

The SHORT WAVE Magazine

VOL. XXV

AUGUST, 1967

NUMBER 6

Europe's leading manufacturers of equipment for the Radio Amateur—throughout the world



KW201

AMATEUR BANDS
COMMUNICATIONS
RECEIVER

Now with 2 detectors (i) product detector for SSB and CW (ii) diode detector for A.M. The KW201 has been specifically designed for optimum performance on Single Sideband. 11 ranges give coverage in the amateur bands from 1.8 mc/s. to 30 mc/s. A mechanical filter gives an IF selectivity of 3.1 kc/s. at 6 dB, and 6 kc/s. at 60 dB. A "Q" multiplier is available giving a variable range of 3.1 kc/s. to 200 cycles selectivity.

BASIC PRICE

£105



KW2000A

SSB TRANSCEIVERS

The finest value available, with no extras to buy. 180 watt PEP operation on all amateur bands 10-160 metres, complete with AC psu, VOX control, crystal calibrator, Independent receiver tuning, Upper/lower sideband tuning, Top band included, Automatic linearity control or transmit, Special attention to TVI proofing.

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11 licensed amateurs on our staff
are waiting to serve you.

KW1000 Linear Amplifier—now in
production—1200 watts PEP complete
with built-in psu and SWR indicator—
£128 . 0 . 0.

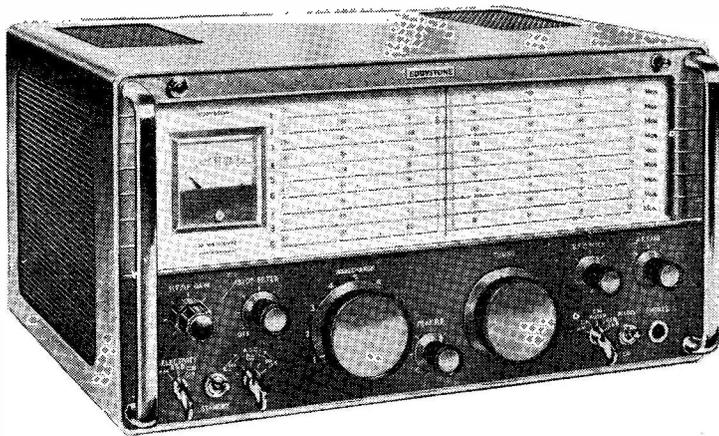
KW VESPA Mk. II—220 watts PEP
SSB AM CW—now available complete
with psu—£28 . 0 . 0.

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Eddystone EA 12

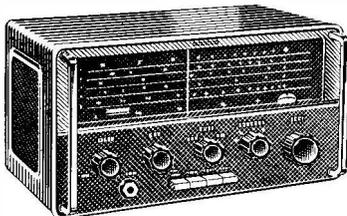
Amateur communication receiver



An amateur bands double-conversion superheterodyne receiver, for a.m, c.w, and s.s.b reception. For all amateur channels between 1.8 MHz and 30 MHz in nine 600 kHz bands with 28 MHz to 30 MHz in four bands.

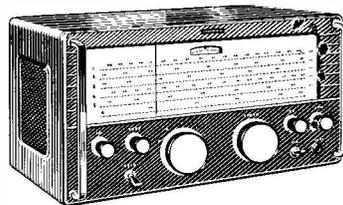
Primary features. Crystal controlled 1st oscillator, 2nd oscillator with continuously variable selectivity to 50 Hz, muting switched or by external relay, twin noise limiters, for a.m/c.w, and s.s.b, short-term drift better than 20 Hz and less than 100 Hz in any one hour, 'S' meter calibrated in nine levels of 6 dB and dB levels beyond 'S9,' two a.g.c time constants, deep slot filter, independent r.f, i.f, and audio gain controls with outputs for f.s.k and panoramic adaptor. **£185.**

OTHER RECEIVERS IN THE FAMOUS EDDYSTONE RANGE



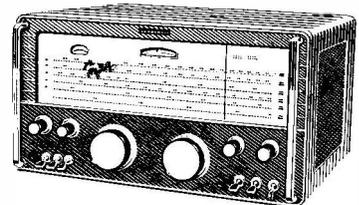
EC10 communications receiver

The fully transistorized EC10 communications receiver, supreme in its class, covers both medium wave broadcasting and all shortwave service to 30 MHz. Incorporating the famous Eddystone tuning drive, with logging scale and auxiliary vernier, shortwave reception is particularly simple. Battery operated or from optional a.c mains unit. **£53.**



840C A.C or D.C communications receiver

An 8-valve receiver with gap free coverage from 600 to 10 metres providing excellent reception of broadcast programmes and all major s.w channels including marine and international distress frequencies. The famous Eddystone extended band spread and logging scale is an essential feature. Suitable for a wide range of a.c and d.c voltages. Fully tropicalized. **£66.**

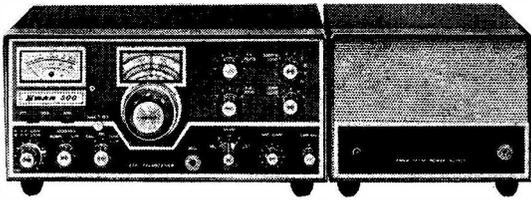


940 13-valve high sensitivity receiver

A superb high performance receiver incorporating two r.f and two i.f stages, push-pull output and silicon diode noise limiter circuit. Gap free coverage from 480 kHz and suitable for reception of c.w, a.m, and s.s.b modes. Exceptional sensitivity and stability. Built to professional standards for the serious listener. **£133.**

Comprehensive information from your Eddystone distributor or from: Eddystone Radio Limited, Eddystone Works, Alvechurch Road, Birmingham 31. Telephone Priory 2231. Telex 33708

Introducing the New De-luxe SWAN 500



5 BANDS — 480 WATTS

HOME STATION — PORTABLE — MOBILE

It is with great pride that we announce the development and production of the newest addition to the Swan Line. The Swan 500 is a most fitting de-luxe companion to the classic model 350. Improved circuit efficiency provides increased power ratings of 480 Watts P.E.P. on sideband ; 360 Watts CW input and 125 Watts AM.

At the top of the Swan Line, the 500 offers many extra features : Selectable upper and lower sideband, 100 kc crystal calibrator, automatic noise limiter, provision for installation of an internal speaker (the best solution for the mobile installation), and a factory installed accessory socket for the addition of the model 410 external VFO.

As a receiver, the new 500 will satisfy the most critical operator. Sensitivity is better than $\cdot 5$ uv and the precision tuning mechanism is easily the smoothest you will find on any piece of amateur gear. A new product detector circuit provides you with superior audio quality and a new AGC system responds more smoothly to wide variations in signal strength.

The new 500 is equipped with the finest sideband filter used in any transceiver today. With a shape factor of 1.7, ultimate rejection better than 100 dB, and a carefully selected bandwidth of 2.7 kc, this superior crystal filter combines good channel separation with the excellent audio quality for which Swan transceivers are so well known.

Frequency coverage of the five bands is complete : 3.5-4.0 mc, 7.0-7.5 mc, 13.85-14.35 mc, 21.21-5 mc, 28.29-7 mc.

Along with higher power, improved styling and many de-luxe features, the new 500 has the same high standards of performance, rugged reliability and craftsmanship that have become the trade mark of the Swan Line. Backed up by a full year warranty and a service policy second to none, we feel that the Swan 500 will establish a new standard of value for the industry, £238.

ACCESSORIES

Matching A.C. supply Model 230XC	£45
12 volt D.C. supply Model 14-230	£66
Full coverage external VFO Model 410	£45
Dual VFO Adapter, Model 22 provides for separate control of transmit and receive frequencies	£12
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93 Baldertongate, Newark.
- S.W. Area **SWANCO PRODUCTS**
247 Humber Avenue, Coventry.
- Scotland **L. HARDIE**
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PETER SEYMOUR LTD.
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	£	s.	d.
NATIONAL NCX3 with non-commercial P.S.U. 200w. P.E.P. 200w. CW 125w. AM, 80, 40, 20. First class condition throughout	110	0	0
KW 200A purchased new this year with P.S.U.	175	0	0
SPHINX first class condition throughout 75w. P.E.P. 160, 80, 20	55	0	0
SOMMERKAMP FRI00B. Brand new to clear	105	0	0
EDDYSTONE 680X. 480 kc/s.-30 mc/s. As new	75	0	0
KW VANGUARD. Mint condition throughout	50	0	0
EDDYSTONE 940. 480 kc/s.-30 mc/s. product detector, etc.	95	0	0
HALLICRAFTERS SXIII. Amateur bands only 80-10	85	0	0
MURPHY B40D. 540 kc/s.-30 mc/s., built-in mains P.S.U., speaker, calibrator, etc.	25	0	0

	£	s.	d.
EDDYSTONE 770U/2. 150-500 mc/s. AM/FM, works reconditioned at a cost of £90. Brand new condition	175	0	0
RACAL RA17L. Works reconditioned, with cabinet	285	0	0
GONSET G77. Mobile/mains Tx with mains/battery P.S.U. 75w. input 80-10	38	0	0
MATCHING G66B receiver 550 kc/s.-2 mc/s. plus 80-10 Amateur bands only with D.C. P.S.U.	30	0	0
G.E.C. BRT400 E. 150 kc/s.-30 mc/s.	75	0	0
HAMMARLUND HQ170. As new	95	0	0
THE NEW DRAKE 2C and TR4 is in stock along with the fabulous SWAN 500 and is available for your inspection.			
EAGLE DE-LUXE SWR INDICATORS, reads forward and reflected power directly calibrated in SWR up to 10-1 plus direct reading RF wattmeter 0-15W. FSD, 2-200 mc/s.	9	19	6

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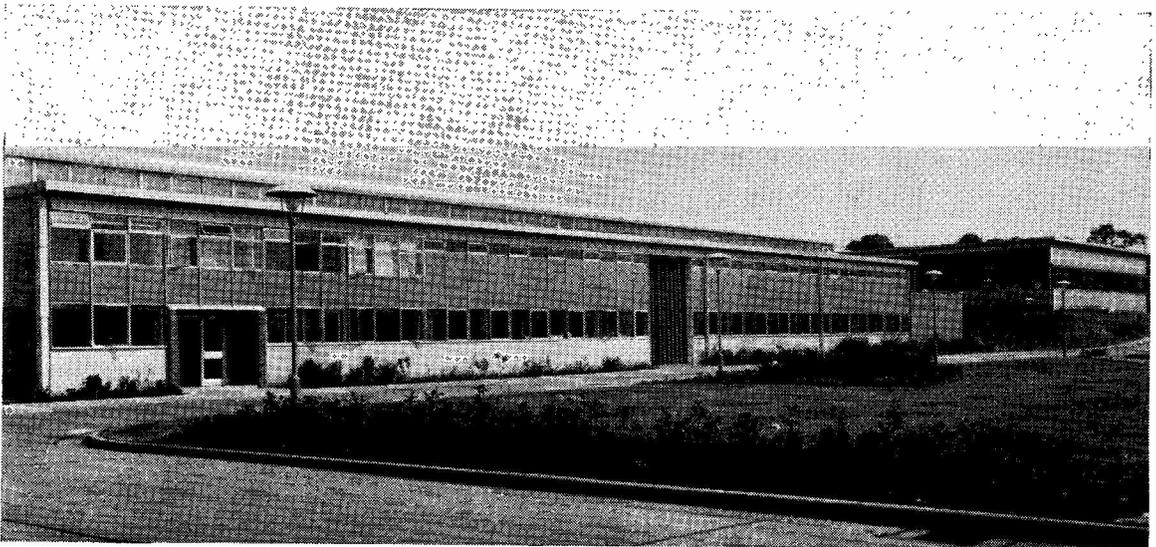
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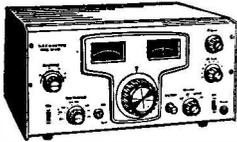
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Ham bands 10-80 metres, mechanical filter, 12 valves, double conversion, outstanding performance, 75 gns.



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General coverage receiver. 150-400 Kc/s., 550 Kc/s.-30 Mc/s., two mechanical filters, product detector, B.F.O., S meter, noise limiter, etc. Only 36 gns. Carr. 10/-.



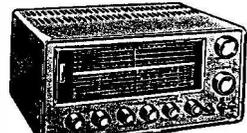
MODEL HA-500

Ham bands 6-80 metres, 10 valves, dual conversion, two mechanical filters, product detector, crystal calibrator. Only 42 gns. Carr. 10/-.



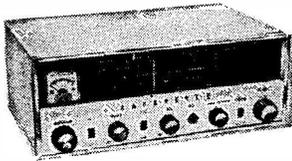
MODEL KT-340

General coverage receiver in semi-kit form. Few hours of work to complete. Full instructions, save pounds, 550 Kc/s.-30 Mc/s., 25 gns. Carr. 10/-.



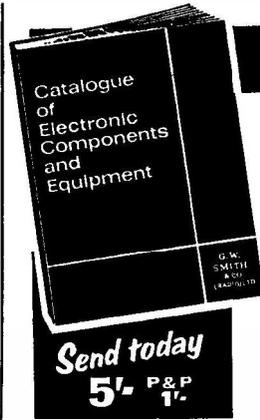
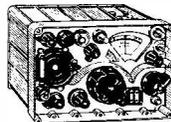
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R209 Mk. II COMMUNICATION RECEIVER

11 valve high grade communication receiver suitable for tropical use. 1-20 Mc/s. on 4 bands. AM/CW/PM operation. Incorporates precision vernier drive, B.F.O., Aerial trimmer, internal speaker and 12v. D.C. internal power supply. Supplied in excellent condition, fully tested and checked, £15. Carr. 20/-.



CATALOGUE

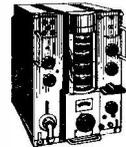
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- H.T.46 SSB Transmitter ... £175
- SX.146 SSB Receiver ... £125
- SX.122 General Coverage Receiver £135
- SX.130 General Coverage Receiver £79
- HA.1 Electronic Keyer ... £39

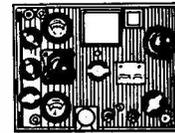


ADMIRALTY B.40 RECEIVERS

Just released by the Ministry. High quality 10 valve receiver manufactured by Murphy. Five bands 650 Kc/s.-30 Mc/s. I.F. 500 Kc/s. Incorporates 2 R.F. and 3 I.F. stages, crystal bandpass filter, noise limiter, crystal controlled B.F.O. calibrator, I.F. output, etc. Built-in speaker, output for phones. Operation 150/230 volt A.C. Size 19 1/2in. x 13 1/2in. x 1 1/2in. Weight 114 lbs. Offered in good working condition, £22/10/-, Carr. 30/-. With circuit diagrams. Also available B41 L.F. version of above. 15 Kc/s.-700 Kc/s., £17/10/-, Carr. 30/-.

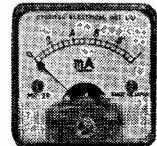
COLLINS TCS TRANSMITTERS

Frequency range 1-5-12 Mc/s., in 3 bands. Employ 7 valves, 2 of 1625 PA, 1625 Buffer, 1625 Mod., 3 x 12 A6 Osc. R.T. or C.W. V.F.O. or provision for Xtals. Incorporate plate and aerial-current meters. Require ext. P.S.U. Offered in excellent condition, £8/19/6. Carr. 15/-.



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First grade quality, Moving Coil panel meters, available ex-stock. S.A.E. for illustrated leaflet. Discounts for quantity. Available as follows. Type MR. 38P. 1 21/32in. square fronts.



50µA	32/6	5mA	22/6	1A	DC 22/6		
100µA	29/6	10mA	22/6	2A	DC 22/6		
200µA	27/6	20mA	22/6	5A	DC 22/6		
500µA	25/-	50mA	22/6	3V	DC 22/6	500v DC 22/6	150v AC 22/6
500-50µA	29/6	100mA	22/6	10V	DC 22/6	750v DC 22/6	300v AC 22/6
100-0-100µA	27/6	150mA	22/6	20V	DC 22/6	750v DC 22/6	300v AC 22/6
500-0-500µA	22/6	200mA	22/6	50V	DC 22/6	15v AC 22/6	500v AC 22/6
1-0-1mA	22/6	300mA	22/6	100V	DC 22/6	50v AC 22/6	'S' Meter 29/6
1mA	22/6	500mA	22/6	150V	DC 22/6		
2mA	22/6	750mA	22/6	300V	DC 22/6		

Larger sizes available—send for lists

CODAR EQUIPMENT

CR70A Receiver	£	s.	d.
PR.30 Preslector	19	10	0
PR30X Preslector	5	10	0
Built-in P.S.U.	7	4	0
RQ.10 Q Multiplier	6	15	0
RQ.10X Q Multiplier	8	8	0
Built-in P.S.U.	6	10	0
CC.40 Station Control	9	10	0
CR.45K Receiver Kit	11	7	0
CR.45 Receiver Built	16	10	0
AT5 160/80 12w. TX.	8	0	0
AT5 Mains P.S.U.	2	7	6
AT5 12v. P.S.U.	15	10	0
I2R/C Control unit	1	19	6
T.28 160/80 Receiver	75	0	0
Mini Clipper Kit	29	0	0
Two mobile 2M. RX.	23	0	0
Nuvistor Converters for 2 or 4M.	34	0	0
or with P.S.U.	13	0	0
	18	0	0

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Aerial with 1 coil	£	s.	d.
Extra coils	6	17	6
	3	17	6

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HBI66 T. Coil Pack	15	15	0
GC.166 Coil Pack	12	12	0
OP.166 Coil Pack	12	12	0
I.F. Strips	8	19	6

Many other items

EX-MILITARY RECEIVERS

PCR. Receivers	8	19	6
R107 1-7-17.5 Mc/s.	15	0	0
HRO ST 9 Coils	30	0	0
S27. 27-143 Mc/s.	35	0	0
AR.88LF.	From	30	0
AR.88D.	From	45	0

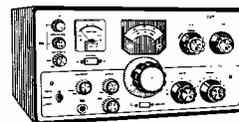
ACCESSORIES

AR.88D 455 Kc/s. XTAL	15	0
HRO Tuning Knobs	1	7
Set HRO G/C Coils (9)	10	10
1 AMP R.F. Meters	10	6
Bug Keys	3	19
Electronic Key	16	10
SWR Bridge 52/75Ω	2	19
F/S Meter 1-250 Mc/s.	2	5

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KYORITSU. 360 Kc/s.-220 Mc/s. Mains	12	10
Operated	12	10
Lafayette Nuvistor 1-7-180 Mc/s. Mains	12	10
Operated	12	10
TE.15 Transistorised.	11	11
400 Kc/s.-270 Mc/s.	11	11

EX-AM CONTROL BOX with two Londex 7026 24v. D.C. Aerial Changeover Relays. New, 39/6. Carr. 5/-.



SOMMERKAMP EQUIPMENT

FR.100B. RECEIVER. 80-10 Metres. Mechanical and crystal filters 4/2-1/5 Kc/s., £112. FL-200B. TRANSMITTER. AM/CW/SSB. 240W. PEP. 100W. AM. VOX. PTT. Break-in CW. Sidetone Monitoring, £130.

R.C.A. AR88 SPEAKERS. 8", 3 ohm speakers in metal case. Black crackle finish to match our 88 receivers. Brand new and boxed with leads, 59/6. Carr. 7/6.

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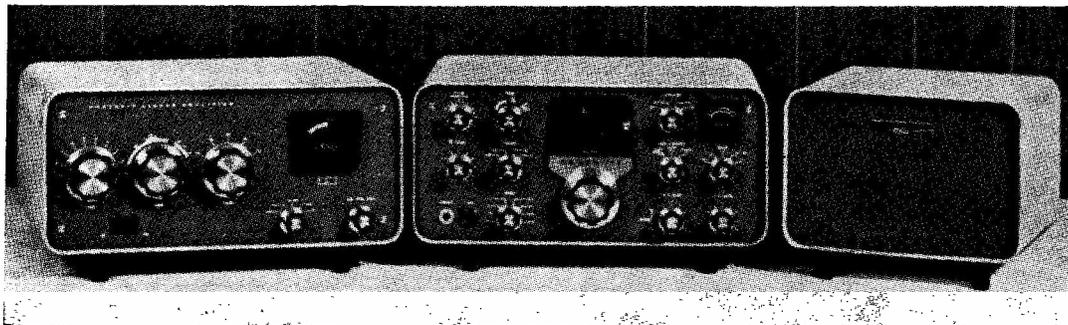
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In Answer to Your Requests . . . now those of you who just can't spare the time for "do-it-yourself", can purchase the SB-101 Transceiver and SB-200 KW Linear factory assembled and tested ready for operating the moment you unpack them. For those who want to save the most, these units also will continue to be available in kit form. Either way, you get the renowned SSB performance and features that have made the Heathkit SB line the fastest selling rigs on the air.

The following related accessories also will be available factory assembled or in kit form: HP-13 DC Power Supply (for mobile operation of the SB-101), HP-23 AC Power Supply (for SB-600 Communications Speaker (matches appearance of SB line and has space for installing the HP-23 AC power supply).

Liberal credit terms available on all purchases over £10 UK only, with lowest possible interest rates. *FREE Factory Consulting Service.* Heathkit maintain a staff of expert technical correspondents to answer any questions about selection, construction and use of your kit. And it costs you nothing. In addition, factory repair service facilities are at your command should you ever need them. Full specification sheet of any model available on request.

SB-101 80-10 Metre SSB Transceiver

● 180 watts PEP, 170 watts CW ● Switch select Upper or Lower sideband or CW ● CW sidetone ● PTT or VOX ● Linear Master Oscillator with 1 kc dial calibration (resettable to 200 cps) ● Provision for switch selection of optional SBA-300-2 CW filter ● Provision for external LMO ● Separate CW offset carrier ● 100 kc/s calibrator.

Assembled SBW-101, 23 lbs., write for terms. £200 0 0
Kit SB-101, 23 lbs. £165 0 0

SB-200 80-10 Metre KW Linear Amplifier

● 1200 watts PEP, 1000 watts CW ● Drives with 100 watts ● Built-in SWR meter, antenna relay, solid-state power supply ● ALC ● Shielded, fan-cooled amplifier compartment ● Pretuned cathode input ● Circuit breaker protection ● 120/240v. A.C.

Assembled SBW-200, 41 lbs. £132 0 0
Kit SB-200, 41 lbs. £107 10 0

SB-600 Communications Speaker

● Styled to match SB series ● For fixed station use ● 8 ohm speaker with shaped 300-3000 cps response ● Has space for HP-23 power supply.

Assembled SBW-600, 5 lbs. £10 10 0
Kit SB-600, 5 lbs. £9 0 0

HP-13 Solid-State Mobile Power Supply

● Supplies voltages for SB-101 ● Provisions for remote operation (can be located in engine compartment) ● Circuit breaker protection ● 12 to 14.5v. D.C. input (pos. or neg. earth as requested).

Assembled HPW-13, 7 lbs. £40 10 0
Kit HP-13, 7 lbs. £33 0 0

HP-23E Solid-State Fixed Station Power Supply

● Supplies voltages for SB-101 ● Excellent dynamic regulation ● 120-240v. A.C. ● Can be installed inside SB-600 speaker cab.

Assembled HPW-23, 19 lbs. £33 0 0
Kit HP-23, 19 lbs. £27 10 0

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FILTER-TYPE SINGLE BAND SSB TRANSCEIVER MODELS.
For the 80 or 20 metre bands ● 200 W. P.E.P. input TX. ● 1 μ V sensitivity RX. ● Employs easy-to-build printed board techniques with pre-aligned circuits. ● Power Req.: 800v. D.C. at 250 mA., 250v. D.C. at 100 mA., —125v. D.C. at 5 mA., 12v. A.C. or D.C. at 3-75A. Dimensions: 12 $\frac{1}{2}$ " w. x 6 $\frac{1}{2}$ " h. x 10" deep.

