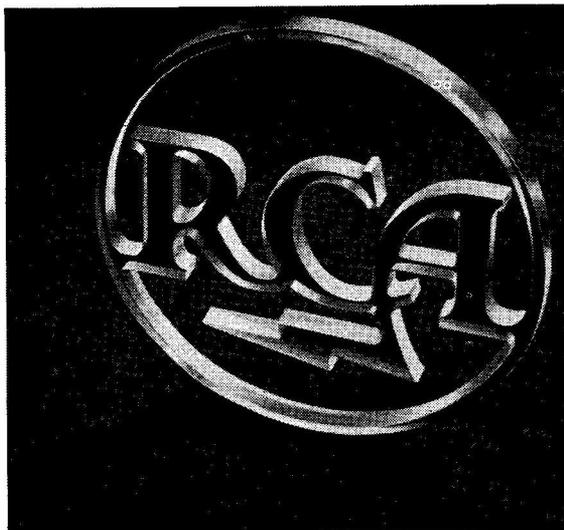
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HALLCRAFTERS HT 33A LINEAR AMPLIFIER. Up to 1kW, 80-10, Pi-network, passive grid circuit, RF output meter. Little used	95	0	0
HALLCRAFTERS SX108. 550 kcs. to 32 mcs. Amateur bandspread. Excellent condition	34	0	0
EDDYSTONE 640. 1.7-30 mcs. bandspread. Xtal filter	21	0	0
K.W. 600 LINEAR AMPLIFIER. As new	85	0	0
HAMMARLUND HQ 145X. General coverage and bandspread, Xtal Cal, 24-hour clock	85	0	0
FT 241 XTALS. Channels 1-15, 17-24, 64-67, 71, 73, 76-79. Singles of 273, 275, 276, 297, 280, 299, 309, 310, 315, 318, 324, 331, 333, 351, 352, 369, 370, 371	4	0	0
New Equipment			
RX80. 535 kcs. to 30 mcs. Amateur bandspread, Q multiplier, 5 meter, AM/CW/SSB	48	0	0
STAR SR550. 1.8 to 54 mcs., 7 bands, double conversion, product detector, Xtal Calibrator	61	19	0
EDDYSTONE EB 35. Transistorised, VHF/FM, Long. Medium and Short	59	7	6
EDDYSTONE 840C	46	0	0
EDDYSTONE 940	133	0	0
EDDYSTONE EC 10. Transistor receiver	48	0	0
EDDYSTONE EA 12. Amateur bands receiver	185	0	0

Professional type Receivers (to order only)

EDDYSTONE 850/4. 10 kcs.-600 kcs. in 6 bands. Audio filter, 2 Xtal filters, AC mains 100/125 and 200/250volts.40/60cycles	220	0	0
EDDYSTONE 770R/11. 19-165 mcs., 20 valves, rack or table version	231	0	0
EDDYSTONE 830/7. 300 kcs.-30 mcs. in 9 bands, CW/AM/SSB. Selectivity continuously variable, separate detector for SSB, Xtal filter for CW. Single conversion up to 1.5 mcs. and double above 1.5 mcs. 5 meter	275	0	0
EDDYSTONE 770U/11. 150-500 mcs. in 6 bands. AM/FM. Double conversion	330	0	0
EDDYSTONE 990S. Fully transistorised single conversion, AM/FM, 230-870 mcs. 12 volt DC from inbuilt AC mains or dry cells or Accumulator	345	0	0

Carriage extra on all the above

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

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SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: Dow-Key valve T/R switch Type DKC/TRP, 110v. AC with auto-xformer, £7 10s. Eddystone speaker for 888A Rx, 30s. Jap transistor EL-Bug, 70s. Jap xtal mic. and stand, identical BM3, 10s. Thermo-ammeters: 3 amp. 10s.; two 2 amp. 7s. 6d. each; one 1 amp., super quality, 10s. Minimitter IF/AF unit, 1.5 mc input, contains S-me.er, BFO, AVC, Q-multiplier, in cabinet matching Minimitter converters, 70s. Matching PSU/Spkr unit, 30s. All carriage extra.—Stone, 18 Glenluce Road, Blackheath, London, S.E.3.

WANTED: KW-77, Drake-2B or Eddystone 888A. Prepared to inspect and collect in Midlands area.—Details to: Michael Angrave, 100 Bridge Cross Road, Chase Terrace, Walsall, Staffordshire. (Tel.: Burniwood 221.)

G6UT: Harlow and District Radio Society are now operating under the call sign of their late president, T. St. Johnston, of Bishop's Stortford, as a memorial to him. Hon. secretary: G. O'Donald, G3TLJ, Great East, Harlow Road, Roydon, Harlow, Essex.

SALE: Eddystone S.750 receiver, 500 kc to 32 mc, double superhet, in excellent condition, £39 o.n.o.? **WANTED:** A KW-77 receiver.—R. J. Newey, 23 Lea-House Road, Causeway Green, Oldbury, Birmingham.

SELLING: Two-metre Falcon Tx, by Green E.C.E., with AC/DC PSU's, £28. Withers Twomobile Rx, £18. J-Beam 8-element Yagi, £2. KW-160 Tx, £16. Digital type clock, £5. All carriage paid.—G3MEW, 17 Testcombe Road, Alverstoke, Gosport, Hants.

FOR SALE: Eddystone 680X receiver, full gain all bands, in immaculate condition, £65. Also Cossor Type 339 DB 'scope, very good condition, £7 10s. **WANTED:** Newnes "Radio and TV Servicing" volumes from 1960 onwards.—G3PHN, Newfield House, Moira, Burton-on-Trent, Staffordshire. (Tel.: Swadlincote 7537.)

FOR THE SUM of 42s. you can have "Short Wave Magazine" for a year of 12 issues, starting any month, posted for delivery in the U.K. by the day of publication. Half-yearly subscriptions of 21s. accepted. Free QSL Bureau facilities for direct subscribers only. Single copies by post, if ordered in advance, 4s. Order with remittance to: Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Heathkit Mohican GC-1U transistor receiver, with PSU, £20. Elizabethan Recorder, with spare tapes, £10 o.n.o.?—G3NWG, 1 Groton Road, London, S.W.18.

VALVE-TESTER—Taylor Model 45B, covering British, American and Continental receiving valves, 21 different bases. Tests mutual-conductance, cathode-leakage, emission, inter-electrode shorts, heater-continuity, etc. Complete with manual covering over 5,000 valve types. (Below)

SIGNAL-TRACER AND CIRCUIT-ANALYSER—Taylor Model 20B. checks signal through RF/IF/AF stages, RF-probe, magic-eye for checking AVC and DC voltages, audio amplifier, HR/LR-loudspeaker, provision for headphones. Both instruments in A1 condition, instruction manuals.—Offers to: Watts, 62 Belmore Road, Norwich, NOR.72-T.

TWENTY-FIRST REUNION: Ex-15119 and Ancillaries, April 23, at Pathfinders Club, 115 Mount Street, London, W.1.—For further gen. contact: Proverbs, 144 Broadway, Yaxley, Peterborough, Northants.

VHF: J-Beam 4/4. 45s. TW 2-metre nuvistor converter with separate solid-state PSU, also good quality matching 4-metre converter, £15. VCR-139A CRT. 7s. 6d. Complete TW two-metre station: TW2 transmitter, matching PSU and twin crystal converter, IF 28 to 30 mc, £30.—Burgess, Moor End Cottage, Main Street, Hawksworth, Guiseley (2231), Leeds, Yorkshire.

SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: Original R.1155 receiver, with built-in S-meter, external PSU and speaker; resprayed and lettered front panel and case, price £10; collect, or local delivery (only). Also AR88D handbook, brand new, 21s. post free.—G3RND, QTHR.

URGENTLY REQUIRED: Original ATU for Panda PR-120V transmitter, also two wide-spaced 200 mmF (or near) variable condensers.—Crutchley, 7 Cobham Close, Chartford, Bromsgrove, Wores.