Models HW-12A (80m.) £53.10.0 Kit £68 Assembled
HW-32A (20.) £53.10.0 Kit £68 Assembled
GH12. Push Talk Microphone £3.10.0 Assembled

THE WORLD'S SMALLEST KILOWATT LINEAR. The Heathkit, Model HA-14 ● 80-10m. ● Provides 1000 W. P.E.P. input power ● ALC output to exciter ● Built-in SWR meter ● Size: only 3 $\frac{3}{8}$ " x 12 $\frac{3}{8}$ " x 10" deep. Weight 9lb. Power supply available.
£49.10.0 Kit £61.10.0 Assembled

AMATEUR BANDS 80-10m. RECEIVER, Model SB-301E ● This de-luxe receiver offers unsurpassed value to the Radio Amateur ● Of advanced concept, employing up-to-date design and construction techniques, its ultimate specification ensures unparalleled performance ● Full specification and details on request. Weight: 22lb. Power Req.: 115/230v. A.C. 50/60 c/s. 50 watt. Size: 17 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ " x 13 $\frac{1}{2}$ ".
£125.0.0 Kit (Less speaker) £155.0.0 Assembled

Kit SBA-301-1 Optional AM Crystal Filter £10.10.0
Kit SBA-301-2 Optional CW Crystal Filter £10.10.0
Kit SBA-300-4 2 metre Converter £10.10.0
Kit SB-600 Matching Speaker Unit £9.0.0

AMATEUR TRANSMITTER, Model SB-401E ● This transmitter is designed for "lock-in" facility with the SB-301E ● A self-powered filter type Tx covering the "Amateur" bands, 80 to 10 m. with a P.E.P. of 180 watts ● Weight: 33lb. Power Req.: 115/230v. A.C. 50/60 c/s. Size: 14 $\frac{1}{2}$ " x 6 $\frac{1}{2}$ " x 13 $\frac{1}{2}$ ".
£140.0.0 Kit £170.0.0 Assembled
Crystal Pack SBA-401-1 £15.5.0 extra

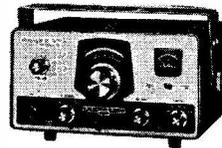
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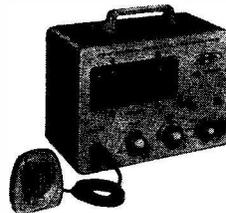
1 kW Linear HA-14



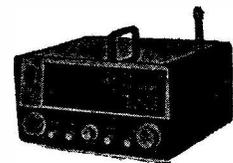
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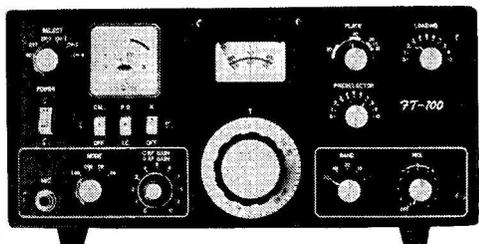
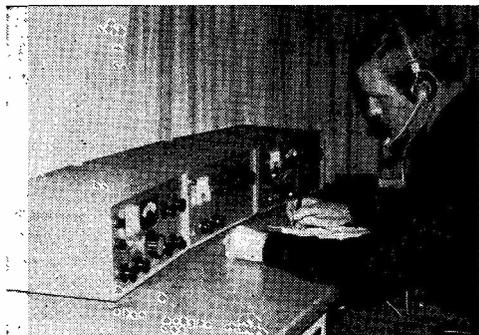
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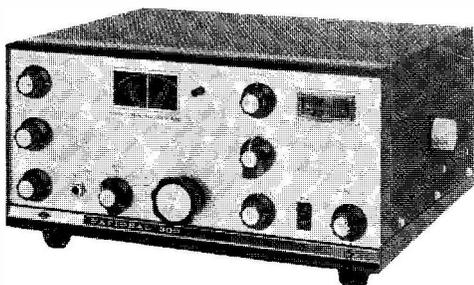
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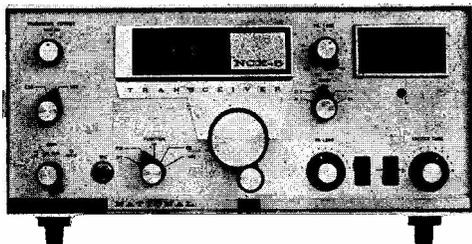
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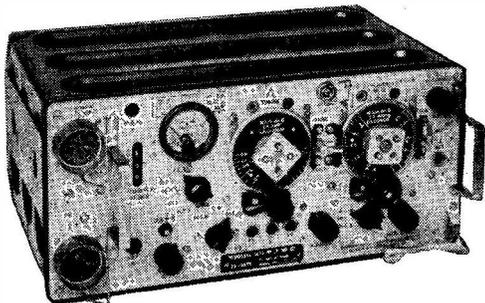
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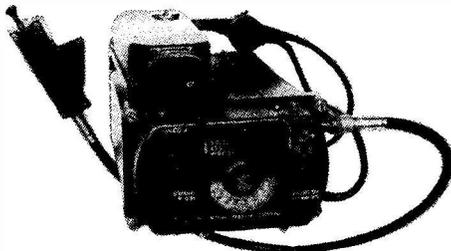
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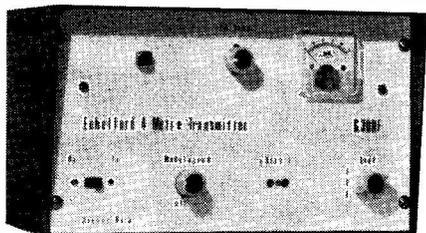


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SHORT WAVE MAGAZINE

(GB3SWM)

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AUGUST, 1967

No. 286

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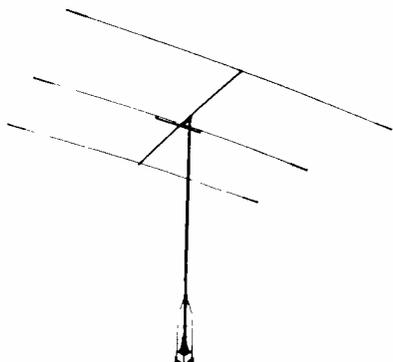
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The SHORT-WAVE Magazine

E D I T O R I A L

IARU Returning to our theme of the last two months in this space, under the headings of "Market" and "Possibility," now it is relevant to look at the IARU (International Amateur Radio Union) and in particular at Region I, IARU, which is the European area.

Though it is neither fashionable nor popular to seem to be criticising the Region I IARU organisation—whose business is very well documented—the fact remains that (a) Not much of a positive nature emerges from their conferences, and (b) The organisation itself complains that a "significant number" of member-societies do not pull their weight. Indeed, that having been represented at a conference, they then go home and do precisely nothing about its decisions and recommendations.

In a way, this is understandable. By the nature of Amateur Radio, most IARU representatives, of whatever society, are themselves amateurs—sometimes pretty junior and not very experienced—who, because they have also to earn a living, cannot devote much time to the business and the politics of Amateur Radio. But when an international conference is mooted, an immense amount of preparatory and behind-the-scenes work must be done if the conference is to be successful. This takes not only time and effort but also experience.

It is not our purpose here to appear to be casting aspersions on the ability and enthusiasm of those who have undertaken what are undoubtedly onerous responsibilities in connection with Region I of the IARU. But the fact remains that the present position cannot be regarded as entirely satisfactory, and it ought to be put right. The opportunity for this could occur as soon as the European community becomes the Seven, and might be looked at along the lines discussed here last month.

While on the subject: It might also be no bad thing to have the next IARU Region I Conference, not at some sunny seaside spot on the Continent, but here in the U.K.—say, at an Oxford or Cambridge college during the summer vacation, or even in Birmingham or Manchester. We would then be able to see, from the attendance of representatives of the member-societies, what Region I IARU really amounts to, and how much influence and authority it has.

And, in thinking of Amateur Radio conferences on the international scene, it is a fair certainty that from the recent Region II jollifications in Montreal (covering the American area of the IARU) the delegates there present will have emerged with an even hazier and less exact understanding of what Amateur Radio means over here in the U.K.—and where the real influences lie.

Austin Forster,
G6FO.

SOUPING UP THE CR-100

GETTING THE MOST FROM ONE OF THE OLDER DESIGNS

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

THESE receivers exist in quite large numbers and the notes here may interest users or possible purchasers. Dimensions of the standard CR-100 are 16in. wide, 12½in. high and 16½in. deep, and the weight is 82lb., which puts the Rx in the large and heavy class. Consumption is 85 watts from 200/250v. 50 c/s mains. There are two RF stages (KTW62's), mixer (X66) and local oscillator (KTW62), followed by three 465 kc IF stages (KTW62's) and DDT for detection, AVC and audio amplification (DH63). There is a KT63 output stage, KTW62 BFO, U50 full-wave rectifier, and 6H6 noise limiter (some models).

Six bands are switch selected, covering 60-160 kc, 160-430 kc, 500-1400 kc, 1.4-4 mc, 4-11 mc and 11-30 mc. Only the range in use appears in the horizontal window, scale length being about 7in. Tuning is by a 25 : 1 spring-loaded gear drive, plus 6 : 1 ball drive to a front concentric knob, which is slightly smaller than the main tuning knob. The geared drive has two rotating scales, giving the equivalent of 1250 divisions over 18ft. for logging.

Terminals provide 100-ohm aerial input, balanced and not grounded, or unbalanced with one terminal earthed for coax (which is quite a good match for 75 ohms), or for a single-wire high impedance aerial. A panel trimmer allows peaking the aerial circuit with any aerial on all frequencies.

The internal speaker transformer has tapings for 3 ohms, or 600-1,000 ohms (the former *must* naturally be used with a 2/3 ohm speaker) and output is 2/3 watts. Two panel jacks take phones.

Other panel controls are HF gain (on RF and IF stages), Audio gain, mains On/Off, BFO pitch, 5-way Operation Switch (1, Manual HF Gain for AM; 2, AVC and AM; 3, HT Off; 4, AVC and CW; 5, Manual HF Gain for CW), also Waveband switch, Pass-band switch (100, 300, 1200, 3000 and 6000 c/s) and Noise Limiter (some models).

Input needed for a 10 dB signal-to-noise ratio (40% modulated) should be smaller than 2 μ V on amateur bands, and is even lower for CW. Image rejection is quite typical for two tuned RF stages and 465 kc IF—80-100 dB on 4-1.4 mc, better than 60 dB on 11-4 mc, and 30 dB at the 28 mc end of the highest frequency band, increasing to about 60 dB at the LF end.

Amateur Operation

A brief summary of thousands of hours' use over some years is not easy. The size and weight can be a nuisance, though actually it is less than some old ones such as the AR88. For AM, selectivity in the sharpest usable position approaches the maximum practicable (the sidebands wanted for intelligible speech are almost

gone). For the sharpest CW position a resonant audio filter is switched in between audio and output stages, and with the BFO set to give a note of about 950 c/s this comes through clearly without otherwise overwhelming interference from adjacent signals.

Sensitivity is good. In use, DX contacts that degenerated into failure almost always left the CR-100 still copying the other man (with 120 watts at the G3OGR end), though this is not conclusive. Originally, a newer valve type for the 1st RF at least was in view, but was never fitted after tests showed 1 μ V at 14 mc gave a copiable output. However, better valves than the KTW62 do of course exist.

As with the usual general-coverage Rx, frequencies within an amateur band cannot be read on the normal scale. Nor is there a signal strength meter.

Adding Tuning Meter

A meter was wanted for aerial tuner adjustments, VFO netting, and so forth and various circuits have been tried. That permanently adopted is in Fig. 1. Its advantages are ease of connecting, few parts, and the fact that it is not swamped by a VFO or strong signals. A 5 mA or 6 mA meter, or more sensitive instrument, has VR in parallel. With no signal input and HF gain at maximum, VR is adjusted for full-scale reading. Its value should be about 5 times the internal resistance of the meter used.

The meter was marked S9 at half-scale, and equally divided from that point to the zero signal end (full-scale) for S8, S7, S6, etc. With this arrangement, S2 was obtained with 1.2 μ V and S9 at 100 μ V, on 21 mc. The usual interpretation needs to be given to readings.

The meter is connected by unsoldering R1, Fig. 1 and

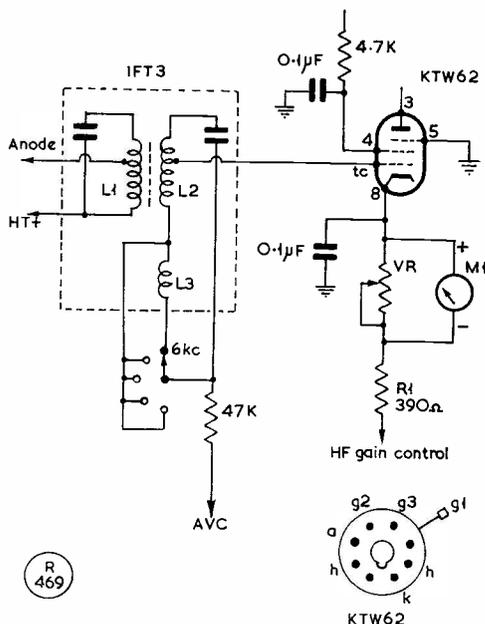
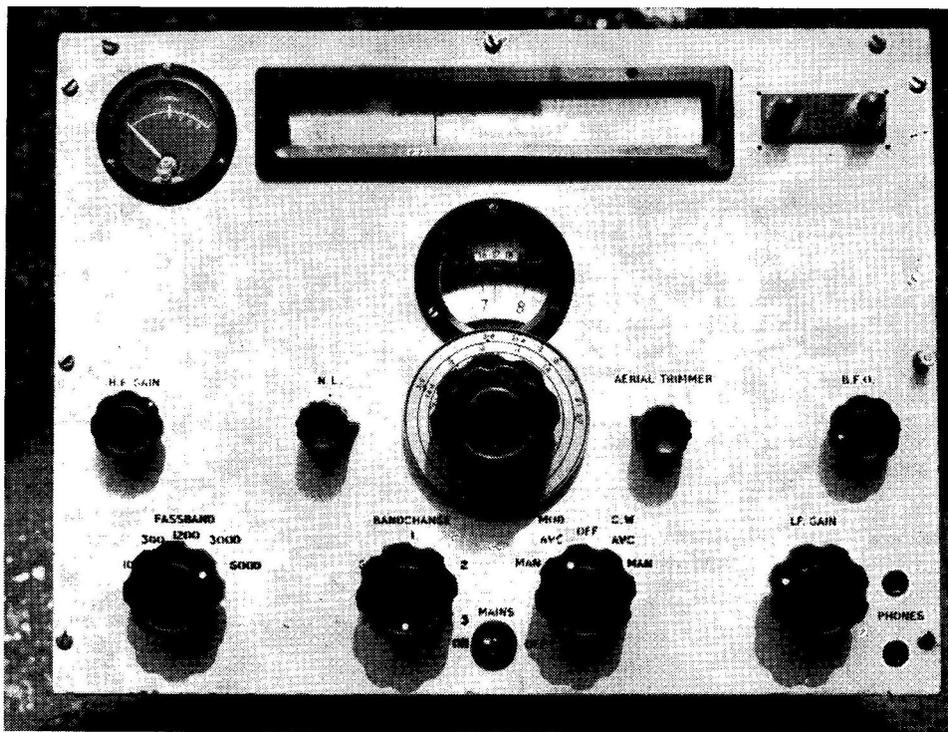


Fig. 1. Cathode tuning meter for the CR-100.



Front appearance of the CR-100, with the tuning meter fitted to the left of the horizontal window, in which appears the band selected by the wave-change switch. The terminals on the other side of this window provide HT/LF for accessories, such as a crystal calibrator. The circular dial carries the amateur-band markings, in addition to the existing internal geared-drive scales. The modifications involved are discussed in the article by G3OGR.

running twin insulated leads from R1 and tag 8. The meter can occupy a small box, or be fitted beside the tuning scale window. A hole can be made with a tank or washer cutter. Turn the receiver upside down, or pack a cloth behind to keep metal fragments out. (The cabinet is steel, by the way.)

Fig. 1 includes the pass-band switching for the grid circuit of this stage, L3 giving extra coupling for the 6 kc position.

Valves

Aged valves naturally reduce performance. Replacements are inexpensive. RF, mixer and oscillator valves are quite important and inserting new correct types in these stages in a receiver purchased as "in perfect order" increased all S-meter readings by more than two points! With audio distortion at other than low audio gain, suspect the DDT or output valve. A rectifier check may also be worthwhile. Expect 250/280v. on the HT line, according to the setting of the HF gain control (and consequent HT drain), or 300/315v. at rectifier cathode.

The anode current of the RF valves and 1st and 2nd IF valves should be about 6 mA (maximum HF gain) to under 0.5 mA (minimum HF gain) and can be checked by a meter across the individual decoupling HT resistors.

The cathode line from the HF gain cathode potentiometer runs between zero and about 25v. according to the control setting, with the line supplying screen grids at the same time showing about 80-120v.

IF Stages

Selectivity should increase considerably at each step from 6,000 c/s to 300 c/s, and at the 100 c/s position all signals should virtually disappear except a carrier heterodyned to the audio filter frequency. There are five IFT's in all. Two are switched as in Fig. 1. The final IFT (into the diode) is not switched. Fig. 2 is the mixer/1st IF coupling and shows the crystal filter.

The crystal is 465 kc plus or minus 2 kc and the IFT's are peaked (if necessary) to suit the crystal frequency. A signal of uniform strength and stable frequency is required, either provided at the mixer grid from a signal generator, or obtained from a crystal oscillator or marker coupled to an aerial terminal. The receiver should have been switched on for at least half an hour. With the pass-band set for 300 c/s, rock the generator tuning slightly (or the receiver tuning, if input is to the aerial terminal) to find the crystal peak. Maximum selectivity and sensitivity are achieved when all IFT's are aligned on this peak. Results can be observed on the S-meter, with quite a low input; or the signal can

Fig. 2. Crystal Filter as fitted to the CR-100.

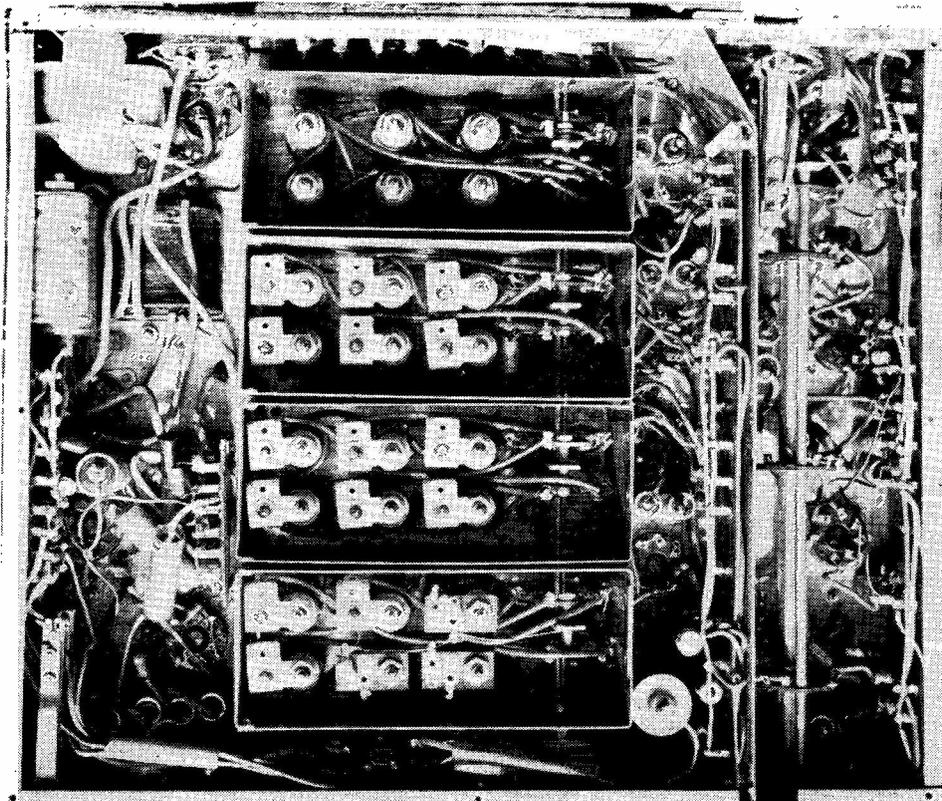
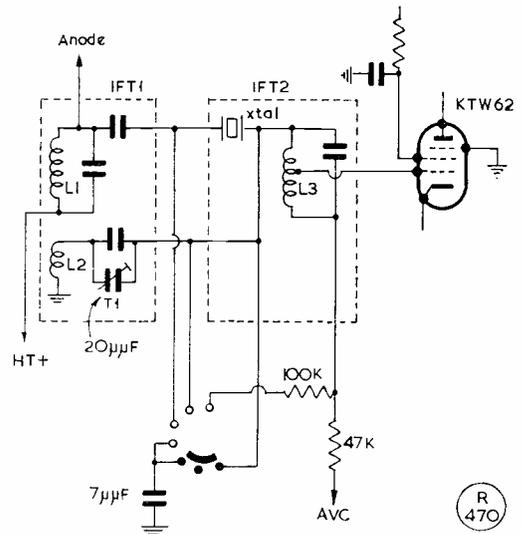
be modulated, AVC off, and output readings taken with an AC meter (or DC meter with series diode) across the speaker.

Neutralising is by feedback from L2, adjustable by T1. Wrong adjustment of T1 flattens the peak and makes response unsymmetrical, as seen when tuning very slowly through a fixed signal, or swinging the generator frequency very slightly.

IFT's 1 to 5 are located by finding IFT1 nearest the geared drive, and counting to the left for IFT2, then towards the back for IFT's 3, 4 and 5, observing the receiver from the top and front. The audio filter lies between the final IF valve and output transformer, and has two trimmers which may, if needed, be peaked for maximum output. For this, the pass-band should be switched for 100 c/s and a steady CW signal carefully tuned to the audio filter by the BFO.

RF Stages

Each range has its own coils and trimmers, so the main requirement is patience! Provided the panel aerial



Underneath the CR-100. The coil box has six coils in each section, except for aerial coils at rear. The RF/mixer/oscillator portion of the circuit adjoins the coil box, on right. The AF section is at the extreme right. To the left of the coil box lie the BFO, AF and power supply circuits. The bottom plate of the cabinet removes by taking out screws.

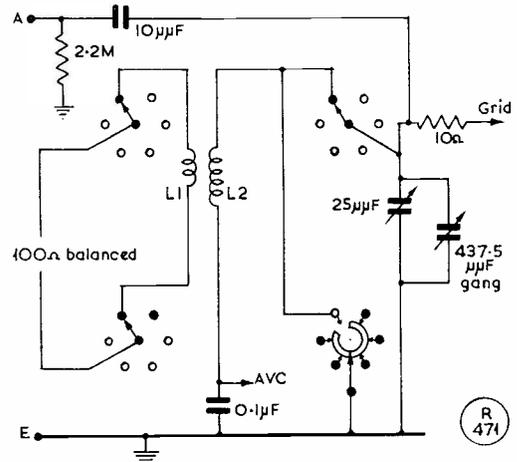
Fig. 3. CR-100 aerial circuit for one band.

trimmer can be peaked for best sensitivity on each band, the aerial-coil section is satisfactory.

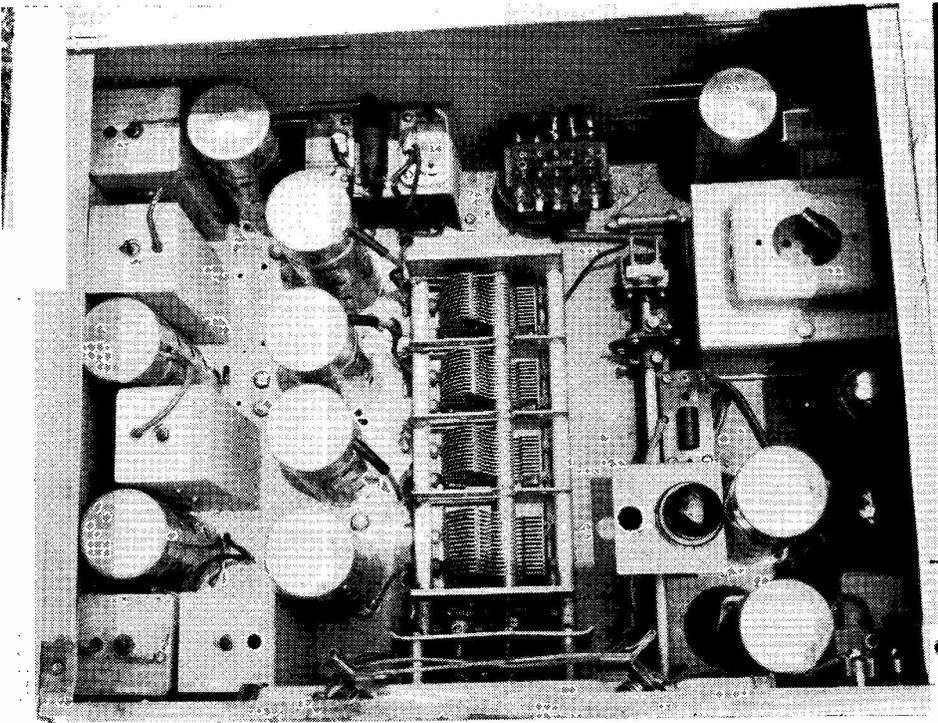
Fig. 3 is the aerial circuit, with high impedance aerial terminal A, balanced input to primary L1, and secondary L2 for 1st RF control grid. For unbalanced low-impedance input one balanced input terminal is connected externally to earth terminal E. The other five ranges duplicate this. All unused secondaries are shorted.

Couplings between 1st and 2nd RF stages, and between 2nd RF and mixer are basically the same as Fig. 3. Each secondary has a trimmer, and unused primaries and secondaries are shorted. No AVC is applied to the mixer. The oscillator circuit is similar, with coupling windings employed for feedback.

A removable plate on the receiver underside allows the coil assembly to be reached. Alignment procedure follows the usual sequence. Cores are adjusted towards the LF end of the band, and trimmers near the HF end, one band being dealt with at a time until there is no further improvement. A 100 kc xtal unit is suitable for the LF bands, and a 1 mc crystal marker for the higher frequencies, to secure accurate agreement



between frequencies and scale markings. Band 4 can be aligned at 1.9 mc and 3.7 mc; Band 5 at 5 mc and 10 mc; and Band 6 at 14 mc and 28 mc. [cont'd over



Looking inside the CR-100. The valves adjacent to the tuning gang, from the rear, are (1), 1st RF; (2), 2nd RF; (3), mixer; and (4), oscillator. Valves from front left to back are (1), 1st IF; (2), 2nd IF; and (3), 3rd IF. At right, the BFO stage, DDT AF, output and rectifier stages. The noise limiter double-diode is on a bracket over the aerial trimmer extension shaft. At the back, from right to left, are the smoothing components, output transformer and audio filter.

Amateur Scales for the CR-100

Since the rear control knob revolves with the 0-25 inner dial and allows logging with the geared drive, a disc bearing amateur band markings can be attached to it and read against the vertical hair-line. The disc can be 3½ in. in diameter, thin card between 1/16th in. paxolin behind, with thin perspex in front. The rear surface of the knob is tapped, or drilled for self-tapping screws. A mark on the card lines up with zero on the 0-25 scale. Then the disc can be calibrated without the perspex, removed, inked, and replaced correctly.

An alternative is a graph or logging chart. The approximate number of divisions obtained are: 1.8-2.0 mc, 100; 3.5-3.8 mc, 84; 7-7.1 mc, 12; 14.0-14.4 mc, 30; 21.0-21.5 mc, 21; and 28-30 mc, 85. The quickest accurate method is 100 kc points from a crystal marker and 10 kc points estimated.

Models of the CR-100

Models vary slightly, usually in minor details. The CR-100/2 has a side-tone socket from which external leads short a 2K preset resistor on the chassis, providing high cathode bias. When controlled by a key or keying relay this allows reception of the associated transmitter CW at a suitable level. The socket needs to be shorted when this facility is not used.

All models have a hinged lid allowing access to valves. With any model one 100-ohm aerial terminal may prove

to give better results than terminal A, Fig. 3, even with an end-on wire (unless extremely short). The other 100-ohm terminal is then earthed to the chassis. The CR-100/2 and CR-100/5 models have a screened unbalanced 100-ohm input, not separate terminals.

Unless someone has changed the output transformer connections to suit themselves, expect to use a 2/3 ohm speaker with the CR-100 and CR-100/2. However, a medium to high impedance load is required with the CR-100/4 and CR-100/5. This can be a 2/3-ohm speaker with a 20 : 1 or similar transformer. The CR-100/4 and CR-100/5 also give more output on headphones, and plugging these in mutes the speaker.

The noise limiter, when provided, is a small assembly on a bracket near the ganged capacitor. The switch for it is to the left of the tuning control, matching the aerial trimmer to the right; or it may be on the unit inside and reached by lifting the lid.

SSB Results

Performance of the unmodified receiver on SSB is about as generally experienced with equipment of this kind. With most SSB signals the audio gain needs to be at maximum, and the HF gain control turned well back so that the SSB is not too strong for the carrier obtained from the BFO. When the correct BFO tuning positions have been found, and possibly marked, SSB can be received quite well, though with less ease than equipment actually designed for Sideband operation.



One of the most unfortunate men in Television—and there have been more than a few—was John Baird, who started it all, using an electro-mechanical system. This certainly worked, and in skilled hands could be made to produce a picture, but Baird's mechanical design was overtaken and rapidly passed by the development of the CR tube technique. John Baird's first official demonstration before the Royal Institution was given on January 26, 1926, in what is now Bianchi's Restaurant, Frith Street, Soho. There, a commemorative plaque was unveiled on January 26 last, presented by the Royal Television Society. On left, John Ware, chairman of the Society, with Charles Marshall, its honorary secretary.

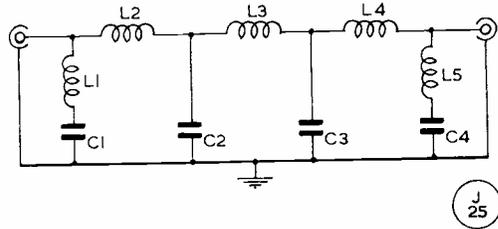
COMPACT LOW-PASS FILTER

CONSTRUCTION OF A STANDARD DESIGN

D. GOUGH (SM5RN)

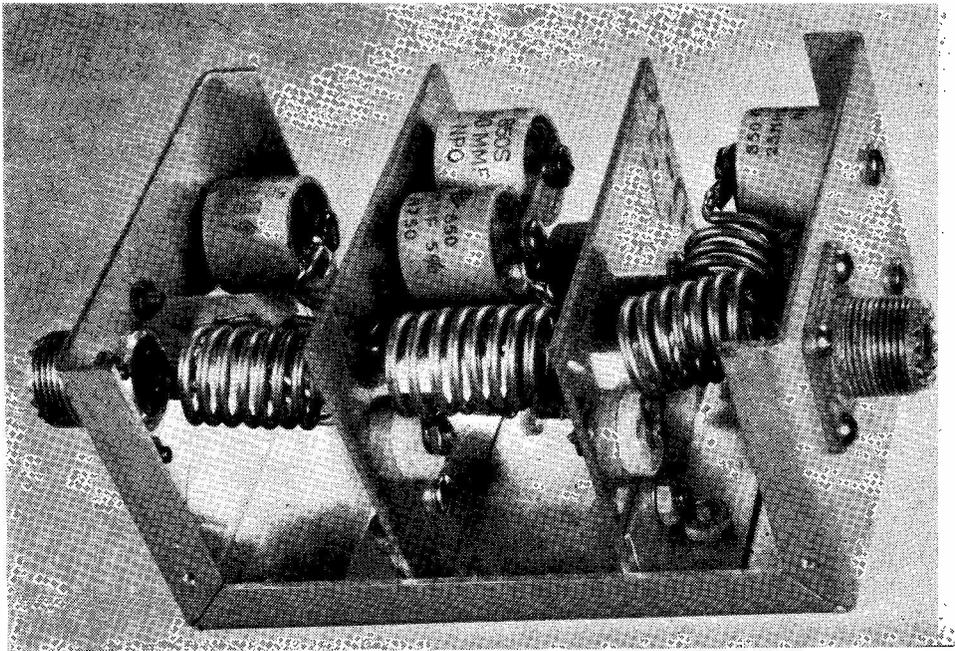
THERE'S nothing new about the circuit for this filter—but its construction and the choice of components may be of interest to those who need an effective unit which is compact and able to pass a good deal of RF energy. The filter is built into an aluminium trough-box, 5 by 3 by 2½ inches. Two aluminium shields are mounted inside the box in such a way as to make three equally-spaced compartments (see photograph). The capacitors used are CRL Ceramics, type 850, with screw mountings (purchased on Lisle St. at 6d. each during a recent trip to London). These condensers are of the type found in some TU units, or Collins aircraft antenna matching units, which have been on the surplus market.

Coils are wound with No. 14g. tinned copper wire, with an inside diameter of half-an-inch, and spaced at 8 turns per inch. In making the coils it is a good idea to wind one long coil round a ½-inch diameter wooden rod, fastened in a vice, and marked with divisions to get the correct spacing, then cut off the correct number of turns, leaving a bit at each end that can be bent for soldering to tags. Ceramic button lead-throughs are used to connect the coils through the shields.



Circuit of the LPF as described and illustrated, for which values can be: C1, C4, 50 $\mu\mu\text{F}$ ceramic; C2, C3, 150 $\mu\mu\text{F}$ ceramic; L1, L5, four turns 14g. wound to ½ in. i.d., spaced at 8 t.p.i.; L2, L4, seven turns, ditto; and L3, 8 turns.

Placing of the components can be seen from the photograph. In the writer's case the capacitance values of 150 $\mu\mu\text{F}$ had to be made up of a 50 $\mu\mu\text{F}$ and a 100 $\mu\mu\text{F}$ in parallel; these were mounted facing each other but at a different level so that there was sufficient spacing and no risk of flash-over. Amphenol coax connectors type SO-239 were mounted on each end of the box (or Belling-Lee type could be used). This filter has been tested to 500 watts AM on 3.5 to 14 mc, 500 watts on 21 mc, and about 300 watts on 28 mc. It will probably take much higher power on the lower frequencies. It is effective in reducing TVI especially when on 21 mc which is a touchy band for TV interference, at the writer's QTH. This filter has proved satisfactory for its purpose, and is well worth the time and trouble involved in building it.



An impression of the Low-Pass Filter, as built by the author and described in the text. The circuit and values are given with the diagram, and it should prove an efficient aid for TVI suppression.

FREQUENCY METER CALIBRATOR

COMBINATION MULTI-PURPOSE
TEST AND CALIBRATION
INSTRUMENT FOR BENCH WORK

G. A. STANTON (G3SCV)

NO really keen constructor can claim to have a complete workshop unless it is equipped with a frequency "standard" of some kind. Such a device is essential if home built oscillators and receivers are to be accurately calibrated and also if a regular check is to be made upon commercial equipment. By the terms of the Amateur Licence, of course, every AT-station is expected to be so equipped, in order that a constant check can be made upon outgoing transmissions. The instrument described here has been designed and constructed in order to meet these requirements.

From a study of the circuit in Fig. 1, it will be seen that the unit is dual-purpose. In the first mode of operation it functions as a crystal calibrator and as such provides frequency check points at 500 kc, 100 kc and 10 kc intervals. The 500 kc and 100 kc beats are available well into the 30 mc region and the 10 kc series up to at least 20 mc. All these will be within the accuracy of the master crystal used, and without undue expense can be plus or minus .02 per cent. A second crystal can also be brought into operation, CX2 in the circuit, the purpose of which is to produce spot frequencies. These are a great help in finding the band, especially in the higher ranges.

The frequencies generated by the calibrator can be used either externally or internally. For example, they can be applied to a receiver the calibration of which is to be checked. Alternatively, the output of a signal generator or VFO can be fed into the instrument and calibration carried out by the normal beat method.

In the second mode of operation the unit functions as a heterodyne meter, whereby two external frequencies can be checked against each other. This enables, for example, an experimental oscillator to be compared with a standard signal generator both for frequency and for stability. This provision is extremely useful for the constructor interested in the development of oscillators for either test or transmitting purposes.

Circuit Points

The heart of the instrument is V1, an EF80 connected as a Colpitts crystal oscillator. As will be seen, two crystals can be brought into operation in turn, the main xtal being CX1. This is a 500 kc bar and can be obtained quite reasonably from many of the larger component stores. CX2 is included to provide the "spot" frequencies mentioned below. In the author's case, CX2 is a 2 mc type and provides useful check points at two megacycle intervals. (This crystal was used because it happened to be available, but any type having a convenient "round" frequency could be substituted.)

The constructor whose main interest is in the amateur bands could well use a crystal cut for 3.5 mc and the unit would then give a check point at the lower edge of each of the amateur HF bands.

So that the main xtal CX1 can be "pulled" slightly, C2 is included in the grid circuit of the oscillator. This allows the unit to be adjusted to one of the MSF standard frequency transmissions.

The remainder of the frequency producing section comprises V5 and V6. Both these are double-triodes connected as multivibrators and are brought into operation as required by SW1. When correctly adjusted these are synchronised by the 500 kc oscillator and produce square waves of 100 kc and 10 kc respectively. Being square wave generators their output is rich in harmonics.

Output from the three generators is fed to the grid of V2, which is an EF80 operating with zero bias as a distortion amplifier. The purpose of this stage is to increase the harmonic content of the wave-form fed to it and this in turn widens the frequency spectrum of the unit. It will be noted that the anode load of this stage consists of a resistor (R6) in parallel with a small value capacitor. The latter (it must be confessed) was added as much by accident as design. When setting up the prototype it was noticed that the strength of the higher order harmonics was greatly increased when an oscilloscope lead was connected to the anode of this stage. On investigating this effect it was found that it was due to the self-capacity of the lead and a small condenser C9 connected as shown produced the same result! Because of the improved output it was left there. In the original a value of 33 μF was found to be optimum but this may vary somewhat with a different lay-out.

The wave-form produced by the generators is injected into the grid circuit of V3A where it can be "mixed" with external signals. This valve is a triode, which,

Table of Values

Fig. 1. Circuit of Frequency Meter Calibrator

C1 — 180 μF , s/m	R5, R8 —
C2 — 100 μF , air-spaced trimmer	R23, R24 — 27,000 ohms
C3, C8 —	R6, R18 —
C14, C20 — .01 μF , cer., 350v.	R27 — 15,000 ohms
C4 — 0.1 μF	R12 — 47,000 ohms
C5 — 220 μF , cer., 350v.	R13 — 3,800 ohms
C6, C7 — 3.3 μF	R16 — 220 ohms
C9 — 33 μF , cer. (see text)	R17 — 68,000 ohms
C10, C11 —	R19, R20 — 22,000 ohms
C12 — 10 μF , cer.	R22 — 1,500 ohms
C13, C21 — 2 μF , elect.	R25 — 56,000 ohms
C15, C18 —	R26 — 2,700 ohms
C23 — .005 μF , cer.	VR1 — 500,000-ohm potentiometer
C16, C27 — 500 μF , mica	VR2 — 10,000-ohm pre-set potentiometer
C17, C19 —	VR3 — 100,000-ohm pre-set potentiometer
C22 — 25 μF , elect.	SW1 — 3-p, 4-w Yaxley
C24, C25 — 100 μF	SW2 — Toggle on-off
C26 — 5 μF	T1 — O/p transformer
R1, R4, R7, R15 — 470,000 ohms	Cx1 — 500 kc bar
R2, R10, R11, R21 — 10,000 ohms	Cx2 — Marker xtal (see text)
R3, R9, R14 — 100,000 ohms	V1, V2, V4 — EF80
	V3 — ECC82
	V5, V6 — ECC81

Notes: Similar valve types may be substituted. For accurate band-edge marking, Cx2 should be on frequency. All resistors can be $\frac{1}{2}$ -watt rating. Value of C9 may depend upon layout but is not critical.

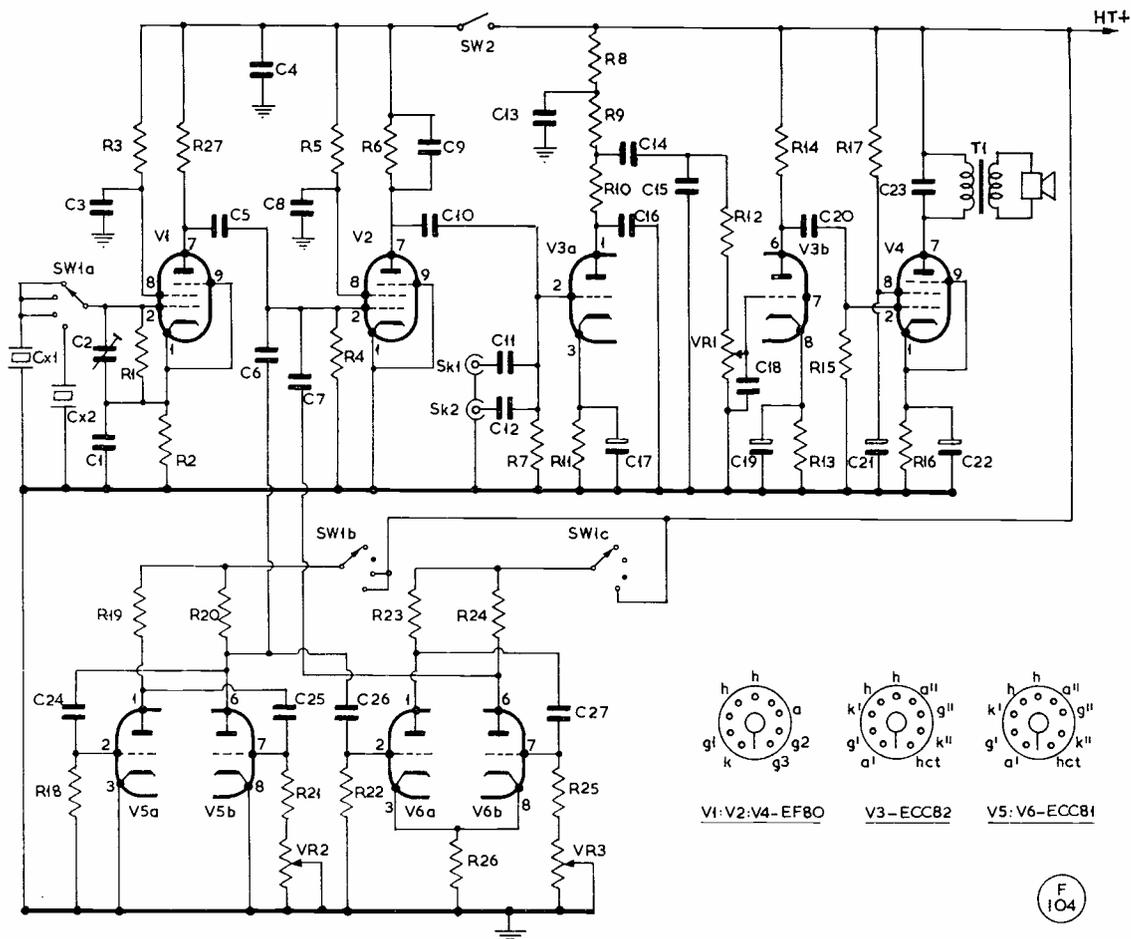


Fig. 1. Circuit of the Crystal Calibrator-Heterodyne Frequency Meter, in which V1 is the master oscillator and V5, V6 are triode-connected multivibrators, giving respectively 100 kc and 10 kc beats. V2 is an amplifier to ensure good harmonic output. V3A is a mixer for external inputs, such as a signal generator. V3B, V4 are audio amplifier stages, enabling a speaker to be driven for bench work.

because of the high standing bias produced by R11 in its cathode circuit, operates as an anode-bend detector. Differing frequencies present at the grid of this stage will produce heterodyne voltages in the anode circuit. Heterodyne frequencies falling within the audio range are passed on to the audio stages for amplification. Higher frequencies present at the anode are drastically attenuated by means of the low-pass filter, made up of R10, R12, C15, C16 and C18.

External Inputs

Provision is made for two external signals to be fed to the grid of V3A to enable the unit to be used as a heterodyne meter independent of the internal generator, the latter section being switched out by means of SW2. Output can also be taken from the unit from either of these points.

On the audio side, the circuits are quite conventional and comprise V3B and V4. The latter is the output stage, and although an EF80 is used for economy reasons, it is capable of producing sufficient output for normal test-bench purposes. As it stands the output stage is intended for loud speaker operation, but if desired low-impedance headphones could be substituted.

PSU Requirements

Power supply requirements for the unit are quite modest, 50 mA at 250v. being ample for HT and two amps. at 6 volts for the heaters. Fig. 2. gives a suitable circuit utilising silicon diodes. This, it will be seen, is a full-wave circuit, but if desired a half-wave type could be used, and also a valve rectifier could be substituted for the silicons. The value of the smoothing resistor should be adjusted for an output of 250 volts when all the valves



in the unit are operating—*i.e.*, when the instrument is set for 10 kc output. A value between 1000 and 2000 ohms will be required and this will need to be rated at least 3 watts.

Ideally, the HT supply for V1 should be stabilised and for extreme accuracy this would be necessary. In the prototype however it was noted that a change of as much as fifty volts on the main HT line only altered the 500 kc beat by approximately 50 cycles. In view of this the extra complication of a stabilising circuit was not deemed necessary.

Constructional Points

Construction of the unit is along conventional lines and is quite straightforward. A four-sided chassis 10in. x 6in. will easily contain all the components and a suggested layout is given in Fig. 3. Short direct connections should be made wherever possible and this will be greatly facilitated if the valve holders and larger components are orientated as shown. Most of the smaller parts can be wired directly to the valve holders, and tag strips mounted as indicated will ensure complete rigidity.

Particular care should be taken in wiring the signal-producing section, *i.e.*, V1, V5 and V6. Any purely mechanical instability here can render the instrument useless. For the same reason only first-class components should be used in this section and if possible high stability types. Care must also be taken in wiring the grid of V3A. This point is very prone to hum pick-up and the components connected here should be fitted as close as possible to the grid pin but well clear of the heater leads.

Setting Up and Calibration

Setting up the unit is a relatively simple matter although a certain amount of patience is required in adjusting the two multivibrators. The first part of the operation is to check the frequency of the 500 kc oscillator; this is most easily done with a receiver tuned to the 2.5 mc MSF transmission. (Most readers will know that station MSF at Rugby provides a standard-frequency service throughout the twenty-four hours of each day.) Details for MSF are given in many of the well-known radio handbooks but it is sufficient to say here that for most of each hour the transmission is modulated by one-cycle pulses. This results in an easily recognised clock-like tick from the receiver. Every quarter-hour the call sign is given in slow Morse.

With the station receiver set at 2.5 mc the unit should be switched to operate at 500 kc. A low-frequency audio beat will most likely be heard from the receiver LS. This will be the fifth harmonic of the 500 kc oscillator beating with MSF. C2 should then be adjusted until this beat is as low in frequency as possible. If the constructor is lucky enough to have a crystal that is "spot-on" it will be possible to zero-beat it with MSF. However, it is perhaps expecting a little *too* much to find a surplus type to be 100 per cent accurate and in the author's case the crystal used was 70 cycles high and the lowest beat possible with MSF was 350 c/s. This represents an accuracy of better than .015 per cent and is a great deal better than most standards accepted in radio work.

If desired at this stage a check can be made for

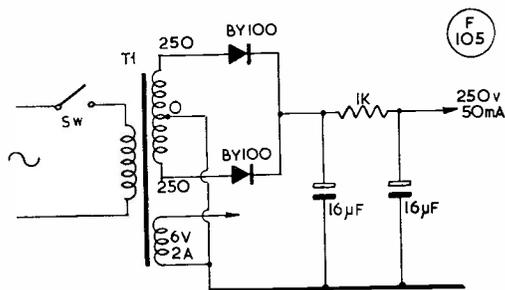


Fig. 2. Circuit and values for a power supply unit suitable for the instrument described in the text. It should give 50 mA or so at 250v.

drift simply by leaving the 500 kc oscillator and the receiver running for an hour or so. Any change occurring in the beat note between MSF and the local oscillator one can be quite sure is *not* due to MSF! The prototype was found to drift by approximately 10-20 cycles in the first hour. This again is quite acceptable.

Having adjusted the master oscillator the next operation is to synchronise the 100 kc multivibrator (V5). For this a signal generator or test oscillator is required and the following procedure is suggested: Output from the signal generator is fed into the input socket of the crystal calibrator, the signal generator being set to produce an unmodulated signal on a range covering 500 kc to 1 mc. The calibrator unit is set for 500 kc and relatively loud beats should be heard as the signal generator is tuned through 500 kc and 1000 kc respectively. As the generator is tuned between these two frequencies much weaker beats will probably be found—these will be due to various harmonics of the generator beating with harmonics of the calibrator and the strength of the beats will depend upon the purity of the wave-form of the generator. For our purpose these "in between" beats are spurious responses and a note should be made of them.

Having done this the calibrator is then switched to produce 100 kc and the purpose of the operation is to adjust VR2 until four distinct beats are heard between the 500 kc and 1 mc points on the generator dial. These will correspond to 600-700-800-900 kc, and if the generator dial is properly calibrated this will be obvious. As VR2 is adjusted through its range a number of distinct "plops" will be heard in the unit speaker as the multivibrator frequency is altered. The correct positioning of VR2 should be around the half way point but this will obviously depend upon circuit tolerances.

Attention can now be turned to the 10 kc multivibrator (V6). With the calibrator still set at 100 kc the signal generator should be switched to a range covering 100-200 kc. If the 100 kc multivibrator has been correctly set loud beats will be heard as the generator is tuned through 100 and 200 kc. Again, a number of spurious beats are to be expected between the two points and a note should be made of these. The calibrator is then switched to 10 kc and VR3 is adjusted until nine distinct (and relatively evenly spaced) beats are found between the 100 and 200 kc points on the generator dial; take care not to confuse the 10 kc beats with any of the "spurious"

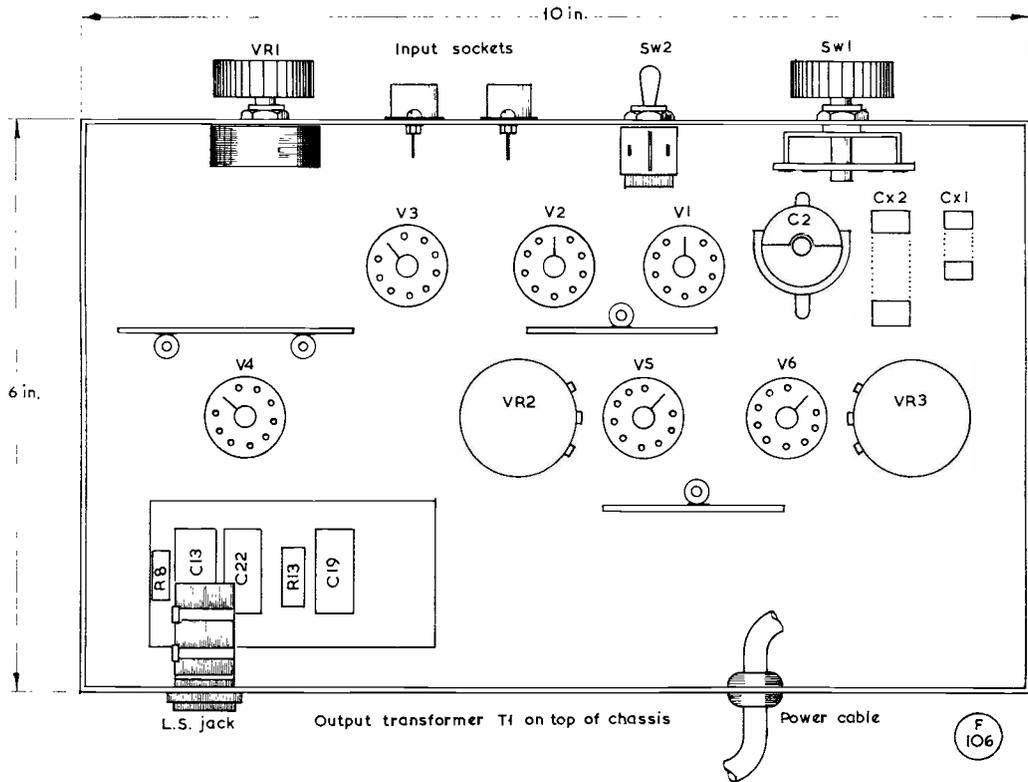


Fig. 3. Showing the general layout as adopted for the prototype, on a standard chassis 10in. by 6in. wide with a 2in. sub-space. Some constructional points are covered in the text.

beats.

A final check can be made on the multivibrators by switching the signal generator to a higher range and counting the beats between known settings. Once accurately set the oscillators should not need any further adjustment unless the circuit is altered in any way or a valve replaced.

No adjustment is allowed for on the second crystal, this being intended simply as a guide to calibration and not as a standard.

When used as a heterodyne meter the crystal calibrator

section is switched out, and the known and unknown signals are fed into the unit *via* the two input sockets SK1, SK2. If the known signal source is then adjusted until a zero beat is produced then this will indicate the frequency of the unknown signal. Care must of course be taken not to confuse beats produced between harmonics and those produced between fundamentals but normally the latter will be much stronger responses. If the known signal source has itself been calibrated and checked against the crystal calibrator then with care very accurate measurements can be made.

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HOW TO USE AN OSCILLOSCOPE

SQUARE-WAVE TESTING—HUM DETECTION—CIRCUIT ALIGNMENT —THE WOBBULATOR— MODULATION CHECKING

Part II

C. BOWDEN (G3OCB)

The first part of this article appeared in the June issue of "Short Wave Magazine."—Editor.

A SQUARE wave is made up of a sine wave the fundamental frequency of which is equal to that of the square wave plus an infinite number of odd harmonics added in phase. Fig. 5A, B, C, show how the wave is built up in this way. Consequently, if we pass a square wave through an amplifier the response of the latter will modify the shape of the square wave depending on how its frequency response affects the harmonic content of the wave. In practice, it is very difficult to obtain a perfect square wave but a good representation may be obtained provided harmonics up to about the eleventh are present and this is easy to get. From Fig. 5B, it can be seen that the major part of the square wave is formed by the fundamental sine-wave frequency, and the sharply rising and falling leading and trailing edges occur as a result of the higher order harmonics. Thus, if we use a square wave as a test signal and observe the signal on the scope after it has passed through a circuit, we can get a good idea of how the circuit is behaving.

For example, if the circuit has a poor low-frequency response then the wave will appear as shown in Fig. 5D, where it can be seen that the "top" has a pronounced slope. Poor high-frequency response is revealed where the corners are rounded as in Fig. 5E. Where HF or LF responses are very poor indeed the waveform degenerates as shown in Figs. 5F and G. It is interesting to note that the process of reducing a square wave to a series of positive and negative pips, as indicated by Fig. 5F, is a technique very much used in radar and pulse circuitry

generally and is known as "differentiation."

Fig. 5H, shows how the shape of the square wave is altered when there is an excessive amount of HF gain present, and Fig. 5J is what appears when the LF gain is excessive. It is, of course, possible to find several of the above conditions present. The easiest course to adopt then is to cure each one in turn, as the remaining fault conditions will be more obvious from the waveform as it becomes more nearly a square wave. When a scope is used for square wave testing the capacity between leads should be kept to an absolute minimum so that the higher frequencies are not excessively shunted. It is interesting to note here that it is often far more effective to hook the test leads into the wiring rather than to hold them, as the hands can cause excessive shunt capacity, as well as possibly feeding hum into high-impedance circuits. It is very desirable whenever one is testing with an oscilloscope to make use of a high-impedance, low-capacity probe. This will ensure minimum disturbance of the circuit under test, minimise hum pick up and reduce stray capacitances.