WANTED: "CQ" for May, 1959, and any issue "CQ" or "QST" covering modifications for Hammarlund Super-Pro Rx series; also a Cossor 339A 'scope, or similar instrument. **SELLING:** TW 2-metre converter, IF 4 to 6 mc, brand new and unused, £10 plus carriage. Various other items for disposal, mostly new and surplus to requirements, such as Command Rx's, Selsyns, mains transformers, etc., etc.; send s.a.e. for list.—Box No. 4266, Short Wave Magazine. Ltd., 55 Victoria Street, London, S.W.1.

SALE: Sphinx Tx, with control unit, in mint condition, £65. Eddystone S.750 Rx, very good, £45. TW "Communicator" for 3-5-3-8 mc, including mains PSU, mint, £55. Rolleiflex 4 x 4, and ERC, mint, £30. Reid 111, f2 TH lens. 13-5 Hektor and finder, also gadget bag, all in very good condition, £55.—Moser, G3HMR, 31 Castle Road, Kendal (2421, evenings), Westmorland.

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SELLING: National HRO-MX, with five GC coils, PSU, speaker, spare valves and handbook, in excellent condition, £17. Hallicrafters S-38E, 550 kc to 30 mc, electrical bandspread, auto-transformer, £8. Geloso VFO, Type 4/102, complete with dial and valves, £4. Geloso pi-tank coil, 12s. 6d. Mullard QV05-25's (807), 4s. each. Mullard EF37A's, 2s. each. Woden UM1 mod. xformer, 25s. Copies "Short Wave Listener" and "Short Wave News," 9d. each. All carriage extra. **WANTED:** Valve voltmeter, 100 + 100v. (or greater); also wide-spaced Tx variable condensers.—GM3DPK, Old Manse Farm, Banff, Banffshire, Scotland. (Tel. Whitehills 207.)

FOR SALE: TR10 SSB transmitter model TX-3885, coverage 3-5 to 21 mc. £65. TR10 2'6m. transmitter, £9 10s. TR10 VFO for 2 and 6 metres, £4. TR10 2-metre converter, £5. Miscellaneous tower supplies.—Details from: Free, 49 Queen Edith's Way, Cambridge. (Tel. OCA 348779.)

EMIGRATING: For Sale, a Minimitter de luxe Transmitter, 120w. AM/CW. £30. Eddystone 358X receiver, 32 kc to 32 mc (32-90 kc coil missing), £10. Minimitter low-pass filter, 20s. Panda ATU, 150w. model, 50s. All the lot for £42, plus home-built 100w. Tx, faulty, but could be used for spares; has Woden UM2 mod. xformer, and with valves. Also sound make tape recorder, two-track, 2-speed, in working order but could do with overhaul, £10.—R. Thyer, G3KWTW, 9 Lyndhurst Avenue, Castleton, Rochdale, Lancs.

SALE: Ten-watt 80/160m. transmitter, integral mains PSU, plate-and-screen modulated, beautifully constructed, £7 10s.—Tongue, 3 St. James's Street, Farnworth, Bolton, Lancs.

SELLING: In mint condition, a Panda PR-120V Tx, including ATU, £40. Also an Eddystone 838 Rx, in excellent condition, recently serviced by makers, price £45 o.n.o.—G8IO, 69 Redditch Road, Bromsgrove (2151), Wores.

FOR SALE: R.107 Rx, 1-2 to 17-5 mc, for 230v. AC or 12v. DC, as new, £10. Buyer collects.—52 Rosslyn Crescent, Wembley, Middlesex.

J. B. LOWE 115 Cavendish Road, Matlock, Derbyshire

SPECIALS Miniature blowers—beautiful, 17/6, post free. Variable inductance, the intestines of the 19 set variometer, 7/6, post free.

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NEW STUFF NCX5 Mk. II, £235/10/11. A.C. p.s.u., £48/9/11, D.C. p.s.u., £57/1/7. NC303 demonstrator, £170.