Hum Detection

As most amateurs are probably aware the clearing of hum modulation from the trace of an oscilloscope is often very difficult. However, the scope does enable us, by the same token, to detect hum at very low levels in other circuits. Fig. 6A, shows how the ideal trace should appear when no signal or hum is present and this is the sort of trace that we hope to see when, for example, we check a receiver HT rail for hum. It is more than likely however that the trace will look more like Fig. 6B, where the hum is easily visible. The frequency of this hum will normally be either 50 or 100 c/s, depending whether half-wave or full-wave rectification has been used. If we know the deflection sensitivity of the scope we can measure the hum voltage and, knowing the amount of smoothing in the circuit, we can make a fair estimate as to whether the smoothing is reasonable or not by reference to the various tables and charts in the handbooks. Fig. 6C, shows how hum may show up in a circuit carrying an AF or RF signal. It is also possible to check for filter circuit component defects. For example, in Fig. 6D, we see the waveform which would appear at the cathode of a full-wave rectifier when the smoothing becomes open circuit (or as it would appear where a choke input filter is used). Similarly Fig. 6E, shows the comparable waveform obtained with a half-wave rectifier. The waveforms appearing at other points

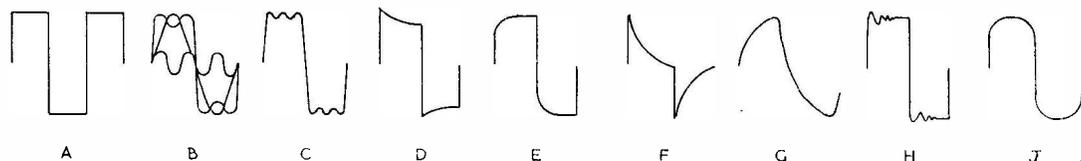


Fig. 5

Fig. 5. Showing square-wave build up. At (A) is a perfect square wave. (B) shows a sine wave plus an odd harmonic. (C) is a sine wave carrying odd harmonics up to about the 9th. Square waves can be used for amplifier testing, and (D) indicates poor LF response, (E) bad HF response, (F) Very poor LF performance, (G) Very poor HF, (H) Excessive HF, and (J) Excessive LF.

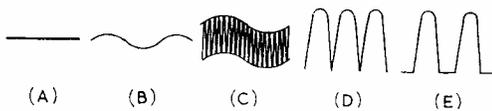


Fig 6

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Fig. 6. The process of hum tracing using an Oscilloscope—see text for discussion.

in filter circuits are dependent to a large extent on the amounts of inductance and capacity present, and on the load resistance, so it is not possible to show exact waveforms. But in general smooth output should be about sinusoidal in shape and very much lower in amplitude than the waveform at the cathode of the rectifier. In order fully to appreciate the waveforms to be expected the best course is for the experimenter to check a few power supplies in his own workshop and to sketch the shapes of the various traces.

RF and IF Applications of the Oscilloscope

Due to its relatively low input capacitance, high input impedance and very rapid operation the oscilloscope is an ideal instrument for checking radio frequency signals—but it should be stressed that any tuned circuit under test should be retuned to resonance when the 'scope is connected. Depending on the bandwidth and timebase range of a particular instrument it may be possible to view directly several cycles of radio frequency waveform up to several megacycles or so. However, such a display will not tell us very much about what is happening to the modulation being applied. We are usually much more interested in the latter as the various DC instruments in circuit will usually tell us all that we want to know about the radio frequency conditions (where transmitters are concerned). It is therefore normal practice to set the timebase to show several cycles of the modulating waveform (which is usually single frequency for the purpose of this test as it would be impossible to view a rapidly varying audio signal).

As the modulating waveform is much lower in frequency than the radio frequency, the latter will appear as a patch of illumination between the extremities of the display, since there may be hundreds or even thousands of cycles of radio frequency energy for every cycle of modulation. Where one is testing a receiver the modulated RF signal can be obtained from a signal generator and traced through the various stages of the receiver up to the detector. Fig. 7A shows an almost fully modulated

signal as it would appear on the 'scope screen and the waveform as traced through the receiver should correspond to this. It may of course be impossible to obtain sufficient voltage from very early stages in the receiver without over-loading them. Assuming that the waveform from the signal generator is beyond suspicion (and not all signal generators are) then a waveform appearing as shown in Fig. 7B, indicates distortion which is probably the result of overloading one of the RF or IF amplifiers, faulty biasing, or may be due to a fault in the AVC system. If the waveform has a rough edge on it as shown in Fig. 7C, then this usually indicates instability due to faulty screening or decoupling, or parasitic oscillation. The roughness may occur at only one part of the waveform as shown or may extend along the whole "edge."

Plotting Response Curves—The Wobbulator

One method of checking response curves is to plot a graph, taking readings at, say, 500 c/s intervals, and using an RF voltmeter or receiver S-meter as indicator. Such a method is exceedingly tedious, especially where a filter response curve or bandpass curve is required, as it may be necessary to re-adjust and re-plot many times before the desired curve is obtained.

By using a device known as a wobbulator we can obtain the passband curve on the face of the tube and we may see instantly the result of any alterations made to the tuning of the circuits. The wobbulator is a device that alters the frequency of a tuned circuit in sympathy with the variation of a voltage applied to it. If that voltage is taken from the timebase circuitry of the oscilloscope, then the circuit will tune in step with the timebase. As an example, suppose that when the timebase voltage is zero the wobbulator oscillator circuit tunes to say 460 kc and the spot is at the LHS. As the timebase voltage rises towards its maximum the spot moves towards the RHS. The wobbulator oscillator may now tune to say 470 kc. When the timebase voltage returns to zero, the spot returns to the LHS and the wobbulator retunes itself to 460 kc. Thus, we can call the LHS of the trace 460 kc and we can call the RHS 470 kc in this case. If the output voltage of the wobbulator oscillator is applied to the input terminal of an IF amplifier of about 465 kc, and the output of this amplifier is taken to the Y-plates of the 'scope, the response of the 465 kc circuits will be traced on the screen.

Fig. 10, shows the general arrangement of equipment for plotting the response curves by this method and Fig. 11 is the circuit of a typical wobbulator. When there is no input to the grid of the wobbulator valve the

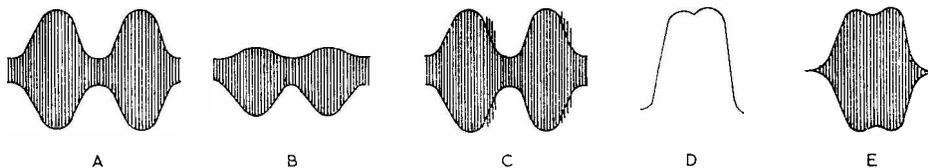


Fig.7

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Fig. 7. Looking at the trace when monitoring on the RF or IF side, as discussed in the text.

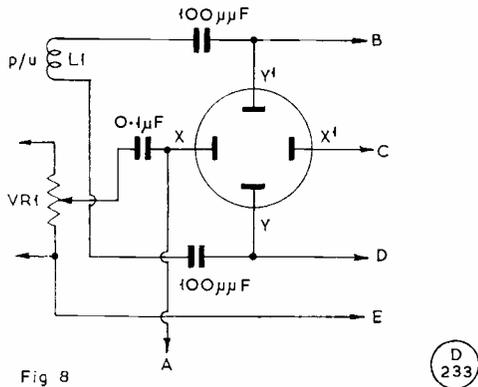


Fig. 8. Circuit for modulation monitoring, to produce the pictures shown in Fig. 9. LI is a small link coil coupled to the PA tank such that sufficient RF can be fed to the Y-plates. VR1 is one megohm, connected across the modulator to get about 50-100 volts of AF, and fed via a suitable HV condenser. Points A, B, C and D go to the shift controls on the 'Scope. LI must be insulated to prevent HT contact and can be tuned if RF pick-up is insufficient.

tuned circuit oscillates at a certain frequency. The wobbulator valve should, to be correct, be called a "reactance" valve. Due to phase relationships in the circuit the valve acts as a capacitor the value of which depends on the grid voltage. As the timebase signal alters the voltage on the grid of this valve its effective capacity will alter and the tuned circuit will now oscillate at a different frequency.

Most wobbulators are not tunable over a very wide range of frequency and thus it is normal practice to feed the output into a mixer stage into which the output from a wide-range signal generator is also fed. In this way it is possible to obtain any desired frequency and the sweep will remain the same as the frequency is changed.

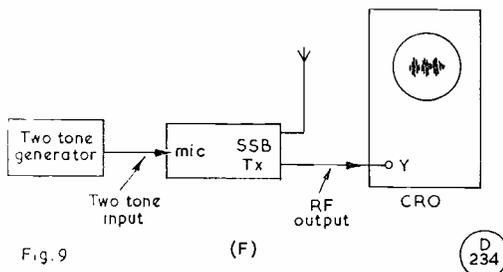
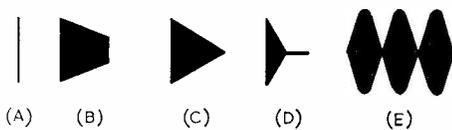


Fig. 9. The traces to be expected when checking modulation—see text. A two-tone test signal trace is shown at (E), and (F) is the set-up for SSB Tx testing when using the recommended two-tone input method.

(The sweep is the number of kc over which the oscillator swings at a particular setting of input voltage to the wobbulator grid.) It is important to remember that the frequency deviation or sweep of the wobbulator signal is dependent on the *amplitude* of the *input* voltage from the timebase circuit. Too much voltage will create much too large a frequency deviation, resulting in the passband curve being very cramped, as it will only take up a small percentage of the total trace. The potentiometer controlling the timebase signal into the grid of the wobbulator stage can be adjusted so that the curve covers a satisfactory portion of the trace. The timebase speed should not be set too high when making tests of this sort. A frequency of about 10 to 20 cycles is best. Higher frequencies may cause ringing of selective tuned circuits and distort the shape of the passband. It is also important to switch off AVC circuits and it may be helpful to disable the local oscillator to avoid spurious signals or distorted traces. It is also important to avoid overloading the receiver by applying too large a signal as this would result in an excessively flat topped trace and give the impression that one has obtained a better curve than is in fact present! Too little signal, on the other hand, may result in the disappearance of side lobes which would show up with higher level inputs—so it is obvious that extreme care is necessary in making these tests.

The signal to the Y-plates may be taken at the DC output of the detector stage of the receiver under test, in which case the trace would appear similar to that shown in Fig. 7D. It is possible that this trace may appear on the screen "upside down" depending on the polarity of the signal taken from the receiver. This is of no importance to the operation, but if this unduly worries the operator he can reverse the image by introducing a low gain single stage amplifier in front of the "Y" input socket, or he can reverse the connections to the Y-plates (or he can even turn the 'scope upside down!).

However, taking a signal from the detector is not, in the author's opinion, the best one. Distortion of the trace is very liable to occur and a much clearer trace results if the RF signal into the detector is taken to the "Y" amplifier, rather than the rectified signal. Fig. 7E, shows the shape of the trace which then results and it can be seen that as the signal is now unrectified, the problem of inversion does not occur. The main advantage obtained by using a wobbulator is that every adjustment to the circuit can be instantly observed and thus there is a tremendous amount of time and hard work saved when one is aligning circuits. The easiest procedure is first to adjust all circuits to the centre of the passband using a signal generator tuned to this frequency, and then to switch over to the wobbulator in order to make the final adjustments.

Checking Modulation

While it is possible to obtain a curve such as that shown in Fig. 7A by feeding a sample of RF from the transmitter into the scope and setting the timebase to a suitable frequency, a much more precise method of checking is available if we disconnect the timebase and connect up the tube in the manner shown in Fig. 8.

A sample of the modulated RF output is fed to the Y-plates, and a sample of the modulating signal is fed to the X-plates. When modulation is absent the

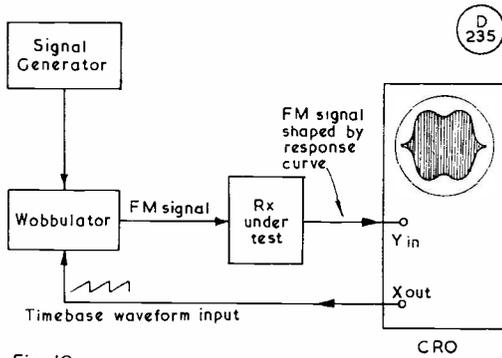


Fig. 10

Fig. 10. Layout of equipment for checking frequency response —see text.

trace will appear as Fig. 9A. This represents the carrier signal only. As modulation is applied the pattern will become more like that shown in Fig. 9B, and as the level of modulation is increased the trace will progress towards Fig. 9C, and eventually 9D. Trace B shows less than 100 per cent modulation while that in C represents exactly 100 per cent modulation, while trace D indicates overmodulation.

The percentage modulation can be calculated by measuring the lengths *p* and *q*, the straight sides in Fig. 9B. The modulation percentage is given by:

$$M\% = \frac{p - q}{p + q} \times 100$$

The edges of the trace should be straight. If they are not then some form of non-linearity is present and the equipment should be checked for instability, incorrect

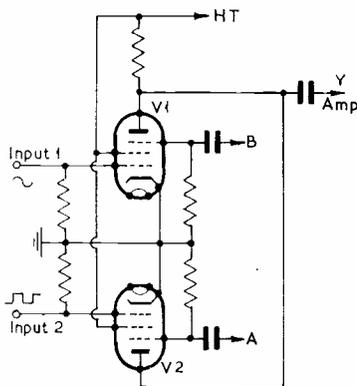


Fig. 12

Fig. 12. The basic circuit for a beam-switching unit. Depending on the type of valve used for V1, V2, they can be switched either on the screen, the suppressor or control grid; a frequency-changer type of valve will give best results. For V3, V4, pentodes are recommended, to give least distortion of the traces. R1, R2, is a 50K two-gang separation control, and R3, R4, a two-gang 500K speed control.

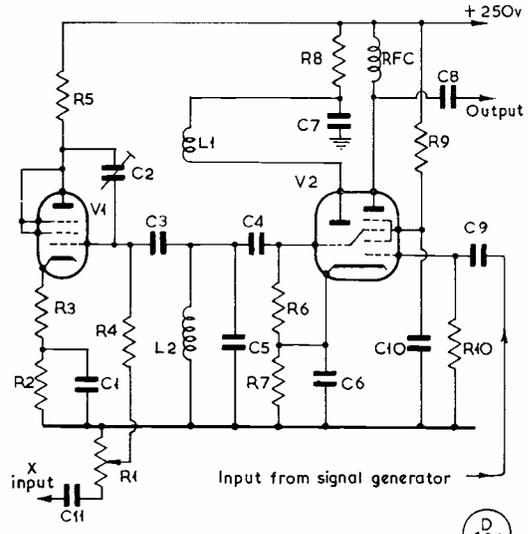


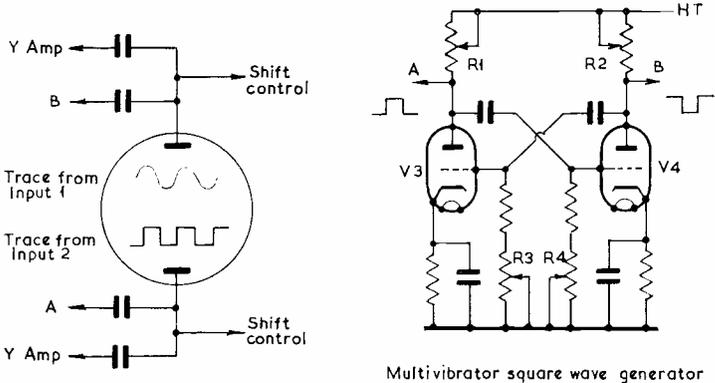
Fig. 11

Fig. 11. Typical Wobbulator circuit, for which values can be: C1, C6, C7, C10, C11, 0.1 μF; C2, 30 μF trimmer; C3, C4, C8, C9, 50 μF; C5, to tune L1, L2 to about 5 mc; R1, 1-meg. pot.; for sweep width; R2, about 150-450 ohms; R3, about 150 ohms; R4, 470K; R5, R10, 4.7K; R6, 47K; R7, about 150-450 ohms, R8, 18K; R9, 27K; V1, small RF pentode; V2, ECH81 or similar. L1, L2, to tune 5 mc. Experiment with R2, R3 and C2 values for best sweep and linearity with valve used.

matching, excessive or inadequate drive, incorrect loading and similar faults.

SSB Checking

While the foregoing method will work well for checking AM transmissions, it is necessary to use a different technique for checking single sideband equip-



Multivibrator square wave generator

ment. The set-up for doing this is shown in Fig. 9F. Here we are able to use the 'scope in a normal fashion, but we require what is known as a "two-tone" generator. This is a simple low-powered pair of oscillators (two transistors will suffice) operating at about 1,000 c/s and 2,000 c/s respectively. The oscillators are adjusted so that they both give equal outputs, which must be very pure in waveform, and this is fed into the microphone socket of the SSB transmitter. The latter is then adjusted for a trace similar to that shown in Fig. 9E. There should be no flattening of the peaks and the cross-over points should be clear and sharp when the transmitter has been adjusted for maximum output. If this is not the case then the transmitter has been incorrectly adjusted and it must be retuned and loaded until the correct pattern results. The whole subject is dealt with fully in the textbooks and it was also discussed in recent issues of *SHORT WAVE MAGAZINE*. It is not essential to have an oscilloscope to tune up an SSB transmitter but if one is available and a two-tone test can be made, the whole adjustment of the transmitter is very greatly simplified.

We have discussed the usual applications of oscilloscopes in the amateur's workshop, but there are of course many other uses to which the instrument may be put.

A beam switching unit enables two separate signals

to be viewed at the same time, so that direct comparisons of traces can be made. Such units usually consist of a multivibrator square-wave generator, the output of which is applied to the Y-plates. If the speed of the square wave is slower than that of the timebase, the beam will appear as two horizontal lines separated by an amount depending on the amplitude of the square wave. The same square wave can be used to switch two different input valves on and off. If two different inputs are fed, one to each of these valves, then the two separate inputs may be viewed on the screen. Fig. 12 shows in basic form the circuitry necessary to enable this to be done.

Amongst many other uses, the Oscilloscope can be of great value in some of the following applications:

- Examination of waveforms from TV video and sync. circuits.
- Examination of switching characteristics in DC/DC converters.
- Adjustment of mark-space ratio in automatic keyers.
- Adjustment of key click filters.
- Time measurement.

One could undoubtedly add more to this list but it is hoped that sufficient has been said in the last few pages to illustrate the possibilities.

PLUG-IN MODULES FOR CIRCUIT CONSTRUCTION

The *Pidam* series of plug-in modules enable logic systems to be designed and bread-boarded, for testing the circuitry, in a matter of minutes. The 16 standard modules available in the *Pidam* range each carry out well-defined functions and are easy to combine. They can be directly inter-connected and a wide variety of circuit systems is possible, using printed-circuit boards, into which the encapsulated units can be plugged. Various items of auxiliary equipment go with the range of modules, to enable circuits to be assembled easily and correctly.

For experimental and instructional purposes, kits are

available. Kit No. 1 enables a large number of devices to be built, and the more advanced Kit No. 2—which incorporates the No. 1 and is a good deal more sophisticated—is suitable for professional and laboratory work. Some of the devices described in the *Pidam* booklet are: A light-operated switch; a timer, with a range of 15 seconds to 5 minutes; speed monitors; a temperature-operated switch; dividers and counters; and a voice-operated switch.

All *Pidam* items are individually priced and—for what they are and the quality of the units—are very reasonable. For instance, the AND/EF (AND Gate/Emitter Follower), involving a transistor, four diodes and three resistors, in a neat plug-in mounting, and connected to give a powerful -V pulse, with no capacitive loading on a previous stage, costs 18s. 6d. The price of the No. 1 Kit is 19 guineas. The *Pidam* Logic System is produced by West Hyde Developments, Ltd.



A "Pidam" plug-in unit of the type described in the accompanying notes. The BI is a bi-stable, triggered by +ve pulses, and can be used as a divide-by-two unit.

SIDELIGHT ON CURRENT AFFAIRS

We applaud the 4X4's on their recent tremendous success in the hard, fundamental business of fighting out their own battle, and winning it. Whatever one's interests or opinions may be (religious, political, military, economic or just working the DX), it was a tremendous achievement on the part of the Israelis. In the Amateur Radio context—which is only what we can be concerned with here—it is germane to our theme to record that in Israel radio amateurs have always been licensed freely and with no more than the restraints and controls that are accepted in the rest of the civilised world. On the other hand, in the Arab countries engaged in the June war (though a few "special cases" are listed), nothing like Amateur Radio as we know it is permitted.

HIGH-PERFORMANCE GROUND-PLANE SYSTEM FOR FOUR METRES

SOME DIPOLE THEORY —
DERIVATION OF THE GROUND-
PLANE — COMPARISONS WITH
A VERTICAL DIPOLE —
MATCHING AND FEEDING

P. HARRIS (G3GFN)

This is a useful and interesting article in which it is shown how theory can be applied to practice with the object of producing an effective ground-plane system for our 4-metre band, to give results markedly superior to the conventional vertical dipole. In the course of his investigations, our contributor devised an ingenious method of matching the system accurately at the resonant frequency. While the treatment may be thought over-elaborate, it will be seen that the discussion proceeds logically, to lead to full details for the construction and setting up of an efficient radiating system for the 70-megacycle band.—Editor.

EXPERIENCE gained during the operation of a fixed station on 4 metres indicated that the commonly used vertical dipole was not the most satisfactory aerial with which to work mobile stations on this band. In addition, and despite running the maximum permitted transmitter power, results with fixed stations at distances exceeding 8 miles tended to be disappointing even though (depending on propagation conditions) stations in excess of 60-100 miles could sometimes be heard and worked at appreciable strength.

While the situation could have been improved by the use of a colinear array it was considered that such aerials are better suited for working GDX, and that for contacts with mobiles within a radius of about 12 miles, together with semi-local fixed stations at up to 20 miles or so, it should be possible to produce a simple omnidirectional aerial showing a better performance than that given by the vertical dipole.

It will be noted that the accent is on an omnidirectional aerial as opposed to any highly directive system. When working mobile stations which are continually changing geographical direction, or a number of local or semi-local fixed stations at different points of the compass, the need to change the bearing of a directive array is an unwelcomed complication. For this type of operation therefore, the omnidirectional aerial has distinct advantages.

Prior to dealing with the ground-plane aerial, it

it pertinent to examine the reasons for the behaviour of the vertical dipole, and also the effect of the angle of radiation on the distance covered.

Angle of Radiation, Aerial Height and Distance

At VHF, and UHF, while communication may take place between points as a result of tropospheric refraction, sporadic-E ionisation, aurora, ducting or some other mode, for the majority of systems it is the *normal* behaviour of the space wave which is the determining factor in respect of the distance which can be covered. As the space wave travels essentially in a straight line, it is important that the transmitting aerial should concentrate the radiated power in the direction of the horizon. That is, it should be radiated at a low angle.

Due to the action of the atmosphere adjacent to the earth's surface, the space wave is formed into a slight curve, and fortunately for us all this results in the radio horizon being at a greater distance than that of the optical. Generally the space-wave horizon is considered to be $1.4\sqrt{H}$, where H is the height of the aerial in feet, and the resultant distance in miles. It should be noted that the distance obtained will be that for a single aerial, and that the *total* possible path length will be the sum of the distances individually applicable to the transmitting and receiving aerials. For example, if both transmitting and receiving aerials are at a height of 30ft., then while their *individual* distances will be about 8 miles, the overall path length to be expected would be 16 miles. With a fixed station having an aerial at 30ft., and a mobile with an aerial at, say, 5ft., then the path length could be:— D_{fs} 8 miles + D_{mob} 2.25 miles = 10 miles approx.

This method of determining total path length presupposes (i) Angles of radiation not exceeding 10 degrees, (ii) Normal propagation conditions, and (iii) Flat terrain with an optical path to the horizon from the aerial position. The last requirement is not often met in practice, and if there are natural or man-made protrusions in the path of the space wave, either the path length will be reduced, or the signal attenuated to some degree. When calculating distance, it should be remembered that the

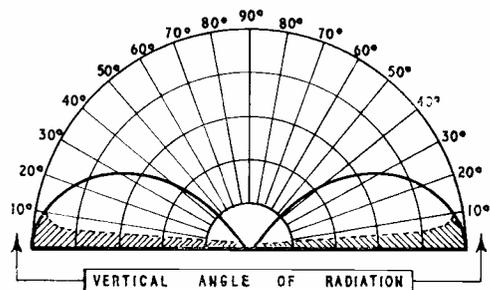


Fig. 1. Lobe and radiation angle of a vertical half-wave dipole with its centre a quarter-wave above ground. Shaded portion below about 5° indicates no radiation due to ground losses. White peak radiation occurs at around 10°, overall radiation ± 3 dB is between 5° and 30°.

height H must include the height of the ground itself above sea level. For example, two mobile stations, each sitting on top of a hill giving them an effective height of 400ft. a.s.l., should, subject to intervening screening, be able to communicate over a distance of 56 miles always provided that sufficient power is employed to overcome the transmission path attenuation factor.

Angular Radiation Patterns

It will now be apparent that while aerial height is important in determining the potential path length, to achieve the theoretical distance requires that the transmitted power is radiated at a low angle. Aerial height alone does not automatically guarantee long distances, and it is for this reason that the range achieved by a mobile station on a hill top is not usually as great as might be expected, for, due to a variety of reasons, the radiation angle of mobile aeri-als is usually higher than that which is desirable.

If the *angular radiation* diagram is plotted for a vertical dipole, the reasons for its performance begin to be apparent. While the *horizontal* pattern is a simple circle, in the vertical plane the power in the aerial is divided between a number of lobes at varying angles, the number of the lobes, their angles, and the relative power in them changing as the height of the aerial is altered. Further, due to the lossy nature of the ground itself, radiation at angles of less than 5° is normally highly attenuated. These effects are illustrated in Fig. 1 and Fig. 2.

From Fig. 1 it will be noted that a vertical dipole with its centre a quarter-wave above ground exhibits a single lobe, the major power of which is concentrated at about 10° . Taking the half-power points as the useful limits of the lobe, it will be seen that the main radiation is spread between 5° - 30° approximately. There is virtually no radiation below 5° due to ground losses. Since we are concerned with radiation at angles of 10° or less, the power in the lobe between the 10 and 30 degree points will contribute little to the received signal under normal conditions of space-wave propagation.