Lafayette HA350, 75 gns.; HA230, 33 gns.; KT340, 25 gns.

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Codar ATS, £16/10/-, A.C. p.s.u. £8, D.C. p.s.u., £11/5/-.

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For the man who wants the utmost, a similar filter to the above but with a 6 : 80 dB (yes, eighty!) shape factor of 1 : 2 at £20/10/-.

Write for details.

If you are in the market for a Tx or Rx, or interested in a wide range of surplus junk, a.s.a.e., will get you my latest stock list, amongst which you may well find what you are looking for at the right price, and my trade-in allowance for your gear will be a good one.

No light hearted cracks this month, gentlemen. I lost money on a trade-in deal and I'm still in mourning. Blinds drawn, beam at half mast and all that. Never mind, we shall recover. In the meantime, instead of your genial nit on the hill, I am trying the flint-eyed, stony-hearted dealer bit—just give me the odd widow and orphan to grind beneath my heel.

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"SILPLUG" replaces 5v. Rects. in RX's and TX's. 500v. one, 39/6. 750v. one, 49/6 + 1/- P. & P. Reduces heat and drift.

"PYRAMID" Linear parts. 600-0-600v. 1 amp. impregnated Trans., 10 gns. + 10/- carriage. Fils. Trans. 6v. 12 amp., £3/5/- 6HF5 tubes 31/6 each. Bases 4/- each. Cabinets, 95/- each, etc.

"SCARAB" Filter Kit. All parts inc. carrier xtal—436-l Kc/s. 250-3500 c.p.s. S.B. suppression on speech 35 dBs, £6/19/6. Ready made and aligned. 3" x 1" x 2" high, £8/7/6 + P. & P.

"HA350" Receivers 160m. to 10m., 80 gns. (Conversion professionally done internal). 80-10m., 75 gns. 100 Kc/s. calibrator, 35/-, Speaker 55/- + P. & P.

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SMALL ADVERTISEMENTS, READERS—continued

VHF PA VALVES: QQV03-10, 25s.; QQV03-20, 45s.; QQV03-20A, 65s.; QQV06-40A, 80s.; 52 Set PSU, 40s. Packets of 50 various types of transistors and diodes, 12s. 6d.; all c.w.o.; uncrossed postal orders acceptable.—Box No. 4267, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Eddystone S.640 or National HRO-5 with coils and PSU. Must be in perfect condition, with no mods. Seller to deliver; price, please?—Lyons, 5 East Street, Leigh-on-Sea, Essex.

WANTED: Late G.E.C. BRT-400, table model, or Eddystone 940. Must be in new and original condition and handbook essential. Also required in similar condition, Marconi CR-300 and AR77E. All replies acknowledged and answered.—Box No. 4268, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Eddystone S.640, needs power xformer, but operates FB on external PSU, price £16 10s. Q5'er, modified BC-453 1600 kc, product detector, PSU, £4 5s. Mod. transformers: Woden UM3, 50s.; Collins 25w., 22s. 6d.; Bendix, for p/p 807's into par. 807's, 13s. 6d.; Elstone output xformer, 12s. 6d. All inclusive carriage, but callers preferred. Crystals: 4s. 6d. each, type 10X 8090-77, 8089-09, 5256-75: 10XJ 9400, 4860; FT-243 9190, 7000, 7025. 7050, 7075, 7125, 7150 kc. Unused valves, one of each, 6V6, MU14, 6K8M, 12SR7, 12SF7, 12A6, 6SN7; two of each 12SK7, CV979, EF55, 12K8, all 4s. each, plus post/packing, or 40s. the lot post free. Also 1/1625, 6s. 6d.. 4/6L6G, 20s.—G3KVG, QTHR. (Tel. Sheffield 55307.)

COMPLETE CLEARANCE: Components, service sheets and what-have-you, too numerous and extensive to advertise; inexpensive, please send s.a.e. for list.—Hatley, 2 Fitzgerald Avenue, Seaford, Sussex.