If the aerial is now raised so that its centre is one wavelength above the ground—about 14ft. at 70 mc—the angular pattern changes to that shown in Fig. 2. Instead of a single lobe, there are now three separate lobes at approximately zero degrees, 30° and 60° . Due to ground losses, by far the greater proportion of the power in the zero angle lobe is attenuated, and that which remains is effectively at 8° . It should be particularly noted that the power remaining in this low-angle lobe is not only less than that in the 30° lobe, but also appreciably lower than that of the low-angle lobe of Fig. 1. For the space wave mode, the 30° and 60° radiation angles contribute nothing to the received signal, and the power in them may be considered as wasted.

The inference from Figs. 1 and 2 is that, in the case of a dipole, by raising the aerial the power in the lower radiation angles is reduced, and that, for space-wave communication under normal conditions, instead of improving the performance, increasing

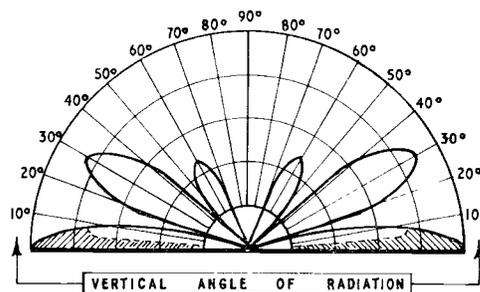


Fig. 2. Lobes and radiation angles of a vertical half-wave dipole centred a full wave above ground. Shaded portion below 5° indicates no radiation due to ground losses. Note (a), reduced power in ground-wave lobe at 8° compared to Fig. 1; (b), major radiation occurring at 30° , and (c), formation of a further lobe at 60° .

height will degrade it.

The patterns given in Figs. 1 and 2 were obtained by multiplying one lobe of the free space pattern of a half-wave dipole by the earth reflection factor which applies to each wave at the height specified, so giving the relative strength in each angle and lobe. Limited field tests conducted subsequently indicated that these angular radiation patterns are substantially correct, and have served to reinforce the conclusions reached as a result of effects noted during the operation of a fixed station with a dipole aerial.

Standing Waves and Radiation Angle

One matter not so far covered relates to the support for the dipole, and the feeder cable itself. Due to the fact that the lower element of the dipole will invariably be near to the mast and/or the descending feeder, standing waves are likely to develop on the mast if it is metal, or on the outer of the co-axial feed line where the support is wooden. If this occurs, radiation from the metal mast, or the outer of the feeder, will combine with that from the aerial itself and this will have the effect of further increasing the angle of radiation.

It should be particularly noted that these standing waves are not related to those caused by any mismatch between feeder and aerial.

Earth Losses and Matching

Disregarding radiation at angles higher than those which are likely to contribute to space-wave communication, Figs. 1 and 2 show that as a dipole is raised, so the effects of earth losses on the low angle wave become more pronounced. Since no earth is ever a perfect earth, and the magnitude of the losses invariably changes from location to location, it becomes impossible to predict with any accuracy the precise performance to be expected from a vertical dipole even if its height above ground level is known.

Additionally, and in a manner similar to its horizontal counterpart, the radiation resistance of the system will change as its elevation is varied. While at heights greater than two wavelengths above true

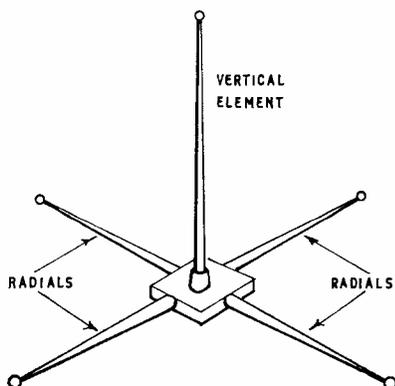


Fig. 3. Construction of a typical ground-wave aerial.

ground (which is not the earth's surface but which generally lies some indeterminate distance below it), such changes are generally within plus or minus 5 per cent. Below this height the radiation resistance can show large differences above and below its nominal value. Thus, any matching undertaken at a convenient height will probably not hold good when the aerial is elevated to its operating position. This is a difficulty frequently met with in amateur installations.

Performance Objective

With the foregoing in mind, it is now possible to be specific concerning the characteristics which an omnidirectional aerial should exhibit if the desired performance is to be achieved. They may be summarised as follows:— (a) The greater part of the power radiated by the aerial should be in a lobe having an angle not exceeding 10 degrees, (b) There should be no major change in this lobe irrespective of height, and the aerial should not develop secondary high-angle lobes with changes in elevation, (c) Steps must be taken to reduce the effects of earth losses, and matters must be arranged so that they are predictably constant irrespective of changes of geographical position and height, (d) The performance of the aerial should be substantially unaffected by the proximity of any metal mast or the descending feeder, (e) The aerial should be easily matched to co-axial feed line, and show an SWR not greater than 1.5:1, and (f) It must be relatively simple to construct.

A survey of suitable types indicated that the ground-plane aerial virtually met the specification in full, and, subject to (a) the adoption of a particular matching technique and (b) attention to the lengths of the radial elements, this has proved to be the case. Subsequent fixed-station operation has proved the ground-plane aerial to be described infinitely superior to any of the dipoles previously employed.

The Ground-Plane Aerial

The ground-plane aerial, which is illustrated in basic form in Fig. 3, is an asymmetrical system in

which a quarter-wave vertical element operates against an earth plane formed by four quarter-wave radial elements spaced at 90° intervals.

Depending on the relationship of a free-space half-wavelength to the diameter of the vertical element, the radiation resistance of a ground-plane will lie between 25 ohms and 33 ohms. For the usual diameter of vertical element, and where the length of this element is between 100 and 1250 times the diameter of the material employed, the radiation resistance will be between 30 and 32 ohms. When calculating the lengths of the various elements,

they are usually determined from $L = \frac{5906}{d \cdot f}$ where L

is the decimal length of a physical half-wave in relation to the measurement of a free-space half-

492
wave derived from $\frac{492}{mc}$ feet, d the diameter of the

elements in inches, and f the frequency in mc. (Note that the calculations are for a half-wave, and that the results must be divided by two to arrive at the actual element lengths.)

As the ground-plane aerial creates its own earth image, variations in radiation resistance with changes in height above ground are virtually eliminated. This attribute means that matching adjustments made at some convenient height will hold good when the aerial is raised to its working elevation. For the same reason, *i.e.*, a built-in earth image, the angle of radiation will remain constant irrespective of height and geographical location. In addition, since the feeder will fall away beneath the ground-plane radials, it is screened from the radiator and there is little possibility of standing waves developing on the outer of the feeder, or on any metal mast.

Being an unbalanced aerial, the ground plane is particularly suited to co-axial feed, and, with a suitable matching arrangement, there is no difficulty in achieving an SWR of better than 1.1:1.

Initial Ground-Plane Aerial

The first ground-plane aerial constructed followed conventional lines, and its performance, while superior to the vertical dipole, was not so outstandingly good that it could be called a remarkable improvement. In this, the radials and the vertical element were cut for a corrected quarter-wave in relation to the diameter of the rods employed. Matching to the feed line was by means of a 52-ohm quarter-wave Q section, the length of which was corrected for the velocity factor of the cable. As an alternative, the vertical element was shortened, and the reactance tuned out by means of a closed-ended stub. In the latter case the feed line was of 52 ohms impedance, and in the former 75 ohms.

Neither system could be made to produce an SWR of better than about 1.5:1, and both entailed a series of adjustments to arrive at the best figure. Altogether matching was a tedious business.

Revised Matching Method

Both of the methods used on the initial ground-plans aerial for matching are commonly used in commercial practice. However, there is another method, and although this entails a physically larger aerial for a given frequency, the increase in size for a 70 mc system (or higher) is not so great as to be troublesome. By comparison, matching is child's play. Not only this, but for all intents and purposes, a perfect match can be secured between feeder and aerial. This is by varying the length of the vertical element.

As the length of the vertical section is increased beyond a quarter-wave, the radials remaining fixed, the impedance at the base of the vertical section increases. Thus, by suitably proportioning the length of this element it is possible to arrive at a value which precisely matches the characteristics of the feeder cable. Provided that the aerial appears as a resistive load, then optimum transfer of power will take place.

The length of the vertical element which are of principal interest, since they correspond to feed impedances equal to those of commonly used coaxial cables, are:—(i) $\cdot 28\lambda$ (100°) which produces 52 ohms, and (ii) $\cdot 32\lambda$ (113°) which gives 75 ohms.

Matching is not just a question of extending the vertical element, however. While increasing the length beyond a quarter-wave raises the impedance, since the vertical element is no longer resonant at the desired frequency but at some lower frequency, on the frequency of interest it behaves as a quarter-wave section with an inductive reactance in series. The extent of this reactance depending on the effective additional length. At $\cdot 28\lambda$, where the impedance is 52 ohms, the reactance is of the order of 100 ohms; and at $\cdot 32\lambda$ for an impedance of 75 ohms, the reactance amounts to about 200 ohms.

As the termination is no longer resistive, standing waves will occur on the feed-line unless steps are taken to cancel the inductive reactance. This is accomplished by including at the base of the vertical element, and in series with it, a capacitor showing a similar reactance. Being of opposite signs the

reactances cancel, and the feed point becomes resistive restoring optimum power transfer.

Due to a number of variables, it is not possible to be precise concerning the extent of the inductance which will be encountered in a practical aerial, and for this reason it is desirable to make the series capacitor an air spaced tuning type. However, having said this, it must be appreciated that the more accurately the vertical section is dimensioned, the closer the feed impedance will be to the desired value, and after the inductive reactance has been neutralised by the series capacitor, the nearer the resistive resultant will be to the feed-line impedance, and the better the power transfer from feeder to aerial.

Where the co-axial cable has an impedance of 52 ohms and the vertical section is $\cdot 28\lambda$ long, a capacitor with a maximum value of $50 \mu\text{F}$ should be fitted, and where the cable has an impedance of 75 ohms, and the vertical section is $\cdot 32\lambda$ long, a condenser with a maximum value of $25 \mu\text{F}$ is required. These values naturally only apply to 70 mc. When adjusted, the moving vanes will be in a position approximating to between 30 to 50 per cent of the maximum capacity value.

Length of Radials

In the first ground-plane to be constructed using this method of matching, the radials were cut to a corrected quarter-wave by applying the length-to-diameter correction formula. While the system performed in a highly satisfactory manner, it was decided to substitute radials cut to a free-space quarter-wave. Investigation with a probe indicated that this produced a further lowering of the lobe angle, and as a consequence, the aerial is now operated with free-space dimension radials.

(To be concluded)

SCOUTS ON-THE-AIR

Further to the notes about the Tenth Annual Scout Jamboree-on-the-Air (see p.288, July issue, *SHORT WAVE MAGAZINE*) we are now informed that another station of particular interest to be on will be ZS6JAM, at Mafeking. It was here that the late Lord Baden-Powell, while serving in the Boer War in 1900, first conceived the whole idea of the Scout movement.

SUMMER EDITION "CALL BOOK"

The U.K. section of the *Radio Amateur Call Book* is the latest and most up-to-date listing of G licence holders available in print—it includes all call sign addresses and QTH changes published in *SHORT WAVE MAGAZINE* up to and including "New QTH's" in our April 1967 issue, together with earlier notifications received by us for the May issue of the *Magazine*.

REMEMBER THE DATES

For the 1967 International Radio Communication Exhibition (the Amateur Radio show) at the New Horticultural Hall, Vincent Square, Victoria, London, S.W.1, are September 27-30 (Wednesday to Saturday) open all day.

HALLICRAFTERS IN THE U.K.

For many years now—and that means since before Hitler's War—the name of Hallicrafters (of Chicago, Illinois) has been synonymous with a wide range of high-class amateur band equipment. Many of the earlier Hallicrafters models of communication receivers are still widely in use, not only in the U.K. but in all parts of the world. Under a new business agreement, the firm of Electroniques (Prop. STC, Ltd.) will henceforth be handling exclusively in the U.K., the sales, service and marketing rights in Hallicrafters professional radio and amateur-band apparatus. The latest Hallicrafters equipment in which amateurs would be interested was described and illustrated on pp.138-139 of the May issue of *SHORT WAVE MAGAZINE*. Further details can be obtained on application to: Electroniques (Prop. STC, Ltd.), Edinburgh Way, Harlow, Essex.

CATHODE-RAY PHOTOGRAPHY

NOTES ON A PRACTICAL PROBLEM

E. JOHNSON (G2HR)

OCCASIONS often arise when it is not possible to give a "live" demonstration of cathode-ray oscillographs. The photographs shown here are the result largely of trial and error, but will give some guidance for publication and lecture purposes.

The writer is of the opinion that a reflex camera is an essential to avoid parallax error on close-ups. The photographs were taken with a Voigtlander Bessamatic, exposure $\frac{1}{4}$ -second at aperture F4 with a 3-diopter close-up lens. No difficulty was experienced in using a medium-speed film, viz. FP3, series 2. This film's rated minimum exposure index is A.S.A. 125, and the sensitivity is increased in the yellow-green region, thus giving better results to record phosphor P1 than on the earlier type film. The cathode-ray tube used was the Du Mont 3RP1, spectral range 4950-5800Å. (yellow-green). A blue trace, which has a greater actinic value, will give satisfactory results at a higher shutter speed. The film was developed in Unitol. A rigid tripod, or other means of rigid support, is an essential. Admittedly, the Bessamatic is an expensive camera, but there is no reason why good results should not be obtained with one of

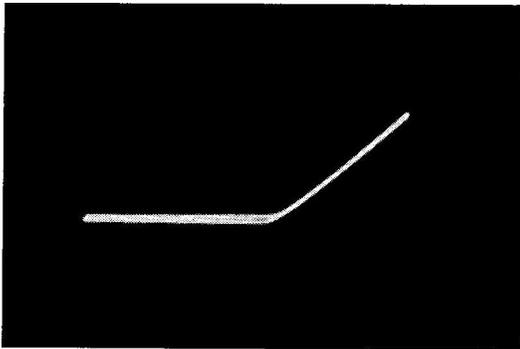


Fig. 1. A silicon diode, with 3.15v. r.m.s. applied—see text.

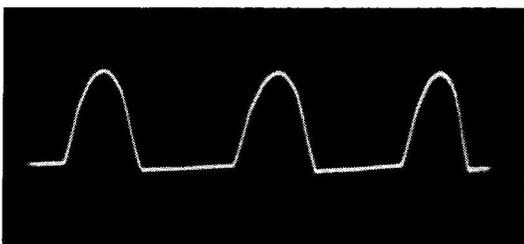


Fig. 2. Trace when using half-wave rectification, with some evidence of reverse current.

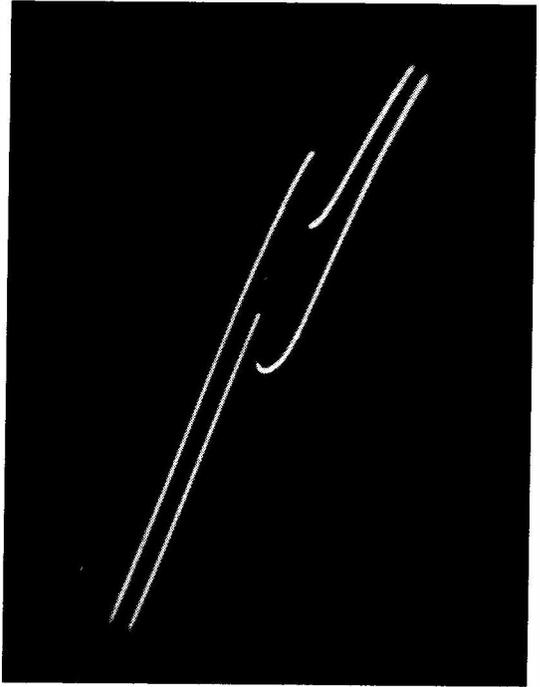


Fig. 3. A tunnel-diode trace showing the bi-stable regions.

a more modest nature. Just prior to exposure the brightness was turned up as high as was consistent with spot defocussing and overall tube "flare," which could destroy contrast. It is clearly important that no external reflections show on the tube face which could cause disastrous "fog." Nothing more powerful than a 3-diopter close-up lens should be used, as the depth of field is very shallow, and a marked fall-off in definition could well occur with the usual curved-face tube.

Some Results

Fig. 1 shows the characteristic curve of a silicon diode with 3.15 volts r.m.s. applied. In order that a true picture could be obtained, care was taken that

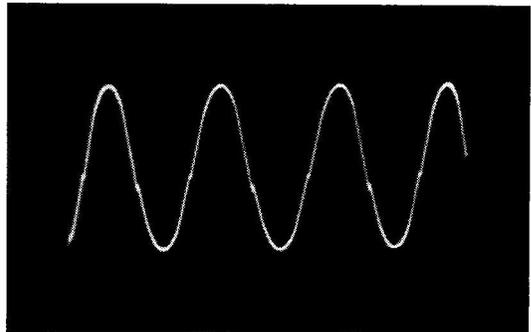


Fig. 4. Blip in the bi-stable region showing different points which occur with forward and backward sweeps.

“X” and “Y” plate amplification were equal. There are, of course, cases where gain on one of the axes is required to be different in order to show special effects. It will be observed that the forward direction is remarkable linear. Examination of this trace and that of Fig. 2, where the negative half-cycle is not parallel with the X-axis, gives evidence of slight conduction in this region, which is what one expects with semiconductors.

Fig. 3 is of particular interest in picturing the characteristic curve of a tunnel diode, and demonstrates a bistable condition as proved by preliminary tests with a battery and meter. Gradually increased applied voltage showed a sudden drop in current around 0.6 volts, but voltage had to be decreased markedly below this value before current increased once again and then fell linearly, or substantially so. This effect occurs when passing through the negative resistance “valley.”

Fig. 4 shows this effect clearly when a 50-cycle sweep is applied, and the “blips” are quite obvious on the few cycles displayed. An expanded trace of one half-

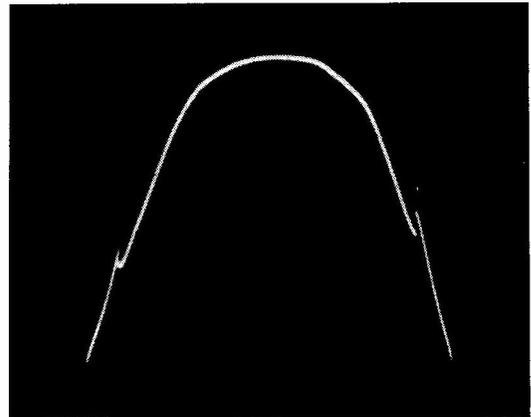


Fig. 5. An expanded trace to demonstrate Fig. 4 more clearly.

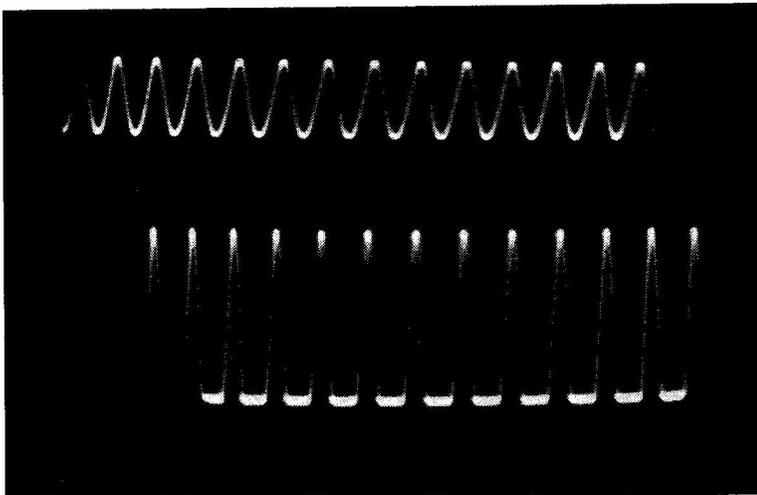


Fig. 6. Input/output distortion, showing predominance of even-harmonic distortion.

cycle only shows the point even more clearly, and demonstrates the non-coincidence differing by some degrees over 180° . There is evidence that the half-wave is not perfectly sinusoidal as compared with the previous picture. This is undoubtedly due to excessive amplification on the Y-plate amplifier in order to obtain a sizable display, and is a well-known feature in many oscilloscopes, demonstrating the precautions that must be taken in order to obtain a faithful trace.

The Bessamatic camera has a useful feature which enables one to reap the advantages of a double-beam oscilloscope, when using a tube without splitter plates or external electronic beam switch. A lever on the camera can be used to cock the shutter without advancing the film. Fig. 6 was taken by this means. The first trace illustrates a sinusoidal input to an over-biased amplifier. The shutter is then recocked, without frame advancing, and the vertical shift control altered to accommodate the second trace. Owing to amplification in the output of the amplifier, it is necessary to reduce “Y” gain before re-exposing. Severe bottoming is seen on the

second trace indicating second-harmonic distortion.

All work was done with the American oscilloscope OS/8U manufactured for the American Bureau of Ships, and is obtainable on the surplus market at a reasonable price. Its circuit or manual does not appear available in this country, but the writer was able to obtain a large and very clear diagram from the Hickok Instrument Co., Cleveland, Ohio.

ESPERANTIST STATION IN POLAND

For the Third International Esperantist Holiday—at Miedzygorze, Lower Silesia, Poland—which is to be from September 20 till October 3, the Warsaw radio amateur Club group will be putting SP6PAM/6 on the air for all-band operation. About 300 esperantists, from at least ten countries including the U.K., are expected for the Holiday Fortnight, during which SP6PAM/6 will be looking for QSO's with esperanto-speaking amateurs throughout the world.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

IT really is amazing how Murphy's Law selects the moment to strike at the unwitting DX'er. Your poor old conductor, having spent a large proportion of his time in the last month in the shack with the soldering iron, with the object of tying together both transmitters and both receivers into one system, using break-in CW—and, of course, only hearing DX whenever the Tx was upside down—finished it all, and fired up on Top Band to do a test. Not only did it work, but a phone call from an SWL assured that the signal was getting out to quite reasonable distance for the time of day. So he went to bed a happy man. The following evening, upon his return home, for no apparent reason the long-wire was flat on the floor.

No problem at all—because the halliard is continuous and separate from the support ropes for the aeriels, so that the loose ends can be retrieved and another length, complete with wire and insulator, hauled up with no necessity for going up on the roof. Alas for hopes—the old one refused to come down, and so the ladder had to come out to reach up and cut away the ends which had by now become tangled up in the pulley. When all was set to rights again, it was found that the insulator had broken in such a way as to release the wire while still retaining its hold on the aerial rope, the loose ends and bits of broken glass then falling away. So the problem was not realised till the wreckage had been released.

Just how the heck *does* one ensure that things never go awry at the top of the pole?

Around the Bands

By and large, things have been distinctly patchy, although it has to be admitted that, especially on 21 mc, there has been the odd opening of some reasonable quality—if you could find it! However, things being the way they have, no band has any claims to start the round-up, and

so we will just take 'em as they come, working from HF downwards.

At the top of the 10-metre pile here is the letter from G2DC (Ringwood), for whom things were none too good on 28 mc; however, Jack did manage to find CR6AI, ZE3JO—who was featured as "The Other Man's Station" last month—4Z4AG in Tel-Aviv, and 9J2MX.

G3NOF (Yeovil) echoes the G2DC sentiments, but mentions several openings to South America. During the day, there was a lot of short-skip stuff about, but the early evening on July 8 showed a good opening to the States, with signals from W2, W3, and W4. The pick of the crop, from Don's point of view, were contacts with KP4CRD, VP2AA, K4VYN, WA4GVE, WA2SFP, ZD8CX, 8R1G, and 9X5SA.

As far as GM3JZK (Mull) was concerned, activity generally was down, although the odd short-skip opening yielded HB9 and DL, with GB2SM heard very strongly indeed. George had the misfortune to have the generator pack up on him, fortunately just before he went off on holiday, so that on his return the necessary bits and pieces were to hand for repairs, and to his surprise all the aerial farm was intact also. GM3JZK mentions that at last the Electricity Board have shown signs of getting round to him, but unfortunately they say the only place for the pole-transformer is right outside the shack window—is the QRN from the insulators, when they get dirty, worth it? We must admit having doubts!

Bert of G8DI has a very terse comment on the band—"You guess!!" Similarly, GM3SVK, for the short period during which he had the band under his eagle eye found only either nothing or short-skip.

Fred's fellow-conspirator in Unst, GM3KLA also found mainly short-skip, but does mention QSO's with CR6DA and ZD3I.

Fifteen Metres

Only an hour spent on the band in the whole period under review indicated quite clearly the feelings of G3UTS (Newcastle-on-Tyne), who raised ZC4MO on Phone and JA1KSO CW in that 60 minutes.

A rather amusing comment came in from G3VMQ who has received a QSL card for a 21 mc contact. Thus, says Phil, this means that "either some nut who has not heard of me did it, or some nut who *had* heard of me. In the former case my comments are not printable, in the latter case he must be mentally disturbed—only a *real* nut would knowingly use the G3VMQ call!"

From G3SML (Earl Shilton) we hear that Roy worked or called CE3ZN, CP1ER, EL9A, HC1DX, HI3JHV, JA's around 0745z, KG4AM, KV4's, KZ5SS, TU2BQ, VU2DKZ, ZD7DI, ZD8's and several such, during June.

Up in Golspie, GM3JDR found things distinctly variable, with short-skip much in evidence, W's and JA's more or less non-existent, until about 2100, when the paths changed to leave loads of South Americans working W's. CW contacts were made with CO2's, CX8CZ, EL2J, GD3AIM, HP1AC, JA's, including one with JA1SFB/MM near 4S7-land, KP4's, PY's, and various rarer parts of the USSR. On the SSB front the list is longer, including AC3PT, CE3, CR7, CX8CZ, EL9A, JA's, KP4, KV4, MP4B's, PY's, TU2AY, TY5ATD, VP9FC, VS9ARS, VS9MB, YV's, ZC4's, 5Z4, 9M2 and others in the African continent.

G3NOF also mentions the evening appearances of the South American stations, and found things during the day to have been poor, in general. Don's SSB was used to tie up with EL8C, XW8BJ, ZC4PC and 5N2AAY.

One of the best reasons for being up early in the morning is that offered by G2DC, who was on at 0500z and found a first-class opening

to W6 and W7—because he was awakened by one of his dogs. Having let the hound out, Jack was far too wakeful to go back to bed. A look at the 15m. band showed FO8, FB8, HK, KH6, VR5, VK, YN, and ZL, with the W6 and W7 areas “as plentiful as fleas on a Pi-dog’s back!” So, if you want to work DX—keep a dog.

Another early-bird was GM3JZK, and amongst his “worms” were VP6FD, OH0AA, UF6, 5Z4, UH8, VP8JD in the S. Orkneys, although YA1KO dived down the hole and was lost.

Nice long letter from G8DI (Liverpool) this month, mentioning much of interest heard, but only a few as worked; among these was CR6CN, at 2008 on a frequency of 21057 kc. The point of interest here is that at 1958 the CR6 sent “Back in ten minutes,” to the assembled multitudes—but none of them could have believed him, because Bert was the only taker when he reappeared!

For most of the period under review GM3SVK (Haroldswick) was Down South, and so not much in the way of the usual reportage is in his letter. However, he has found Fifteen open to South America and the Caribbean until the small hours—KP4BCL faded out on him at 0150 on July 5. In addition, there has been the usual spurge of short skip to G and Europe. A notable escapee was TY5ATD.

GM3KLA (Haroldswick), is clearly reporting on rather more than just the past month, and he says 21 mc has been his best band. As proof, he offers a long list of CW contacts, including 5Z4KL, CR6AZ, CR7LU/YL (?), HP1AD, XE, ZD3I, TA2AC, 9J2, PY0ARS/0, 9V1NV, FP8DD, CX’s, CE8AA, VP6’s, ZC4’s, UH8BO, KZ5GN, EA6BD, OD5LX, KG4DAY, KP4ATS, ZS, 9Y4LT and various JA’s.

Twenty Metres

Naturally enough, with the two highest allocations at flat as they have been, and summer static plaguing the LF bands most of the time, 14 mc has borne the brunt of the battle.

GM3KLA regards things as having been fair, albeit not so good as Fifteen, and offers ZS1XR, CE3AG, ZP5EC, FG7XX, UG6JJ, F2CB/FC,

FIVE-BAND DX TABLE

(New Cycle)

Starting date: January 1, 1967

Station	Countries	28 mc	21 mc	14 mc	7 mc	3.5 mc
GM3JDR	165	—	137	93	—	—
G3IAR	174	61	107	139	45	48
GM3SVK	160	24	100	125	35	15
G8DI	103	23	73	78	36	22
GM3KLA	109	38	67	64	36	44
G3VDL	90	24	59	59	31	7
GM3JZK	87	32	48	56	22	10
G3NUT	73	—	44	32	18	—
G3VWC	39	4	25	20	22	5
G3PQF	76	37	15	23	26	23
GI3GTR	44	1	12	35	12	9
VP8HJ	69	17	9	64	1	4
G3VOK	58	7	1	46	6	36
G3TTG	38	—	—	38	—	—

Note: Placings this month are based on the “21 mc” column.

KP4UW, UD6BU, IS1PEM, and IT1ACA.

SSB has not been a very profitable way of doing things this month for G2HKU (Sheppey), whose sked with ZL2KP has failed due to conditions, so that they have had to revert to CW to get through. In addition there were VK6AJ (*ex*-G3JJX of Sidcup), VK3CT, VK6RS, VK8HA (who has been keeping an eye on Ten from Darwin, but says it is no good yet) and VE7ARZ, all being worked at around 0700. On the SSB front a new one was YN1RTS, QSL cards for whom go to the American Embassy, Managua, Nicaragua; and there were VK5TJ, and I4CXD, which was a special station for an exhibition. Ted comments on a four-way with XE1FFA, XE1PLO, XE1RM, and XE1UE all speaking Spanish amongst themselves and very good English to work the DX, saying that it is amazing just how backward the English are at languages!

“Does the short-skip ever stop?” asks GM3JZK plaintively—but he battered a way through it by main force and managed to connect with

EA8FF, EP2HB, YV6AG, and HK3RQ, all on CW.

WA7BSQ (Renton, Washington) is mentioned by G2DC as being *ex*-G2BYA; Bob is using medium power to a vertical, and finds difficulty at times in working into G. Other *ex*-G’s worked from G2DC were VK3SR (*ex*-G6KP) and, on 28 mc, 9J2MX who is *ex*-G3MXJ. Although the bands were patchy, Jack also hooked CO3CS, EA6BH—who has a tendency to sign EA665!—FO8BU, FO8AW, TI2PZ, OA4PZ and VK2-8, the latter including VK8HA.

G3NOF suggests that “insufficiently early rising” accounts for the paucity of the DX found on Twenty this month, but nevertheless the G3NOF log includes I6REE, I9RB (ILO Neutral Zone near Turin), KP4CB/AM off the Bahamas, KR6MB *via* the short path; MP4BEU, TN8AA, VS9MB, XW8AW at 2220 and S9 over the short path; YA5RG, ZD9BI, 5Z4KN, 5Z4KO, 9M2NF and 9V1NV. In addition, Don mentions VK2FU, worked at 2137 over the short path, at S8 in the middle of a band-full of short-skip signals. All

his QSO's were SSB, a mode also used by GMCJDR for the only two contacts he mentions on 14 mc, with TF2WKM and KL7WAH.

Callsigns beginning with the letter H seem to have been the speciality of G3UTS, as for instance HL9KW, HI8XMT, HI8LAL, HR6EB, HK4DF, HK0AI, HC1MH, and HC5EJ! In addition, a few other callsigns appear in the list, such as CX9CO, JA8HO (on CW), all W call areas except 5 and 6 on SSB, and KV4EY, OA8AE, PY's, TF2WKM, UA9OH, and UA9KDL all the latter being on Sideband. A couple of AM contacts were made with FG7XL and LU3IQ. Incidentally, Reg mentions calling CQ DX on Twenty and being answered by a G3H and VK8HA—guess which one he took?

GM3SVK felt the 20m. band was not its usual sprightly self—no doubt the prescription should include a large dose of sunspots—but he managed a few contacts: DUIFH, FG7XL, HR2RM, K3FOY/OX5, KP4BCL, KZ5WI, MP4MAX, OA4XX, PJ3CC, TI2HK, TG9RN, VP9BY, VS9MB, XE's and ZE, 3A0DY/M, 5Z4IW, and 9X5BS.

As far as G8DI was concerned, for 14 mc his month was made by a QSO with a station signing 4X4UJ/K5, the reason for which does not take a lot of thinking-out; he also found YV, LU, KG6AAY, MP4BEU, EA6BD, CR6AI, and VK2EO, by way of the key, while

Reporting the HF Bands

the microphone was used to work 9M2PO and YN1LB.

Here and There

Comments here last time about lightning brought a letter from G2HKU, recalling a friend who was hit. The strike blew the coil-set out of the HRO and damaged the opposite wall, and in addition the bath was copper-plated and the toilet-chain welded into a solid length! On a more serious note GM3JZK says that he agrees that everything in sight should have a low-resistance path to earth, and mentions that an AVO in series with his Vee-beam legs to ground gives a reading of 5 mA during spells of charged rain, let alone in a storm.

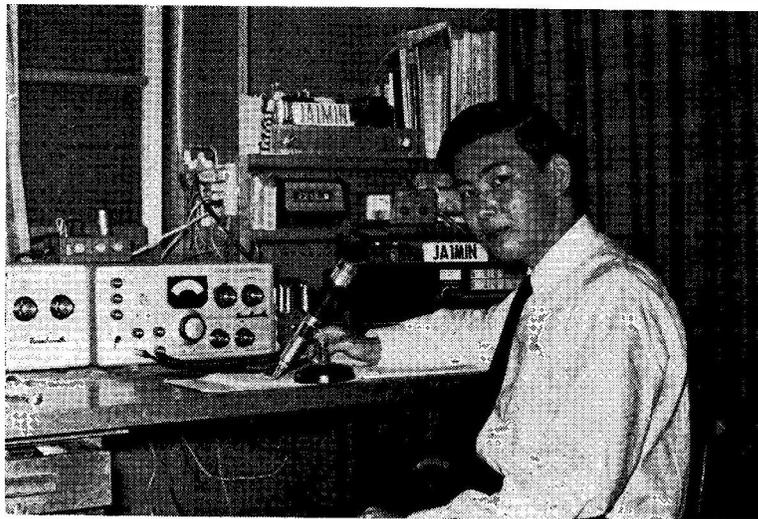
A different problem about aeri-als was mentioned in the June preamble and brought forth a reply from G3NOF last time out. This has now been taken up by G3SML (Earl Shilton) who not only failed to get his planning permission, but also finds that the local council is talking about putting pressure on him to drop his present guyed wooden pole, which has been there, minding its own business, since 1958! However, your conductor can add a point in here, to say that a local councillor, with whom he

takes his lunch most days, is quite adamant that what matters in such a case is the *permanence* of the structure, and that they are just not interested in any temporary erections—hence, it would seem that the move is to drop the thing for a week, and then to put it back up, proving it to be "temporary."

The most unsatisfactory (and disturbing) feature of this whole problem of planning-permission-for-antennae is how the official attitude varies between authorities—in one district, the local Council can be easy and reasonable, while in another all sorts of difficulties are created. Unfortunately, the Council has the law with it, and there are not many amateurs who can cope with the trouble and expense of forcing the issue to a public inquiry—though it has been done, and successfully.

Yet another tack, this time entirely different, comes from G8DI, who mentions that G3AAQ has returned to the air, "having run out of steam-engines to record on tape." Jake and Bert obviously do not agree on the need for steam, as G8DI describes them as "Gresley Pacific 4-6-2 to Grisly Baltic 4-6-7" which clearly proves he has no soul! As a sideline on this, G3AAQ featured largely in the first-ever NFD your E.P.E.

Michio Ogawa, JA1MIN, of Fumabashi, is a university student, 18 years of age, and is mostly to be found on 21 mc, for which he runs an FL-100B and a Drake-2B, with a 3-element Yagi outside.



ever attended (at Stourbridge), when it seemed nothing short of marvellous the way G3AAQ and G3BMY were monotonously saying "Gottim!" to all sorts of signals which the writer just could not hear!

Shortly after this issue appears, MP4MAX will be wrapping up at his Muscat QTH, and making the trip back to the U.K. Iain has been operational on the three HF bands, with the main activity on Twenty due to poor conditions on the other bands, and has used an SB-100 into a groundplane, or a dipole for Ten. The total score since he started was 109 countries in 35 Zones. As for the U.K. contacts, these were mainly between 1800 and 2000 GMT, although the total count of G QSO's was much lower than it need have been, thanks to an apparent lack of desire to listen in an eastward direction after about 8.0

p.m. each evening, although MP4MAX was "calling G's till he was blue in the face!" All card requests should be sent to Iain's home QTH, where he is G3SYW, and QTHR.

We are taken to task by ZE1JE for an inaccuracy in the June piece about the call ZE1AA. Apparently, this is not as old a call as was thought, being later than the series of ZE calls having the suffix first letter as a J, i.e. ZE1JA to Z, ZE2JA to Z, and so on; when ZE8JZ came round the local authority decided to adopt the more normal type of alphabetical arrangements—which ZE1JE says, had at the time of her letter reached only as far as ZE1CW.

Nice to hear again from G3PLQ, who should be signing /MM by the time publication-day comes round. John had a narrow squeak when the Israeli-Arab confrontation blew up, as his ship was in the Canal on June 1, and passed the USS *Intrepid* the same day. At the time of writing, his ship was laid up in Cadiz due to some sort of palaver with engines, involving dry-docking. On the /MM side, the G3PLQ frequencies will be 7025, 14025, 21025 and 28025 kc, using Drake equipment and a Mosley vertical, plus any other odd bits of wire he can string up out of the way.

Still on what might be termed the DX mail, a letter from 9M2XX (who was VS5JC) to say that he has now dealt with all cards so far received. If any have gone astray, another request to:—W.O.2. (F of S) Cooper, 17 Gurkha Signal Regiment, Sikamat Camp, c/o GPO, Seremban, Negri Sembilan, Malaya. 9M2XX enclosed some photographs of himself in the studio of Radio Brunei, and of the pieces he and the Regiment made up as a thank-offering to W5VA, his QSL manager, who gave so much time, energy, money and advice to make the VS5JC project a success. But sadly, the pictures were damaged beyond recall in transit.

VE3MH mentions that he is now G3WLJ, and resident in U.K. for a few years. He will be on various bands using a KW-2000 and his present HW-12 transceiver. Keith wants to know if there are any Clubs in the Orpington/Farnborough area—which will be best answered by a look at the Address Panel of the

"Clubs" feature in this and recent issues. Similarly, a letter from R.A.F. Edzell informs us that WA2DHF is now GM5AHS and hoping to hook up with the G's.

9M6MG writes that he is now QRT from there and back in the U.K., his new QTH being GRSF, R.A.F. Chivenor, nr. Barnstaple, N. Devon. Ian would like to thank all those who, in one way or another, assisted, or offered assistance, to him when he was in Borneo. As for the cards, these are being dealt with, and the chore should be completed very shortly.

QSL Cards

Last month's letter in answer to G3IDG, from 3C3EFX, has resulted in a "counter-counterblast" from G3IDG, who feels that 3C3EFX made him seem a very unobliging sort of chap—but in his first flush of enthusiasm he used to QSL 100 per cent direct, gradually falling back to his present policy of QSL'ing all first contacts *via* the Bureau. However, Allan emphasises that in fact he is always ready to QSL direct if a card comes in before he has despatched to the bureau, and is accompanied by the return postage. In conclusion, G3IDG points out that if all the IRC's and unfranked envelopes were given to RAIBC, the GPO will buy back, albeit at a reduced rate, the stamps purchased with the IRC's, while unfranked envelopes bearing overseas stamps could no doubt be sold to a stamp-dealer, and in both cases the Club would benefit financially.

Changing his tack entirely, to the aspect of QRP working, G3IDG reports hearing that SMØKV, in QSO, was saying that he had made DXCC using 9 watts, and 200 countries worked using no more than 15 watts—which only goes to prove the truth of the argument that QRO is not essential to DX'ing, provided that the aerial system is capable of doing its stuff *properly* (and the operator knows his) which not all that many do.

Eighty and Forty

So very little is mentioned of these two that once again they are lumped together, leaving out of account this time the remarks such

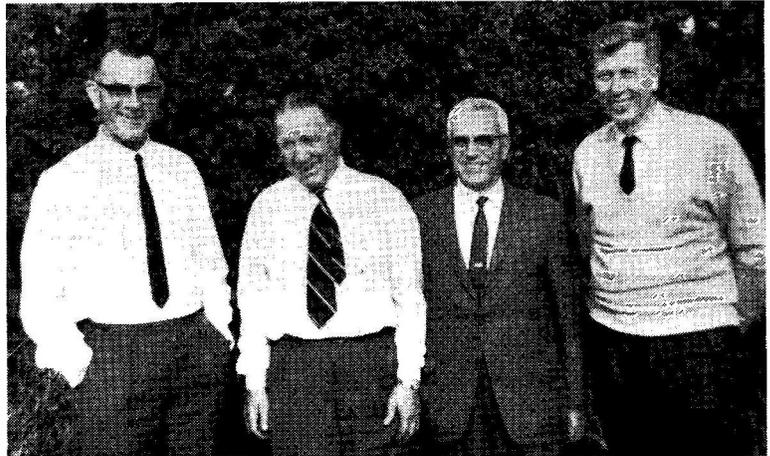
TOP BAND LADDER

(G3U-- and G3V-- stations only)

Starting date, January 1, 1966

Station	Counties	Countries
G3UTS	94	15
G3VGR	90	16
G3UBW	85	18
GM3UVL	85	13
G3VMW	83	16
G3VLT	75	15
G3VMK	70	11
GW3VPL	68	16
G3VMQ	67	14
GW3UUZ	66	15
G3UVT	64	11
G3VES	63	16
G3UGF	62	10
G3VOK	61	15
G3UXP	56	9
G3UJS	51	12
G3USE	51	12
G3VTY	49	9
G3VSL	47	9
G3UGK	43	13
G3VLX	43	8
G3UMK	39	7
G3UCS	36	—
G3VSI	19	4

Photograph taken on the recent visit of, left to right, PA0PN, G4FN and W2DED to G2HKU (right), of Minster, Sheppey, Kent. These four calls cover between them about 140 years of amateur life. PA0PN, well known as a 160m. exponent, is also very active on two metres, for which he has fully transistorised gear. W2DED is with General Motors, N.J., but started as a sea-going radio operator in ships on the Atlantic run, so he knows the European coast stations.



as "Only noise" and "Didn't even bother to look" which pepper the letters.

9H1AB on both bands plus OY4M and EA5HT on Forty about sums it up as far as GM3KLA was concerned, while G2HKU offers CN8AW, PY7LAK and PY7ARJ, all around 7070 kc at 2130z.

G8DI got up early one morning, and all he heard for his pains was an oddity signing LD3KMQ, but at other times raised W's and VP1MW, all of course on 7 mc; but even this was more than came the way of G3UTS, who only managed a few G QSO's on each band. GM3SVK worked PY7ARP, and heard a few W's in the late evening, but on 3.5 mc all he heard was static—very inspiring!

G2DC found CR6AI, VO1AW, UL7BA, UD6AW, all W call areas, and XE2KF on Forty, but dismisses 80m. with the comment "Really shocking, but W's *can* be worked if one goes to bed late enough or gets up early."

Top Band Notes

Here now the picture is vastly different, even though the summer conditions are well and truly with us, with static very troublesome.

W1BB (Winthrop, Mass.) has several interesting points to make. Stew has been attacking the North/South path of late, and reports that PY1NFC and SWL Rolf Rasp (in the same area), were both copying W1BB for an hour, 0400 to 0500z on June 11. Since then ZS6AM, near

Johnesburg heard W1BB/1 at 599 (W1AW at the same time being 569) on July 2 from 0355 to 0410z. In addition, Stew has been logged in the U.K. at various times, as mentioned by other reporters. W1BB also discusses the falling of yet another target in the Top Band DX line—this being the first-ever WAS Certificate—for working all 50 States—which has gone to old-timer W0GDH, to whom congratulations are most definitely in order. W0GDH, John Dormois, is located in Kansas City.

On the more local front, G3PNU (Bootle, Cumberland) is on Top Band AM/CW and proposes to continue there until the end of the year, to give folks a chance for his county. G3PNU says that he would prefer to QSL direct; this includes SWL reports, which will receive 100 per cent replies *provided* that a stamped address envelope is enclosed. (He is *QTHR*.)

Various people mention that OL4AFI (see p.151, May) is now OK1ATP, having graduated to the full OK1 licence. Likewise most of the letters make some reference to the various DX-peditions, albeit there is an odd one in the letter from GM3UVL (Glasgow) who was surprised to find, during the "static peak" on June 25, that both GM5PP/P, who was in Perthshire, and GB2IS in the Scillies, were at times calling and getting no takers. G8HX (Mansfield) mentions that there are frequently times when, to him, the band is open to OK, but the GM stations are weak; similarly,

when Frank finds DHJ rather down, there are almost invariably some Southern English stations to be heard, but DHJ-normal means the band is usually closed to the South.

G3UBW has been having quite a party with the expeditions, in particular GM5PP/P at his various stops, GM3ABM/P in Sutherland, and GB2IS. In addition he heard W1BB/1, W2IU, and W0VXO, the first and last of whom appeared to be working PY2PA.

G3VLT (Orpington) sends in his entries for the Tables, and comments on the difficulty he has in extracting the cards from the rarer stations even though a stamped addressed envelope is provided. . . .

GM3SVK seems very dissatisfied with the present state of the 160m. band, as his location seems to be poor from the static point of view. (Too near the North Pole!) The noise, however, did subside sufficiently to enable the odd contact to be made with the South of England.

G3UTS "knocked back" a few this month (wonder if we are talking about the same thing?), and mentions GM5PP in Selkirk, GM3RVM for Stirling, and Naim, with hopes of taking Orkney just after the deadline. This leaves him only Alderney, Sark, and Hereford to go for the full hand—and still no sign of a *signal* from Hereford, let alone a QSO!

Another cheerful type this time is G3VGR (Southend) who has gone up four in counties thanks to the activities of G5PP, G3PCM (who gave him Rutland) and GM3WIG

for Roxburghshire. Dave also mentions hearing W1BB/1, on the morning of July 9, from 0300 to 0325, 349 and peaking to 579, but failed to hook him.

G2NJ (Peterborough) gobbled up all there was to have, hooking G5PP on all 13 nights of Bob's trip; GB2IS, and GM3RVM from Nairn, Stirlingshire, and Kincardine, as well as GM3TXX/P in Invernesshire.

Nice to hear again from G3VMQ (Burgess Hill) who has finished exams, and been making up for lost time on Top Band. However, not much real DX has been worked thanks to the static level, but he has had the odd QSO with a G5-plus-three, which Phil found most interesting.

It sounds as though G2HKU was a little cross, as he says that nothing worth while was raised, although HAIQI was working OK's by the bucketful on June 17 at 2150z on 1847 kc. PA0PN and his XYL have been staying with Ted recently, and Piet has been making visits to some of his Top Band contacts. Incidentally, PA0PN finds much difficulty in getting cards out of the GM's—for shame!

GW3UZZ (Nash Point Light-house), without any gear, has been catching up on the QSL chores. In addition, Andy has had the pleasure of receiving the card for that daylight QSO with OE5KE which your scribe cast doubts upon in the February piece. From Linz to Llantwit Major is some hop for daylight on 160 metres!

Now to G3PLQ who is, of course extremely interested in Top Band working, and uses his /MM gear to listen on 160m. from all sorts of odd spots. He reported on a QSO by UA1SZ, which he heard while on the high seas, and also mentions a contact between 5A1TY and HB9NL, logged from the Gibraltar area on May 7. Nothing was heard in the Persian Gulf when checks were made on several occasions, although DHJ and WCC (2045 kc, Cape Cod, Mass.) were coming through with a reasonable QRN level around 0200z—these are always good indicators of band conditions.

DX-Pedition Notes

G3SJJ advises of a trip he, together with G3UEG and G3VTL, will be

making during September 9-23. They will be on from Peebles, East Lothian, Kinross, and Kincardine, using GM3SJJ/P on CW and the other two calls on SSB. They have one problem in the equipment line, namely that of a 300-500 watt generator, and would appreciate any suggestions.

For the sake of those who missed out on the G3GIZ affair in the Orkneys, GM3SVK hopes to go there at the end of September or beginning of October—more details anon.

A QRP and crystal-controlled Tx and Mohican receiver will be on Top Band from Inverness, and possibly Perth, before this piece is out, continuing to August 8, driven by G3VWC (Bishops Stortford). Just before Andrew goes QRT, on August 6 in fact, another one starts, this time with G3VTY, G3VQQ, G3DDL, G3WDW, and G3WGW, operating from Nairn. Skeds and suggestions regarding possible activation of other spots, or direct QSL cards, should be routed to G3VTY, *QTHR*.

A real old-time call enters the lists in the early part of August, in the form of G5PM, the Club station of the RMA at Sandhurst. This call has been in existence since 1926, and was originally issued when Sandhurst was the Royal Military

College (when the Academy was at Woolwich). They will be visiting Rutland, Cumberland, Westmorland and possibly some of the rarer small GM counties. All contacts will be QSL'd either *via* the Bureaux or, on a reciprocal basis, direct, the address in the latter case being: c/o Signals Wing, Royal Military Academy, Sandhurst, Camberley, Surrey.

Members of Gresham's School Amateur Radio Society (Holt, Norfolk), in the persons of G3ULF, G3VNH and G3VNV, will be going to Andorra (the lucky lads!), to sign PX1NV on all bands 3-5-28 mc. Times to look out for them is either 1200-1400 BST, or 1700-2100 BST, either 80m. SSB/CW or 40m. (CW only), when they hope to be working the G stations. Their dates are August 18 till the end of the month, so there will be plenty of time to get that rare PX contact.

Not quite a DX-pedition, but still very newsworthy, is the point made by G3GZN (Havant) who is going to ZB2, where he hopes to get a call and will then be QRV with a Heathkit DX-100U and an Eddystone 888A receiver.

Contests and Awards

A letter from 9Q5EP covers details of a couple of awards and a contest. The CRDC award requires



The station of G3HTB, Malcolm Sqaunce, 57 The Drive, Atwoodley, Leeds 17 has been shown in "Short Wave Magazine" before—in April 1955. Since then, many changes have been made, the rig pictured here consisting of a Codar-66 with PR-30X, RQ-10 Q-multiplier and AT-5 transmitter—in fact, an all-Codar station, which gives good results.

Station of ZS8L, Ulli Dehning, P.O. Box 194, Maseru, Lesotho, showing a nice range of modern equipment and a globe to locate the DX. He works Sideband and CW, using either a straight or automatic key.



proof of contact with 15 Kinshasa stations, 15 from Katanga, and ten from the rest of the Congo, making a total of forty QSL's, for QSO's made after July 1 1960, on 3.5, 7, or 14 mc, with not more than two on 28 mc. Eighteen IRC's and a detailed list, with the cards, to L'Union Congolaise des Radio-Amateurs de la Republique Democratique du Congo, B.P.1459, Kinshasa 1. Similarly there is an award to be had for working any six stations in Kinshasa on 3.5, 7, 14, 28 mc. List plus the cards and 8 IRC's to the same address. As for the contest, this is set for the rather odd times of 0001 GMT December 9 to 2200 on the 10th. The usual five or six-digit exchange, the serial numbers to start on 001. Points per QSO: 5 for 21 mc contact, 10 for one on 14 mc, 20 on 28 mc, 30 on 7 mc, and 60 on 3.5 mc. Logs to go to the same address, to arrive before March 15, 1968. (And in view of what has been happening recently in the Congo, one wonders whether the foregoing has any validity at all. However, we give you the gen. for what it may be worth.)

The "YL Anniversary Party" is only of interest in this piece for the record, as scoring contacts are all YL-YL, which means the OM's are just QRM. Dates are October 18/19 for the CW half, and November 1/2 for the Phone section. This is essentially one of those North

American exercises, though we hope our own G/YL's will enter, and let us know how they get on.

Now to the JA effort, this one being the "All-Asia DX Contest," for which the rules are the same as in former years with one exception: The latest DXCC Countries list will be used in the calculation of the multiplier. Logs to JARL Contest Committee, P.O. Box 377, Tokyo Central, Japan, by December 30. As for the actual battle, this will be joined at 1000 GMT August 26, and go on till 1600z the following day. The full rules appeared in the July issue of *CQ*. Acres of small print—when will organisers of international contests grasp the fact that if they want publicity in the world's Amateur Radio journals, they *must* frame their rules in such a way as to take the minimum space in terms of print area. It would take us half-an-issue to show the full rules of all the contests going! So far as *SHORT WAVE MAGAZINE* is concerned, we simply haven't the space for it. All we can do is to *précis*, as briefly but as factually as possible, the requirements for what we consider the more important of these contests.

Then there is, of course, *CQ*'s own World-Wide DX Contest for this year, which takes place on October 21/22 (Phone) and November 25/26 for CW. All bands, 1.8 to 28 mc, with a contest exchange consisting of RS(T) plus the number of

the Zone—the U.K. is, of course, in Zone 14—for which you get three points if the QSO is between stations in different Continents, or one point for stations in other countries on the same Continent. Contacts with one's own country may be made to gain a Zone and/or a Country multiplier, but earn *no* QSO points.