SALE: Lafayette HE-30, with matching speaker, £26 o.n.o.? Also a Kodak 4 x 4 Slide Projector, £6. Carriage extra.—Wilkinson, 3 Bank Buildings, Pantyrafon Penmaenmawr, Caernarvonshire.

FOR SALE: Eddystone 940, coverage 480 kc to 30 mc, in first-class condition, with handbook, £80. Eddystone 770R, the Rx covering 19 to 165 mc, AM/FM/CW, in good condition, £90. Offers, or inspection, invited.—Whitford, 37 Chestnut Drive, Polegate (4659), Sussex.

SALE: National HRO-MX, with ten coils (five BS), ocal valves, PSU and manual, good clean appearance, price £25, buyer collects. Manual for CR-100, 15s.—G3TVM, 43 Park Lane, Whitefield (5165), Manchester.

WANTED: Original stick-type telephone, as used during late 1920's and early 30's, in clean condition.—Hurst, G3JJU, 7 The Laurels, Burnside, Fleet, Hants.

SALE: Copy "Technical Instruction for Marine Radio Officers," Ninth Edn., 1950, published by Hiffe's, at 60s. New and in mint condition. Offers?—G3RDU, QTHR.

WANTED: R.C.A. AR88D, or National HRO with bandsread coils; also Hallicrafters S 27 or R.208, in any condition, even scrap.—Field, 43 Overstone Road, Hammersmith, London, W.6.

FOR SALE: Hammarlund HQ-170E, with manual. condition as new, price £100. Buyer collects; all letters answered.—Coles, 30 Glaston Road, Street, Somerset.

SALE: Heathkit RA-1 receiver, with crystal calibrator and Q-multiplier, price £35. Codar Preselector, £3. Transmitter 40-18-160 metres, 30 watts to 807 with 2/6L6 modulator, plus PSU, all in two matching cabinets, £15. Minimitter mobile Tx, 160-80-40m., with control unit, £12. Minimitter transistorised PSU, £5. Will deliver 100m. from London.—Box No. 4280, Short Wave Magazine, Ltd., 55 Victoria Street, London S.W.1.

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SMALL ADVERTISEMENTS, READERS—continued

G3KUT EMIGRATION SALE: Teletype 14 teleprinter, reconditioned, complete with 45 and 50 baud forks, price £15. R.1475 receiver, with handbook, £7. TA-12B transmitter, 40s. ATU, 5s. Converter 6J6-ECH81-6C4, 15s. Brass Morse key, 5s. Elstone MRT xformer, 5s. K.W. low-pass filter, 15s. One megacycle standard xtal, 10s. PSU giving 500v. DC at 250 mA, 250v. DC 65 mA, 150v. DC stab. 40 mA, -90v. DC variable 30 mA 6·3v. AC 4A, 6·3v. AC 3A., 12v. 4·8A., 25v. AC 3A., price £8.—M.Lls, G3KUT, 6 Bowness Road, Catford, London, S.E.6.

WANTED: Shorrock 3-band portable Aircraft receiver, in good condition; state price.—O'Malley, 207 Pensby Road, Heswall, Cheshire.

WANTED: Complete set of coils for MCR1 receiver, also instruction manual for S.640.—Cowley, 32 Fenton Street, St. Helens, Lancs.

FOR SALE: 60-watt 10-80m. Tx, with PSU, £10. BC-348R, silicon PSU. with manual, £10. B.44, with 4-metre crystal, £6. H.M.V. PB car radio, tunes Top Band, £10. Top Band Command Rx, £5 10s. Woden UM2 mod. xformer, 40s. OSS.B/U 'Scope, with manual, £20. 160-metre Tx with PSU, £8. Post and packing extra.—G3TFN, Elms Bungalow, Whitefield, Lancs.

SELLING: A CDR rotator and table indicator, with control cable, also Mosley TA-32Jr. (two element) beam, £20. Buyer collects.—Berry, 4 Falcon Road, Bingley, Yorks. (Tel. OWR66 5218.)

SALE: AR88D, in mint condition, with S-meter and manual; Serial No. 100188, opened by advertiser from crate 9 months ago; only reason for sale—gone Transceiver. Price £60 o.n.o.? Three brand-new boxed Elmac 4-65A valves, 45s. each.—G3EWZ, 31 Greenbank Road, Hoole, Chester. (24763.)

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FOR SALE: Pair AUY-10 transistors, brand new, 40s. Evershed 2½in. chart recorder, £10. R.220 receiver, a bit hacked about but complete, 20s. Chokes, 100 mA 10Hy and 100 mA 5Hy., 2s. 6d. each. Valves: U19, 5R4, R17, EF86, A.1714, 6J6, 6AK5, 2s. each. 500 mmF BC-type variables, new, 2s. 6d. each. Postage extra and s.a.e. all enquiries, please.—Taylor, G3NNW, 162A Birch Road, Rochdale, Lancs.

SELLING: Heathkit DX-40U and VF-1U, with separate VF-1U PSU, in excellent condition, £27. Labgear LG.300 transmitter, very good condition, £20; Modulator and PSU for it (needs tidying up, but good), £10. Receiver R.209, 6-volt, £5. 45-foot 2in. diameter Type 50 copper-plated steel mast, in nine 5ft. sections, good order £4. Two spotting telescopes, three-draw, one average at 40s., another excellent, £6. One Amato Wilon 35mm. enlarger, 1·45/50 lens, as new, a bargain at £4. Buyers please collect heavier items. —Ivin, G5IC, Oakville, Longden Common, Shrewsbury. (Tel. Dorrington 453.)

WANTED: BC-312 or BC-342 receiver in good condition; also a Hammarlund Super-Pro SP400X or SP200X, preferably in original condition.—Box No. 4275, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: HRO-MX, with bandsread 10-15-20m. and two GC coils, PSU and speaker, £20. Transformers: 500-0-500v. 200 mA twice, 20s.; 200-0-200v. 50 mA, 10s.; mod., 30-watt, suitable 6146, etc., 15s. Two 10Hy 200 mA chokes, 20s. Valves s.a.e. for list. Must clear by 12 April, going /MM.—G3NIR, 6 Martens Close, Bexleyheath, Kent.

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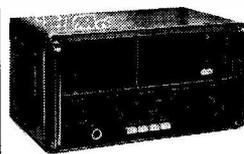
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- (6) Prototype Constructor

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Please write in confidence, giving full details of both private (i.e. Amateur) and/or professional experience to

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All of the equipment offered last month in this column has been sold, BUT due to the enormous popularity and continued interest in the Mk. III 2m. and 4m. Converters, more so in the Mk. IIIA, provided sufficient enquiries/orders are received during April 1966, a further quantity will be manufactured immediately for delivery at the end of May 1966.

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URGENTLY WANTED: Valve type ATP-35, transmitting pentode (similar Mullard PV1-35); please quote price. Also correspondence invited with any 12 Set owner.—G3VBF, 2 Ashburn Place, Ilkley, Yorkshire.

SALE: Minimitter Mercury, in good condition, overhauled, can be seen working, with extras, £40 o.n.o.?—G3GHS (LOW 3741), 164 Hook Rise North, Tolworth, Surrey.

FREE, to Radio Club, School Club, Youth Centre, etc., only a quantity of assorted gear, including headsets, speakers, valves, power packs, 19 Set, etc., etc. SWL changing QTH, so must clear—only condition. collector must take the lot (Yorkshire). **WANTED:** Transistor communications receiver, must be reasonable.—Box No. 4276, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Complete Two-Metre Station, consisting TW-2 transmitter, TW PSU/Control unit, TW nuvistor converter, IF 28 to 30 mc. £33. Eddystone 358X (B.34) receiver, ten coils, 40 kc to 31 mc, £9. Bendix TA-12B transmitter, parallel-807 PA, £4. Prefer buyers collect, or carriage extra.—Earnshaw, G3LHP, Gerharden, Alkington Road, Whitchurch, Shropshire.