The multiplier is determined by the numbers of countries and zones worked, as follows: For a Single-Band entry, Zones-plus-Countries are multiplied by QSO points. For a Multi-Band entry take the sum of the Zones and Countries on each band, and then multiply this by the total of the QSO points achieved on all bands. There are three categories: Single-operator, Multi-operator (single transmitter), and multi-operator (multi-transmitter). It is suggested that if an entry in this big event is contemplated, the official paperwork be obtained as soon as possible from *CQ WW DX Contest*, 14 Vanderventer Avenue, Port Washington, L.I., New York, 11050, U.S.A., enclosing a *large* s.a.e. with 1s. 6d. in IRC's to cover the return airmail postage.

And there you have it; thanks for all your letters, the comments on this—and that, and the support you give each month. For next time the deadline is **First Post August 7**, addressed as usual to: CDXN, *SHORT WAVE MAGAZINE*, BUCKINGHAM. Till we meet again, *73 es gd DX*.

VHF BANDS

A. J. DEVON

IT would probably be agreed that the big event of the month was the marathon Irish tour undertaken by G3BA and G3BHT—into Wicklow, Carlow, Wexford, Kilkenny, Leix, Cavan, Louth and Dublin, signing EI2AX/P, and in the N. Ireland counties of Down and Armagh using GI3BHT/P. Ten counties in the ten days July 7-16—a marathon effort indeed, not to say a *tour de force*, with impeccable operating and accurate schedule keeping throughout, for which they had more than 30 stations on the hook each evening. With about four exceptions, most of those counties were previously unknown in the VHF context. For the team, it meant a great deal of motoring, finding a good site, then pitching camp, getting the gear going and feeding themselves to be ready for the evening's operation—which was nightly from 7.0 till 11.30 p.m., with an SSB session during 10.0-10.30 p.m. To keep this sort of an undertaking going for ten days requires not only good organisation and reliable gear, but also a high standard of operating ability, fitness and determination. Needless to say, we have had many admiring comments on all these points, and G3BA and

G3BHT can rest assured that they have given many people a great deal of pleasure—and not least your A.J.D.

In observing this tour, several interesting points emerge: Conditions for it, though generally quite good, were not exceptional to the west—yet several correspondents report hearing them every evening, though not always with workable signals. In the main, the SSB came through quite as well as the CW (which had rather a “ploppy” characteristic). Other EI/GI stations, that one would have thought might have been alerted by this operation, were conspicuous by their absence. It was the impression at A.J.D.'s that many more stations called EI2AX/P than succeeded in raising them. By circulating the sked list in advance with its five-minute timings, and each station's nominal frequency given to *all* stations in on the sked, meant that matters proceeded in an orderly fashion, and the whole operation could be kept reasonably under control; any station missing his sked-time would simply have had it, because in most cases the next station on the list would be on a different frequency. Since 34 skeds of five-min. duration still left more than an hour-and-a-half of free time, it meant that there was plenty of opportunity for catch-as-catch-can contacts for stations not on the sked list. Finally, in response to many enquiries on the point, the counties of Eire *do* score for our Tables—and always have done—so those concerned can adjust their claims accordingly.

* * *

Some other expedition news: The City University trip to Brecon, signing GW3UCU/P on all three bands, will be starting by the time you should be seeing this, and will last till September 6. QSL's through G3VFD, *QTHR*.

Then, for the fortnight August 18-31, look out for PX1NV, Andorra, evenings on 144.15 mc, with the transmitter running as a beacon during the day. This is an expedition station operated by members of Gresham's School

Amateur Radio Society (Holt, Norfolk) and they will also be working the HF bands. For evening skeds on two metres, write G3VNV, *QTHR*. If conditions give us a break, this could be an interesting event—there will be plenty of time for it, anyway.

For the European VHF contest over September 2-3, the Harwell boys will have a 4-metre station on the Isle of Man, signing GD3PIA/P. This should attract a lot of activity and interest, and the contact-man is G3TEL, *QTHR*.

* * *

The wonderful weather from towards the end of June till after the deadline for this piece produced the expected propagation conditions in the various directions, all reflected in the new

TWO METRES

COUNTIES WORKED SINCE
SEPTEMBER 1, 1966

Starting Figure, 14

From Home *QTH* only

Worked	Station
66	G5NU
53	G3COJ
49	G3DAH, G3USF
42	G3OHH
37	GW3PWH (91)
36	G2CDX, G3FIJ (115)
34	2AXI, G3SZX (171), G5UM (204)
33	G3FNM
31	EI2A
28	G3TQZ
26	G3SML
25	G3KQF
24	G3FVC, GW3CBB (100)
22	G3TDL, G3WKH
20	G3MOE
15	G8VN (76)

This annual Counties Worked Table closes on August 31, 1967, and re-opens again immediately w.e.f. September 1 for the year 1967-'68. The final placings for 1966-'67 will appear in the October issue.

claims coming in for Counties and Countries, and a good many more reports than usual!

The two-metre portable contest early in the period brought on a fair number of stations, under quite good conditions. A signal of particular interest—because he was getting into the Midlands so well—was G3XC/P, at St. Agnes Beacon, in Cornwall. And from what must have been a particularly favourable location up in Shropshire, G3RXX/P was putting an excellent signal all over the southern part of the country.

The several good EU openings during the period brought one extraordinary result—the sudden appearance on two metres of a number of OK stations on the night of June 30/July 1. Never having even heard an OK on the band before, G2XV (Cambridge) worked four in a row! Among others who succeeded on this occasion was G3DAH (Herne Bay)—who thought the /P contest activity rather disappointing, with an almost complete absence of Midlands stations. He also mentions, *inter alia*, that at the last meeting of the South-East UHF/VHF Group, G6CJ came down to give them his famous lecture on aeriels—it being Dud's 100th performance, in the 21st year since he first started these lectures!

For many years, G2CIW (Birmingham) was a regular "VHF Bands" correspondent, always in on time with an interesting budget of news. Then there was rather a long hiatus, during which Jack gave it all up. Now he is back again, though the new QTH does not offer much in the way of aerial facilities for VHF; he can get a 4/4 into the roof-space, and that's about all, but good enough when conditions are right, as he found during the recent openings, when EU's were worked.

G3COJ (Flackwell Heath, Bucks.) worked the EI2AX/P expedition in four counties; G3USF (Keele Univ.) in five; G3OHH (Mow Cop, Staffs.) got them in six; and GW3PWH (Swansea) raised them in seven—nice going.

Now up to 17 countries, G5NU (Reading) is doing very well with the DX, and suggests that the OK appearance on the morning of July 1 may have been due to a sporadic-E manifestation. As it happens, your A.J.D. did not succeed in sniffing this one out, and was not on for what must have been an interesting experience, so cannot offer an opinion—but as G5NU talks of working OK1KDO at 10.0 a.m., it is possible.

The City University (London, E.C.1) station G3UCU is active most evenings and on Wednesday afternoons, 2m./70cm., running 15 watts, with an aerial system 200ft. above ground level. G3VFD, QTHR, asks for more contacts and skeds on the Wednesdays, on both bands.

Brian is moving G3EDD along well in the Tables, and is now at 152 pts. in the Three-Band Annual (not being shown this month, but it will be made up finally for the year when all claims to August 31 have been received, and will appear in the October issue). And G3EDD will probably have a few more to add before then, as he was writing from early in the month. G3AHB (Slough) remarks on hearing the EI2AX/P signal from every location during the trip, and his contacts with G13BHT/P at the end of the Eire tour meant two GI counties—this is a good indication of the coverage the expedition was giving. G3SML (Earl Shilton, Leics.) says he is always on the look-out for contacts to the south "even when conditions are poor," and would very much like to work G5TZ, "always a consistent signal from the I.o.W." (Of course, Jumbo is one of those who knows when to come on!)

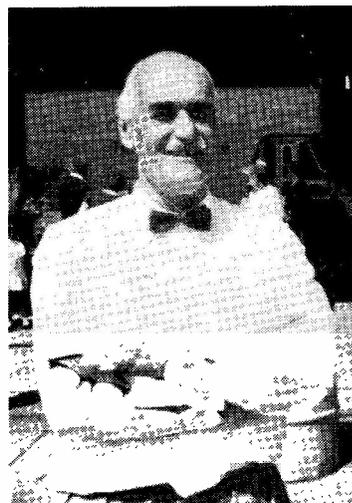
* * *

Now, we must look at a very interesting report from G8AII (Chepstow, Mon.) about 23-centimetre activity in the Bristol Channel area. He runs 15w. to a 2C39A tripler driven by a QV06-40 taking 40 watts at the 430 mc level, his aerial for the 1290 mc band being a 32-element extended array, at 33ft.; and the

Rx is a K6AXN converter into an HRO. With this rig, G8AII holds regular nightly sessions with G3MPS (Bridgwater, 36 miles) and G3TND (Bristol, 15m.). On the former sked, they have had well over 400 contacts, with a failure rate of less than 1%, the "standard signal" being S9! The Mendips lie across the signal path, and many interesting facts have been noted, e.g., rain in the hills attenuates signals but heavy rain at one end has little effect, though rain at both ends can cause total failure. The condition of the two-metre band for DX working does not affect 23 centimetres either way—G3MPS can be S9+30 dB at G8AII when 2m. is dead, whereas during the recent openings affecting 2m./70cm., the 1290-mc band was normal.

The G8AII/G3TND sked has so far yielded more than 170 contacts, and though the distance is less than to G3MPS, signals over this path are not quite so good, nor as reliable; it was found that this also applied to 70 cm. when G3TND first got going on that band.

Other stations down there either active, workable or getting going on 23 cm. are listed by



John Curnow, G6CW, Nottingham, who has been licensed for many years and is very active on VHF. Running SSB, he has worked about 70 G's and nearly 100 EU's on two-metre Sideband.

G8AII as: G3TWT (Bristol), G2WS (Weston-s-Mare) and G3ORL (Bristol). G8AII is actually /A from Chepstow, the home QTH being in Glos. Other stations worked by G8AII/A are G3NNG (Farringdon, Berks.) and G3OBD (Poole), while he has been heard by G3MCS (Lacey Green, Bucks.). Not bad going for 23 cm., and we congratulate G8AII on his results as much as we thank him for a useful and comprehensive report. And now, what about the doings in some of the other centres of 23-cm. activity? It will probably interest all who are active on the 1296 mc band to know that ON4SY is operational with a hefty PA and a 32-ele colinear array, the Rx side incorporating a parametric amplifier.

* * *

As regards 70 centimetres, both G8AJC (Canterbury) and G8AEJ (Penge, London) confirm that the

recent excellent conditions did extend to the 430 mc band. For G8AJC, contacts resulted with DJ, F, ON and PA, his best DX being OZ5HF and DJ9DI. He now has regular skeds running with ON4HN (Zomergem), ON4HC (Antwerp), F3JN (Paris) and F9FT (Rheims), between 1910 and 2045 GMT nightly, all except ON4HC being 100% any day, under all conditions. For G8AEJ, at only 100ft. a.s.l., the five countries worked likewise included OZ.

Reports and claims for the Tables are also acknowledged from ON4FG (Wintam), GW3CBY (Swansea), G2CDX (Cambridge), G8AAY (Poole), G3UVR (Neston, Ches.), G3FDW (Retford, Notts.) and G8APX (Bushey).

As regards *Oscar V*, there is still no hard news, and the advice is to listen for the *Oscar Bulletin* from W6ASH (14030 kc, 0200z., of 7015 kc, 0500z, Fridays, CW).

It also is not known at Oscar Hq. when *Euro-Oscar* or *Aus. Oscar* are likely to be flighted, though "prospects are good." As has been mentioned before in this space, these amateur satellite operations are entirely dependent on local military arrangements for rocket firing, and we can be sure that the Oscar Group at Los Altos Hills, Calif., are doing their best to keep these projects moving. The coordinator on this side is Bill Browning, G2AOX, Hendon.

Deadline

For our next is **Monday, August 14**, for the September issue due out on the 25th. A.J.D., SHORT WAVE MAGAZINE, BUCKINGHAM, is a full and sufficient address. The Wx was beginning to break as this went down, and the long-term forecast is pretty dreary—however, you never know, and we can get Aurora or sporadic-E under the oddest conditions. So—watch it! 73 de A.J.D.

OPEN LETTER TO ALL MOBILEERS

Dear OM,

Have any of you ardent mobile rally fans ever stopped to think what a "Rally Day" means to your XYL? No? Well, I'll tell you.

She is, more likely than not, up at the crack of dawn or soon after, preparing a mountain of sandwiches for lunch or tea or both—according to how far away from the home QTH the rally is. During the journey she notes all the relevant data on contacts made *en route*. At the same time, with the other hand and eye, she is map reading to make sure you take the shortest possible route so that we may get there early and not "miss anything."

Her day *really* begins, however, on arrival at the rally ground. Somehow, she manages to feed you and the children at double quick speed so that you can "get away." It is either that, or trailing round three paces behind you trying to stop the children touching something they shouldn't and at the same time endeavouring to work up an interest in pieces of equipment she knows nothing about.

It is less exhausting to stay with the children by the car and maybe take a little walk. The chances are she will not see a soul she knows and after a time the children want to know where Dad is.

Well, where *is* Dad? You of course, have completely forgotten, for the moment, that you are a husband and father... so busy are you rootling around the surplus stand for what (you think) is a bargain, or slapping on the back, or being slapped by, old so-and-so that you have not seen in years. Occasionally, one of these buddies may ask, "Got the wife and kids with you?"

"Yes," you say with a vague wave of your hand "they're around somewhere."

Eventually, some hours after you have left them, you return to the fold loaded down with about 500 leaflets and with wire, knobs, transistors and anything else you could pick up sticking out of every pocket. "Jolly good rally isn't it. I bet you're glad you came!"

Have you ever thought of saying "Thank you" to your XYL on arriving home for her essential part in seeing that you had an enjoyable day? It wasn't much fun for her, you know, but being a good wife she doesn't grumble—just looks up the date of the next rally.

Just think for a moment what your reaction would be if the little woman wanted, on several Sundays throughout the summer, to travel umpteen miles to see a needlework or knitting or cookery display with lots of lovely (to her) stands where she could browse half a day away. You wouldn't go much on that, would you? In fact you might do it once and "never again." So don't forget that "Thank you" next rally day, will you?

Did I hear you muttering something about betting my husband doesn't say it? He did last rally day *but* only after I had told him I was going to write this letter!

73,

Yours sincerely,
Sally Henshawe.

P.S. If you have only sons and no daughters remember that when they are old enough they want to come with you and then Mother is left completely on her own. Don't let that happen, will you?

• • • *The Mobile Scene* • • •

SCOTTISH MOBILE RALLY PLANS—SOME REPORTS ON RECENT
EVENTS—NOTES AND NEWS—THE RALLY CALENDAR

OF particular interest this time is the announcement of the Scottish Mobile Rally, to be held at Culzean Castle, Ayrshire, as a weekend event over September 23-24. Culzean Castle is a Scottish National Trust property and is the "stately home" of which General of the Army Dwight D. Eisenhower has been given free use (when in Scotland) in recognition of his great services in bringing European operations to a successful conclusion in Hitler's War.

It is a magnificent estate, with all the amenities for a family visit, including a caravan/tenting site, beach, extensive semi-tropical gardens and an aviary. Its situation is on the Ayrshire coast, about 12 miles south of Ayr itself (take the A.719 to Girvan, or the B.7023 out of Maybole—*Sheet 72* of the One-Inch O.S. refers) and since it is Trust property there are charges for admission and parking. Full details from: R. Harkness, GM3THI, 55 Woodend Road, Alloway, Ayrshire—who can also arrange accommodation, if required. The GM's aim to make this Rally *the* event of the year for Scotland, and hope that they will have many visitors from other parts of the U.K.

* * *

The final report on the Mobile Rally held at Mote House, Maidstone, on June 11, discloses the remarkable fact that, after deducting expenses of over £120, there remained a profit of no less than £210 for donation to the Home for Muscular Dystrophy! Something like 15,000 raffle tickets were sold amongst the 650 people present, with some excellent prizes for the several raffles. Each patient in the Home received a £1 note out of the £210 profit, handed over by G6NU, the balance to be held by Matron for the benefit of the patients' social activities. A splendid result indeed, on which G6NU and his team of helpers from among radio amateurs in Kent, Essex and Sussex are certainly to be congratulated. And apart from that, all /M's who attended this Rally enjoyed themselves in sunshine.

* * *

The Eighth A.R.M.S. Rally, on June 18 at the old R.A.F. station at Alconbury (now in possession of the U.S.A.F.) was also a highly successful occasion, in perfect weather—bright sunshine, but with a cooling breeze. The A.R.M.S. affair is always a very well laid on show, following a successful pattern evolved from previous experience at Barford. The facilities at Alconbury are perhaps better, and it is probably more accessible for most people who attend Rallies. During the early war years Alconbury, as a satellite of Wyton, was in No. 2 Group, Bomber Command (not No. 3 as stated in the programme) and in the dire days of 1940-'41 several very fine Blenheim Squadrons operated off its airfield. Now,

it is the Hq. of 10th Tactical Reconnaissance Wing, U.S. Third Air Force, and operates Phantom II's in three squadrons.

A feature of any A.R.M.S. Rally is the large Trade show (accommodated in a hangar) and this year's was as comprehensive as ever, with more than 80 exhibitors (though one might wonder why some of them were there, and what they could possibly have got out of it!). In addition, there were competitions and displays, including a particularly impressive demonstration of radio-controlled model aircraft flying, for which the conditions were ideal, and the giant tombola—all in traditional A.R.M.S. style. As well as the talk-in stations on 2-4-160m., an SSB station signed GB3USA on the HF bands.

As to the attendance: Well, by 3.0 p.m. there were more than 500 cars in the visitors' park—your correspondent knows; he counted 85 rows, six cars to a row, and allowing an average of 3 persons per car, one can say with reasonable certainty that by 3.0 p.m. on June 18, there were about 1,500 visitors on the Rally ground at Alconbury. Another statistic for the record is that a good two-thirds of the cars in the visitors' park were fitted /M, and that of these 350 or so mobileers, at least 300 were on 160m.—and of them, the great majority had the Top Band loading coil and effective whip length above the roof-line of the vehicle. As always, some of the installations were a bit grotesque, but on the other



G3NRB (Datchworth, Herts.) arrived for the Alconbury Rally in his smart little "Turbulent" aircraft, G-AJCP. It is in the ultra-light category, for short-range flying, with an endurance of about two hours, and is powered by a 28 h.p. modified Volkswagen engine.

hand it is true to say that in this respect there has been a vast improvement during the last few years, and the great majority of /M installations are as elegant and well-fitted as one could reasonably expect them to be.

* * *

There was also a Mobile Rally arranged for June 25 at Longleat—but for all the news we have had of it, the organisers could have been eaten by the lions . . . nor has anything been heard of the R.N. Rally Day at Lee-on-Solent, on June 17.

Events remaining to be played off are as follows:

July 30: Informal picnic laid on by Northern Amateur Radio Mobile Society at Flamingo Park Zoo, Kirby Misperton, near Malton, Yorkshire, between Malton and Pickering. A good spot for a day out with the family. Reserved car park, refreshments. Small admission charge to Zoo. Details: Denis Binns, G3MGI, 80 Gipton Wood Road, Leeds, 8, Yorkshire.

July 30: Saltash & District Amateur Radio Club annual Mobile Rally, at Calstock, Cornwall, 1½m. south of the A.390, Tavistock-Callington, and sign-posted to the Rally site on the River Tamar. Talk-in by GB3SAL on 2-4-160m. Free admission, refreshments obtainable, boat trips on the river, prize draw, miniature mobile competition (equipment capable of functioning on one band using simplest means *locomotion*, and currently licensed /M), and pedestrian D/F hunt. Details: D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.

August 13: Tenth Annual Mobile Rally organised by the Derby & District Amateur Radio Society, at Rykneld Schools, St. Albans Road, Derby (watch for local sign-posting). Numerous trade stands, static displays and demonstrations (including a model railway layout), treasure hunt and other field events, a big raffle with more than 40 prizes, and also the ever-popular Derby junk sale. A new attraction is to be a concert by a local colliery band—good brass-band stuff, one may expect. The talk-in stations will be G3ERD/A on 160m. and G2DJ/A on two metres. Admission and parking are free, with ample space, and refreshments will be available. Full details of this big event in the Rally calendar can be obtained from: T. Darn, G3FGY, Hon. Rally Organiser, Sandham Lodge, Sandham Lane, Ripley (2972), Derbyshire.

August 20: Annual mobile picnic organised by the Plymouth Radio Club at the Scenic Car Park on the old airfield at Harrowbeer, near Yelverton, Devon. Talk-in stations will be operating on 2-4-160m. Any further information from: C. G. Clark, 19 Beverston Way, Widewell, Plymouth, Devon.

September 3: Swindon & District Amateur Radio Club Mobile Rally at Lydiard Park, Swindon, Wilts. The site is 3m. west of Swindon, just north of the A.420, Swindon-Chippenham. The talk-in stations will be G3PRR/A on 1925 kc; G3LLZ/A on 3735 kc SSB; and on 2m.-4m. (to be arranged). Attractions include

Lydiard Mansion itself, raffles, games and competitions, with ample car parking, covered accommodation (if wet), and refreshment stalls. The hon. organiser is: I. S. Partridge (G3PRR), 104 Grange Drive, Stratton St. Margaret, Swindon, Wilts.

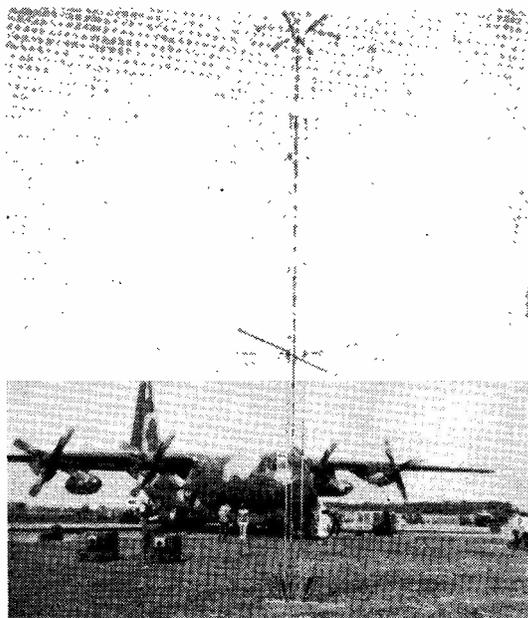
September 10: Annual RSGB Mobile Rally at Woburn Abbey, near Luton, Beds., with talk-in on 160-4-2m. and 80m. SSB. All the usual attractions for this popular event.

September 15-17: Third International Amateur Radio Convention and Rally at Knokke, Belgium. For programme details; local accommodation and camping arrangements; and information about temporary /M licensing in Belgium, write: Lucien Vervarcke, ON4LV, Lippenslaan 284, Knokke 1, Belgium.

September 23-24: Scottish Mobile Rally at Culzean Castle, near Ayr, Ayrshire. For general information regarding this event, see p.363. Talk-in will be given on 2-4-80m. by GB3CC, from the Castle. Full details from: R. Harkness, GM3HTI, 55 Woodend Road, Alloway, Ayrshire, with s.a.e.

September 24: Harlow & District Radio Society annual Mobile Rally.

Editorial Note: Information for the next "Mobile Scene," in the September issue (due out on August 25) should reach us by August 9, *latest*, addressed: Mobile, SHORT WAVE MAGAZINE, BUCKINGHAM.



On display at Alconbury for the A.R.M.S. Rally there on June 18—the Hercules aircraft which carries a complete station, giving HF/VHF/RTTY/SSB facilities for local and long-range working. It can be flown to the point of operations, ready to go on the air immediately. In the foreground is its aerial system and to the left, on the grass, are the two portable PSU's.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for September Issue: August 4)

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

YOUR conductor was saddened to see amongst the correspondence this month that a Club has had its premises broken into, and to hear over the grapevine of another such case. This sort of thing is not unexpected in an age which sees fit to regard reports of drug-taking in the National Gallery as a good joke, but it does nevertheless pose sizable practical problems. Just *how* can one protect a group Hq. from this sort of thing, or at least ensure that it becomes known quickly enough to ensure that the offenders can be caught and brought to book? Perhaps some groups have found ways and means which are both effective and practical within the very limited budget of a small and penurious club, and if so, would be prepared to say so, and give some hint of the way of doing it which could with advantage be passed on to others in the throes of dealing with the problem.

CLUB ACTIVITIES

The top of the crop is **Norfolk**, who report by way of their excellent *Challenge*—the current issue is of special interest for various reasons, two of them in particular. One is a good article on the vexed question of which way the beam should be headed first in order to hear a given area, taking into account such things as anomalous propagation and the use of the long or the short path. Very interesting and readable. The other was a breakdown of the contributions to the newsletter over the

previous fourteen issues, which showed a remarkably wide spread of literary ability in the group, and, perhaps more important, a list of those who had *not* done their stuff!

Unusually, **Mansfield** do not make a "thing" of having a set programme, but prefer instead to either chew the rag at Hq. or enjoy whatever surprise item comes up. As they say they are thriving the system must work, but it has to be admitted that the "surprises" are the work of someone with a very good idea of the best way to keep the troops happy! Hq. is the New Inn in Westgate, on the first and third Fridays of each month.

Sympathies to **Chesham**—after all, it is often said that an amateur goes to the local club to get out of decorating at home, but if he is a member of this one he gets a paintpot put in his hand as he enters the club door! Incidentally, the hon. sec. says that if any reader wishes to dispose of unused decorating materials (quietly, before the XYL notices!) then he is in the market.

Westmorland are going strong, but have had to make a temporary change of home during the summer recess at the local Tech. Thus, anyone wanting to make contact here, should contact G3UEC (*see* Panel). When the new term starts, they will be back at the old place.

The first one on the pile to make any mention of a formal programme is the report from **Wolverhampton**, where a demonstration of Sommerkamp gear is planned for August 7, followed by a Film Show on the 21st.

A typical field-day scene—the Northern Heights Club station, with G3VDS, G3TFF and G3UGF at the rig, and SWL Bottomley keeping an eye on things.



Both of these are slated for Hq. at 8 p.m.—Nechells Cottage, Stockwell Road, Tettenhall, being the point to steer for.

On the first Monday evening in August, **Maidenhead** are to have a talk and demonstration of the Hammarlund HQ-180 receiver, while the informal meeting, held on the third Tuesday, will be occupied by exercising the new call sign allocated to them, namely G3WKX. All their sessions, unless they be in the nature of outside visits, are held at the Victory Hall, Cox Green, Maidenhead.