WANTED: HRO receiver, with PSU and coils; also CDR rotator, Mosley TA-33 Jr. or Snr. Full particulars to:—Box No. 4278, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Eddystone 840A, £21; Eddystone 840C, £35. Buyers collect Essex. "World Radio Handbook," 1964/65 Edns., 15s. each, post paid.—Box No. 4277, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: CR-100 receiver, in good condition, £15. Electronic amateur-band "Quilpax," perfect. £8. Book "Transistor Inverters and Converters," cost 42s. new, price 22s. **WANTED:** Lafayette HA-350. £60 offered.—Thompson, 134 Royal Oak Road Manchester, 23. (Tel. Wythenshawe 2897.)

ENTHUSIAST Selling Up. Must sell all equipment. Send s.a.e. for list of components, mostly new, receiving and transmitting.—Farley, 22 Rotherfield Crescent, Hollingbury, Brighton, Sussex.

FOR SALE: National HRO-MX, five coils 160 to 10 metre, all bandspread, less PSU. Also Xtal Calibrator No. 7 Mk II—and as many bits and pieces as you can carry away. £20 the lot, buyer collects.—Middleton, 11 Apple Grove, Finglingey, Yorkshire.

SALE: Heathkit R/C Bridge C3U, assembled, in mint condition, at kit price. Corfield Lumimeter, £2. Aldisette Projector, £7. Copies "Practical Wireless," Jan. '62 to July '65; "Radio Constructor," June '63 to Feb. '66; "Bulletins," Jan. '57 to Nov. '60, and Jan. '64 to Dec. '65. The lot 50s., carriage extra.—G3KAB & Lampeter Close, Mount Hermon Road, Woking, Surrey.

SMALL ADVERTISEMENTS, READERS—continued

OFFERING: 20-watt 4-metre phone Tx, with AC/PSU, all on one chassis, with crystal and QV03-20A PA, £10. Green & Davis 4-metre converter, 6CW4 RF, output at 28-30 mc, with built-in PSU, £5.—Spashett, G3RK, Bungay (88), Suffolk.

SELLING: A KW-160 Top Band transmitter, A.M./C.W., in new condition, £17 10s. Also latest type Universal Loaded Olympic Z-Match, rated 250 watts, £8 15s. I would LIKE TO BUY a K.W. Viceroy Mk. IV transmitter and also a Linear Amplifier.—Box No. 4270, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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WANTED: For rebuilding, an R.C.A. AR88D or Hallicrafters SX-28. Rx in good working order considered if reasonably priced.—G3KPW, 62 Prospect Place, Grays, Essex.

WANTED: An Eddystone 888A, KW-77 or Hammarlund HQ-170A, in first-class condition. Please state age and price required to: Box No.4279, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BOX No. 4251, p.62, March: Request for Historical Equipment. Advertiser wishes to thank all who so kindly made offers; suitable specimens have now been obtained. 73 es tnx.

WANTED: An HRO-MX manual in good condition. I will pay 50s.—Penfold, 49 St. James Avenue, Ramsgate, Kent.

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LARGE QUANTITY Miscellaneous radio equipment and components For Sale, including condensers, coils, Tx and Rx valves (813's, TZ40's, 803's, 811's, 250TH, etc.); a BC-312 with mains PSU; Olympic T50 Tx, brand new; Tiger CW Tx as new; 1.5 kV/1 kV PSU, with usual LT windings; an HRO-Jr., complete with coils, PSU and speaker, all in hammer-finish rack-mounting cabinet. Offers and s.a.e. for lists to: G3TZL, 18 Queens Road, Fareham, Hants.

SALE: Mullard Valve Voltmeter, Type E.7555/2, in perfect condition, £20 o.n.o.? Heathkit RF-1U Signal Generator, £9 o.n.o.? G.E.C. VHF Tx/Rx, in two units on 19in. rack with internal PSU. £14 o.n.o.? Variometer for 19 Set, 10s. VALVES, Tested and Guaranteed, 5B254M, 6s.; 5763, 5s. 6d.; QV03-20A, 35s; 6AC7M. 4s. 6d.; 12AX7. 3s. 6d.; 12AT7, 3s. CRYSTALS, frequencies 1.6 to 2.5 mc (but no Top Band), 3s. 6d.; 27.065 mc, 10s.; 26.610 mc, 7s. 6d.—Reeve, 284A Barking Road, East Ham, London, E.6.

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WANTED: Late model Heathkit Mohican GC-1U, must be FB as regards working order and appearance, £25 offered. **SELLING:** A 14-watt Tx, crystal-controlled on 70.26 mc, with 2/6V6 modulator, PSU, aerial relay and 4-ele J-Beam, price £7 10s.—Pellett, G3RZC, 29 Jubilee Road, Bexhill-on-Sea, Sussex.

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ATTENTION All: If you want to be on time with the Small Advertisements appearing every month in these columns, put in a remittance for 42s. (by cash, cheque, postal order, banker's draft or international money order—we don't mind) to: Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1, Eng'land. This will guarantee that for a year you will receive "Short Wave Magazine" by post every month—and good luck with the Small Ads.

SELLING: A two-metre Mobile Communicator (by R.E.E. Telecomms.), complete with transistorised PSU, microphone and halo aerial, price £25. — G5DF, 20 Church End Lane, Tilehurst, Reading (27876), Berks.

FOR SALE: New G. & D. four-metre converter, 28 mc IF; new G. & D. CTX-4 20w. 4-metre CW transmitter, with xtal, separate PSU; four-element 4-metre beam, on small mast; all at £20. AG.8105 Philips tape recorder, 3-3/4 i.p.s., needs attention, with microphone, £4. G.77B Philips MW/LW radio, mains converter, good working order, £3.—G3HJG, 17 Torbay Road, Urmston, Manchester.

WANTED: SSB Transceiver type HW-32, or W.H.Y.? **SELLING:** Heathkit DX-40U with VF-1U, £28. Heathkit RA-1 receiver with built-in crystal calibrator, £32. An accurate Nombrex-27 Signal Generator, £8. All perfect, with manuals and circuits.—Carpenter, G3TYJ, 15 Portway, Frome, Somerset.

SALE: TW-2 10-watt Tx, with matching PSU, £17. Factory-built K.W. Vanguard Mk. II Tx, 10-160m., FB, £48 o.n.o.? B.44 Tx/Rx complete, but without vibrator, 40s. Geloso 10-80m. PA coil, 12s. 6d. All plus carriage.—Box No. 4271, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: An R.C.A. AR-8516L Communications Receiver, in unused condition and in perfect alignment, price £135.—Carpenter, 18 Kidborough Road, Crawley (22695), Sussex.

WANTED: A B2 Tx/Rx outfit, complete and unmodified. Also any pre-war copies of "QST."—H. Tee, G8UA, 406 Brunshaw Road, Burnley, Lancs.

WANTED: Recent model Heathkit DX-100U transmitter; FB condition essential and factory-built preferred. A similar sort of table-topper might be considered if offered at the right price. — Box No. 4273, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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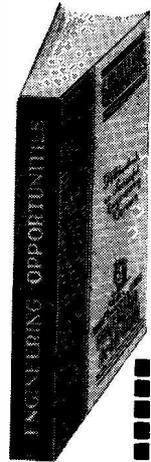
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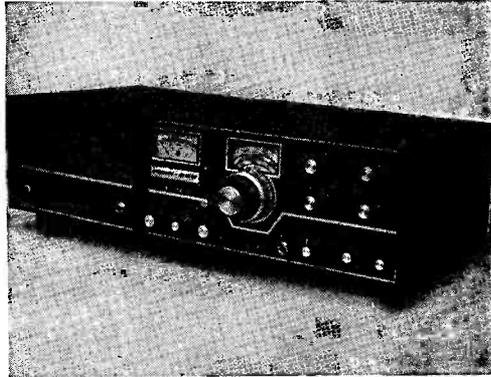
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