Over at **Shefford**, they believe in working people hard—G2DPQ is not only listed for August 3 as the Slow Morse operator, but also has to give the lecture, on Aerials and ATU's. They then shut down till the end of the month and on the 31st kick off the new season with an Open Evening; the Church Hall, in High Street, is where this crowd foregather.

Better Luck This Time!

Mention of GB3FRC, which the **Fylingdales** lads are to actuate for the Whitby Regatta—see "Specially on The Air," p.370—reminds us that last time out it was only by great courage that the station was able to carry on after the gale had done its worst to both the gear and the operators—let us hope that things are much easier for them on this occasion.

The **Cornish** chaps have spent most of July getting ready for their popular Mobile Rally, but for August they have not indicated what is "on." However, we can say that there is a main meeting on the first Thursday of the month, at the SWEB Clubroom, Pool, Camborne. In addition there are sub-sections of the main group, dealing with VHF, and SSB; both these groups meet at the Coach and Horses in Truro. Their July meeting—at which the lecture was on the operations of Lands End Radio, GLD—was not only well attended by members, but they had six holiday visitors as well. In this connection, the hon. secretary (see Panel) will be glad to hear from anyone who is on holiday in Cornwall, to give them what help or advice they may need.

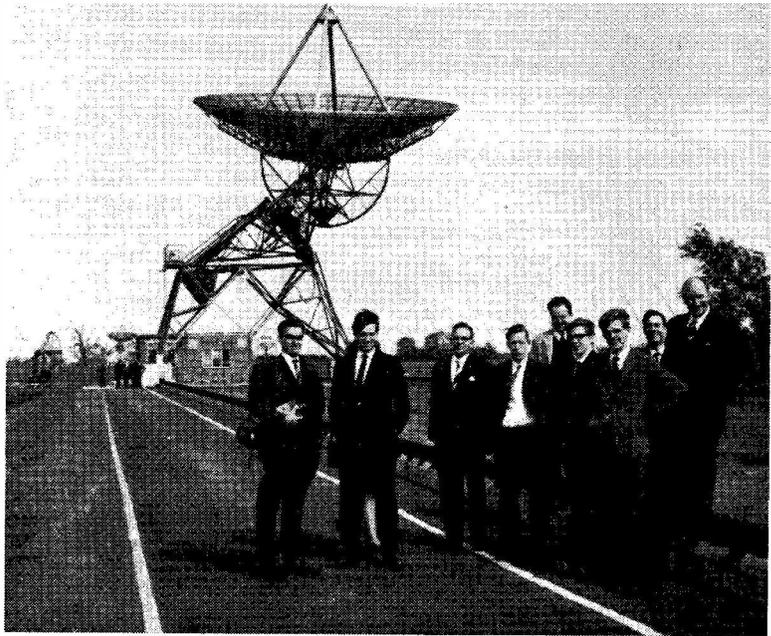
Southport have a session on August 2, at which G3OYC will demonstrate, with the help of an oscilloscope, various forms of rectification. On the 9th, the form is a "Problem Night," specially set aside for discussion of members' technical problems. Informal on the 16th—and with good reason, as the Club chairman, G3NKL, is to be married the following day, and they want time to set him on the right track beforehand! Finally, on the 23rd, the hon. sec. will demonstrate the arts of film developing and printing.

A combined activity is mentioned in the newsletters from **Wimbledon** and **Purley**; along with the South

Names and Addresses of Club Secretaries reporting in this issue:

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W.3.
 A.R.M.S.: N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10 (*LEYtonstone 6700*).
 ASHTON-UNDER-LYME: R. Higginbotham, G3VDS, 1 Bankfield Cottages, Woodlands Drive, Woodley, Stockport, Ches.
 BASINGSTOKE: P. J. Sterry Ashley, Orchard Road, Basingstoke, Hants.
 BISHOPS STORTFORD: A. Marriott, G3VWC, 21 Thorley Hill, Bishops Stortford (*4796*), Herts.
 B.A.T.C.: D. Mann, G6UOU/T, 67 West Hill, Wembley Park, Middx.
 CHESHAM: D. Kind, 19 Hollybush Road, Chesham, Bucks.
 CHIPPENHAM: N. Cutter G3PQG, 1 Fossey Close, Colerne, Chippenham, Wilts.
 CORNISH: W. J. Gilbert, 7 Poltair Road, Penrhyn, Cornwall.
 COSSOR AMATEUR RADIO GROUP: K. Underwood, G3SDW, Sports and Social Club, Cossor Electronics, The Pinnacles, Harlow, Essex.
 CRAWLEY: R. G. B. Vaughan, G3FRV, 5 Filbert Crescent, Gossops Green, Crawley (*23359*), Sussex.
 CRAY VALLEY: D. Buckley, G3VLX, 234 Halfway Street, Sidcup, Kent (*ELTham 6945*).
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London, S.E.23 (*FORest Hill 6940*).
 EAST LANCs: J. Simpson, 1 Marsh Terrace, Darwen, Lancs.
 EDGWARE: G. S. Fitton, G3RAA, 18 Beverley Drive, Edgware, Middx.
 FARNBOROUGH: D. G. Arigho, G3NVM, 6 Frensham Road, Yateley (*2174*), Camberley, Surrey.
 FYLINGDALES: P. H. Ellis, 26 Westbourne Road, Castle Park, Whitby, Yorks.
 GRAFTON: E. A. Rudolph, G3SIL, 29 Pangbourne Drive, Stanmore, Middx.
 HALIFAX: P. B. Furfinger, 227 Keldregate, Deighton, Huddersfield.
 HARLOW: R. Brown, G3TOF, 177 Raddburn Close, Harlow (*23517*), Essex.
 HEMEL HEMPSTEAD: J. B. Adams, 8 Lindlings, Long Chaulden, Hemel Hempstead, Herts.
 HONG KONG: N. Willis, VS6FS, c/o The Shell Co. of Hong Kong, P.O. Box 22, Hong Kong.
 LEICESTER: J. T. McAllister, 239 Sturdee Road, Eyres Monsell, Leicester (*Wigston 6157*).
 MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead (*20107*), Berks.
 MANSFIELD: F. N. F. Bewley, G8HX, 116 Westfield Lane, Mansfield, Notts.
 MEDWAY: P. Carey, G3UXH, 29 Miskin Road, Hoo, Rochester, Kent.
 MIDLAND: C. J. Haycock, G3JDJ, 29a Wellington Road, Handsworth, Birmingham.
 MID-SUSSEX: E. J. Letts, G3RXX, 87 Meadow Lane, Burgess Hill, Sussex.
 MID-WARWICKSHIRE: M. Spencer, G3UOD, NBS 3rd Line, R.A.F. Gaydon, Warwickshire.
 NORFOLK: W. Higgins, G3PNR, 13 Falcon Road East, Norwich, Norfolk, NOR.88R.
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax (*64329*).
 NORTH KENT: P. T. Baber, 64 Latham Road, Bexleyheath (*8655*), Kent.
 NORTH LIVERPOOL: P. H. Jeffs, 38 College Road North, Liverpool, 23.
 NOTTINGHAM UNIVERSITY: K. L. Taylor, Radio Society, The Union, Nottingham University.
 PLYMOUTH: G. Clark, 19 Beverston Way, Widewell, Roborough, Plymouth.
 PURLEY: A. Frost, G3FTQ, 62 Gonville Road, Thornton Heath, Surrey, CR4-6DB.
 R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 331 Wigan Lane, Wigan, Lancs.
 ROYAL AIR FORCE A.R.S.: F/Lt. V. J. Ludlow, G3JLZ, R.A.F.A.S. Hq., R.A.F., Locking, Weston-super-Mare, Somerset.
 SALTASH: D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.
 SHEFFORD: D. A. Pike, G3VMI, 11 Hazel Grove, Stotfold, Beds.
 SOUTHAMPTON: A. Partner, G3HKT, Tekhi, Hound Road, Netley.
 SOUTHGATE: A. Dutton, G3TIE, 77 South Lodge Drive, Southgate, London, N.14 (*L.A.Burnum 3390*).
 SOUTH DOWNS: L. E. Tagliaferrro, 9 Tugwell Road, Hampden Park, Eastbourne (*54244*), Sussex.
 SOUTHPORT: N. K. Waring, 33 Chestnut Street, Southport, Lancs.
 SURREY: R. Morrison, G3KGA, 33 Sefton Road, Croydon CRO-7HS, Surrey (*01-654-5982*).
 VERULAM: J. Thomas, G3RXA, 9 Highland Drive, Hemel Hempstead (*55136*), Herts.
 W.A.M.R.A.C.: Rev. A. Shepherd, G3NGF, 1 North Street, Crewe (*2558*), Cheshire.
 WESTMORLAND: N. Stanley, G3UEC, 9 Castle View, Sedgwick, Kendal, Westmorland.
 WIMBLEDON: K. Alexander, 23 Pepys Road, West Wimbledon, London, S.W.20.
 WOLVERHAMPTON: J. P. H. Burden, 28 Coalway Road, Wolverhampton.
 YEovil: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.

One of the groups making up the 40 members of the Maidenhead and District Amateur Radio Club on their recent visit to the Mullard Radio Observatory, University of Cambridge. They were shown round the Observatory, of which G3CY is the director, in small parties.



London crowd they are to hold a weekend camp at Tadworth, over August 12-13. In addition, Purley mention a Natter Nite on the 4th, a Jamboree-on-the-Air station over the weekend August 5-6, and on the 19th a film show, given by G3DPW. As for Wimbledon, only one evening is booked for August, the 25th, when G3GKF will demonstrate Lasers and Masers.

Up in Blackburn, the East Lancs. lads are now in a new meeting-place, namely the YMCA, which is to be found in Shear Bank Road, Blackburn. They will be in session on August 3 to hear the interesting W1BB tape and slide lecture on Top Band DX.

It is not often we hear from a Works group, but this month news comes of the formation of the Cossor Sports and Social Club Amateur Radio Section, Harlow. Within a couple of weeks of the inaugural meeting, a station was set up, housed in an old ambulance (cast off by the local Red Cross) working the LF bands, and using a long-wire aerial propped up by the crossbars of the goals used by the Football Section! As for the Harlow lads, they are still to be found in their Mark Hall Barn Hq., every Tuesday and Thursday evening.

Chippenham also get together every Tuesday evening, at the Chippenham High School for Boys, Hardenhuish Lane, where visitors are always welcome. It is the practice to set aside the last meeting in each month for some sort of lecture, demonstration, or similar attraction.

* * *

Recently the University of Nottingham Radio Club held its AGM, at which a successful year was brought to a close; they are now looking forward to the Autumn Session, when they hope to consolidate the gains made in the past year.

Among all the plaintive voices complaining of lack

of interest and enthusiasm, it is nice indeed to be able to record that Plymouth feel they have worked their way through their "bad patch," and things are now well on the mend. Apart from the usual weekly meetings, held each Tuesday at Virginia House, Bretonside, Plymouth, August 20 sees the Annual Picnic, to which all are invited.

Talking of moans and groans, while it has to be admitted that often they are just "sour grapes," there are times when strong language is really justified, as when G3KVF expressed disgust from the chair at the recent A.R.M.S. Annual General Meeting, at which only seven members were present, all of whom were on the committee! Apologies for absence accounted for another three. A complete absence of ordinary members at the AGM after a successful year's operation would lead most committees to throw in their hand *en bloc*, so we cannot but admire the fortitude this one showed in even considering carrying on.

Lindfield Primary School, Haywards Heath, is the place to find the Mid-Sussex lads together; however, for details of dates and programme, a call to the hon. sec. will be needed, at the address shown in our Panel.

It is unusual for the Cray Valley *QUA* to miss out the

NOTICE—MCC 1967

The 22nd Annual MCC—"Magazine Club Contest"—will be held over the weekend November 11/18. This is a CW-only Top Band event, for which the rules in full, with the usual Club identification letters, will appear in "Short Wave Magazine" dated October. Clubs who have not previously entered for MCC, and intend to do so this year, are invited to apply for identifications.

dates for the coming month, but this time it has happened, and so here again we have to refer interested folk to the Panel. However, we can say that they have two meetings each month, one of which is an informal, at All Saints' Church Hall, Bercta Road, S.E.9., and the other at the Congregational Church Hall, 1 Court Road, Eltham, where on July 6, they heard a talk given by K.W. Electronics.

A complete house is used as the Hq. of the **Leicester** group, who foregather on Monday evenings and Sunday mornings. With a membership of sixty-three at the last count, plus several to be confirmed by the committee, they seem to be a thriving club.

A couple of non-local organisations to report in this time are **WAMRAC**, and **BATC**. The former exists to unite amateurs throughout the world who are Methodists, and a fine job it does at that. **BATC**, of course, is the British Amateur Television Club, and serves the interests of all those active in, or interested in, Amateur Television.

Finances can be a problem, and with our ever-inflating national economy, a rise in subscriptions is more or less inevitable every so often. It has recently had to happen to the **North Kent** group, who for the past year or so have staved it off by increasing their membership and by running raffles. However, this rise in subscription will no doubt be counted well worth while by anyone who takes the trouble to join and attend their meetings, details of which may be obtained by contacting the hon. sec. (see Panel).

Another of the national groups to report this time is the **RAFARS**, which exists to cater for serving and ex-members of the Royal Air Force; a fine society, this one, which almost makes your conductor wish he had served his time in the R.A.F. instead of one of the other Services! For full details of membership, it is suggested that those interested should write to the Admin. Secretary, at the address given in the Panel.

Over the years, probably the most regular reporters to this feature have been **Acton**, **Brentford** and **Chiswick**, who are in session on Tuesday, August 15, at 66 High Road, Chiswick, starting at 7.30 p.m. This month, members are invited to bring along their problems for a general discussion. Of course, visitors and prospective members are welcome, as always.

Good Point

A comment in **Verulam** news-sheet bears thinking about in the general context; they ran a show at Red-bourn Village Fair recently, and one of the members wonders whether, when conditions are poor and signals drop into the noise level, there is very much for the general public to enthuse about in listening to harsh and squeaks, particularly when there are two stations in close proximity. A good point this, and it has been noticed several times on these occasions that although little or no interest was shown when a couple of stations were operating Phone with much mutual QRM due to their proximity, one station banging away on the key at *DX does* draw the crowds. It has been suggested that the telephony is uninteresting due to its resemblance to TV, but this is perhaps uncharitable—nevertheless, there is a point here. CW operation, with speaker monitoring so that the Morse can be heard, *always* stops people!

A session every fortnight seems to be the order of

things with the **North Liverpool** chaps; August 4 is given over to the second part of a discussion on the future of the Club Shack, and on the 18th, G3TXR will be there to give a "general talk" on Transistors. The September programme is quite varied, with, on the 1st, a lecture on "Mathematics related to Amateur Radio," given by R. Mount, followed by G3HCJ on the 15th, his subject being "Moonbounce." On September 29th, the month is nicely rounded off by a Junk Sale.

There is always something of interest to your scribe in the **Midland News Letter**, and this month is no exception; a digest of the NFD affair, in statistical terms, with a few comments. A rather amusing difficulty was found in having a SWR meter that read 9oz. on the forward direction, and a reverse current of 15 grams—sounds as though someone needs to do a conversion chart!

Alternate Fridays is the routine of the **Saltash** group, at **Burraton Toc H Hall**. Unfortunately, we have only the June issue of their *Tamar Pegasus* to hand, as their dates and ours are a little out of phase at the moment—but there is usually something of interest or novelty going on.

Regular readers of this piece may remember that some little time ago an **Eastbourne** group was projected; it is nice therefore to be able to record that they now formally are in being, after a first meeting attended by no less than 37 licensed amateurs and SWL's. It is really surprising just how much support can appear, apparently out of the blue, in an area which in recent years has never been thought of as likely to support a Club. Anyway, our congratulations on a fine start, and we look forward to hearing more in the future.

Another group in the throes of getting itself into being is at **Bishops Stortford**, where the inaugural meeting should have taken place by the time this appears. However, just in case anyone has not managed to be "on the grapevine" regarding this one, there is a temporary address for contact in the Panel.

The large number of followers of Amateur Radio who are in one way or another handicapped or invalid, are mostly members of **RAIBC**. Naturally enough, there can be no question of regular meetings, and so they have nets on the air. The time of these is set at 10.0 a.m. every Tuesday, and 2.0 p.m. Wednesdays, clock, the frequency being around 3.7 mc. In addition there is the club publication, *Radial*, which is always a pleasure to read.

Over at Croydon, the **Surrey** crowd will be getting together at the "Blue Anchor," South Croydon, August 15, to hear Nell Corry, G2YL, giving a slide talk on her recent visit to Japan, China, and points between. This is also one for wives and friends (G2YL is a very interesting personality) and of course visitors or prospective members will be welcome.

Medway made no mention of their forthcoming activities—by the sound of things their recent past has been quite hectic, with a couple of Rallies, Field Day, and other outside things to keep them amused. Nevertheless, they are live-wires, and anyone in the area would find it well worthwhile to get acquainted.

Hardly a "club" in the normal sense of the word, but rather a national society, is the **Hong Kong A.R.T.S.**, who mention a rather good idea for the programme. They recently ran a "receiver evening" at which no less than ten different types—from a Racal RA-17 to the war-



The East Lancs. and Bury Radio Clubs recently combined for a Quiz Contest, held at the former's Hq. The quiz master, centre at the table, was G3SSD, with the Bury team on the right in the picture. Before a rapt audience, themselves "ready with the answers" (we are told!) the East Lancs. side emerged as the winners of the contest. This is a very effective way of passing an evening and is entertaining as well as instructive.

surplus types, both British and German, with Japanese and American in between—all brought along by owners or borrowed for the occasion, and coupled to the same aerial, so that a direct comparison was possible. Incidentally, the piece by Mary Moore (the wife of VS6CJ) discussing a "Fox-hunt" the group ran, was one of the funniest things to come across this desk for a long time.

* * *

No. 20, Carlton road is the address of the Southampton Club Room, and we hear that they are in the midst of a king-size re-organisation so as to make better use of

the potentialities, not only of the Hq., but of the group itself.

August activities for the Hemel Hempstead lads seem to be mainly out of doors, and include the running of their Club call, G3WIH, at Phasells Wood Scout Camp, for the Jamboree-on-the-Air event, and an exhibition at the Town Carnival on the Bank Holiday Monday.

Re-organisation is also the order of the day for Mid-Warwickshire, where they are just putting the wiring into the shack, after reconstruction. Hence, there is no formal programme for August, but the doors will be open each Monday and Thursday at 8.0 p.m. [over

Yet another one to be re-organising things (must be something to do with the weather!) is **Ashton-under-Lyne**, although in their case it is because they have found more suitable premises, at 6 Stamford Street, Stalybridge. They hope shortly to put G3BND on the air from the new place, as they are anticipating that by the time we are in print the decorating and rewiring will be completed. In addition there are several interesting projects in hand and trips being planned.

The visit to Skelton Pastures BBC station by the lads of the **Northern Heights**, was voted one of the best they had ever had. They were really made to feel welcome and came away with one of the large modulating valves (price £270, new!) as a memento of the trip; this they are to have mounted for use as the prize for their "Fox-hunt" event each year. As for the August programme, unlike most Clubs they seem to believe in filling the holiday month well and truly. On August 2, they kick off with a lecture on Communication in Modern Industry, by Mr. J. Hodgson. Over the weekend 5/6th they will be signing G3MVH in the Jamboree event, followed by G2SU/P at the Halifax Agricultural Show. A visit to the works of the Wharfedale Wireless Company is booked for the 16th, and ten days later there is yet another Demonstration Station, this time at the Warley Charity Gala. The month is rounded off by the annual Pea-and-Pie Supper on the 30th, to which they invite the Manchester and District Radio Club.

Yeovil members are busily constructing gear for the forthcoming VHF Field Day, and visits on a group basis are going on to various Mobile Rallies. A film by WIQCO was shown recently.

A lecture on the Racal RA-17—possibly most amateur's idea of a dream receiver—is to be given to the **Farnborough** lads on August 8, at the Model Railway Enthusiasts' Club, 310 Farnborough Road, Farnborough, the speaker being G3FGF.

Normally, **Grafton** get together every Friday evening, but due to the School closing down for the summer recess, they are only active by way of the weekly net, held on Wednesday evenings, at 2200 clock, on a fre-

quency around the 1970 kc mark, the exact spot depending on the QRM position. The new session starts on September 15, and we are promised lots of interesting things for our next instalment.

The **Crawley** report looks forward to September—presumably, they shut down for August, as many Clubs do—when they have meetings on Wednesdays, 6th ("Lasers," by Mullard) and 20th (informal, contact G3FRV).

At **Southgate**, the *Newsletter* is now the responsibility of young G3WCE—we hope he won't mind us so describing him, as he is only 14 years old—and a very nice job he is making of its compilation and writing-up. Southgate is another Club which announces "no meeting in August."

Halifax report that regular gatherings are now taking place at the Sun Inn, Rastrick, and they also run a net on, or about, 1960 kc, every Sunday morning at 1115, clock. Present members may be interested to know that the then "Halifax Wireless Club" held its own callsign, EG2GU (as it would have been), as long ago as 1927.

Edgware close for August, but the Club net—Wednesdays, 1875 kc, 2100 clock—will remain in being for those not away on holiday.

Crystal Palace find that they have ten members wishing to learn Morse, so a transistor oscillator (which all can build) has been developed for home practice, in addition to the half-hourly tuition to be given each week. The idea behind all this—and it is an excellent one—is not only to help members get their tickets, but also to build up a corps of efficient CW operators so that the Club can make a good showing in the various contests. We are informed that their meeting place is now the Civil Defence Training Centre, Council Depot, Wood-yates Lane, S.E.12 (and we can guess who arranged *that!*), next events being on August 19 (Digital Frequency Meters, by G3OOU) and September 16 (W1BB Tape Lecture, and discussion thereon).

That's it for this time. For next month, the deadline must be first post August 4, addressed, as always, to: Club Secretary, SHORT WAVE MAGAZINE, BUCKINGHAM.

SPECIALLY ON THE AIR

Some stations to be on for some public occasion locally are now as follows:

GB3HH, August 5-6: From Hopehill, Meopham, Kent, the training and camping site for Gravesend & District Scouts, operating SSB on the 10-80m. bands. Enquiries and QSL's to: T. Biddlecombe, G3WAO, 39 Portland Avenue, Gravesend, Kent.

G3OJE/A, July 30-August 11: At Tolmers Scout Camp Site, Cuffley, Herts., running all bands 10 to 160 metres. Any Scouts or Scout Group unable to find a local amateur to co-operate for the Jamboree-on-the-Air (*August 5-6*) may camp at the Site and participate with G3OJE/A. Enquiries to the Camp Warden, address as above. For radio correspondence: M. D. Bass, G3OJE, 42 Clevedon Road, London, S.E.20.

GB3SES, August 12: Operated by the St. Helens Radio & Electronics Society for the Pilkington Gala Day, on all bands 10-160m., with QSL's by special card via E. W. Evans, G3WCN, 33 Atherton Street,

St. Helens, Lancs.

GB2TS, August 19: Organised by local amateurs and SWL's at the Tollerton (York) Horticultural Show and Sports Day, using the 10-160m. bands as suitable, with a special QSL card. A talk-in station on Top Band will probably be operating as well, for /M's wishing to visit the Show. Information from: Dr. T. M. Newland, G3TMN, The Meads, Tollerton, York.

GB3FRC, August 19-21: Organised by Fylingdales Radio Club in connection with Whitby Regatta, and operating from The Spa, West Cliff, Whitby, on all bands 10 to 80 metres, with AM/CW/SSB. Enquiries and QSL's: W. Easton, G3VGN, 24 Castle Road, Whitby, Yorkshire.

GB3CC, September 23-24: Exhibition station for Scottish Mobile Rally at Culzean Castle, Ayrshire, operating on 2-4-80m. For further details see "The Mobile Scene" in this issue. For QSL's and details, write: R. Harkness, GM3THI, 55 Woodend Road, Alloway, Ayrshire.

COURSES FOR THE R.A.E.

From September onwards, courses of instruction for the Radio Amateur's Examination, to be held in May next year (with probably an interim sitting in December) will start at night schools, evening institutes and technical colleges up and down the country. The R.A.E. is Subject No. 55 in the City & Guilds examination syllabus, and must be passed by all applicants for any category of radio amateur transmitting licence in the U.K.

Courses of instruction—which are usually once or twice a week, evenings only, for a nominal fee—are normally held under the *aegis* of the local Education Authority. Subject No. 55 is now a regular feature of the programme of courses at many technical colleges.

Though we shall be publishing lists of such courses as are notified to us with a request for publicity in this space, non-appearance of any particular centre does not necessarily mean that there is no course available in your locality. You should enquire at the local office of your Education Authority about what arrangements there may be for "Subject No. 55, City & Guilds" (it is essential to quote this) in your neighbourhood.

Where no course appears to be available, in populous centres it is often possible for the local Club to get one arranged by contact with the Principal of the Technical College or Evening Institute for that district. The requirement is usually a certain minimum number of students to justify putting on the course—and is often conditional upon there being a suitable instructor available (many such are licensed radio amateurs with the ability to teach).

Suitable and recommended reading matter for the R.A.E. includes: *Guide to Amateur Radio* (5s. 9d.); *Radio Amateur Examination Manual* (5s. 9d.); *Radio Amateur Operator's Handbook* (5s. 6d.); *Radio Data Reference Book* (14s.); *Short Wave Radio and the Ionosphere* (11s. 9d.) and, for a basic text covering the whole field of Amateur Radio, the *American Radio Amateur's Handbook* (44s.). Prices quoted are post free and all books are obtainable ex-stock from our Publications Department, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. (See outside back cover, this issue, for many other titles in our list.)

Courses of instruction for the R.A.E. so far notified are as follows:

Aldridge, Staffs: At the Evening Institute, Tynings Lane, commencing on Friday, September 15, at 7.30 p.m. Morse instruction will also be given and the course will be conducted by N. H. Hyde, G3PJM. This is the fourth year that it is being held.

Barry, Glam.: At the College of Further Education, Colcot Road, on Tuesday evenings (Theory) and Thursday (Morse and Practical), 7.30-9.30 p.m., starting September 19, enrolment at the College evenings during week beginning September 4 (fees, 30s. adults, 10s. for students 16-21, and free for under 16's). A course in Radio Construction for Amateurs is also offered. The College operates its own station GW3VKL, and students are encouraged to take part in its activities.

Bedworth, Warwickshire: At the Bedworth Evening Institute, Mondays 7.0-9.0 p.m., enrolment evenings

September 5-7. The lecturer will be G3ORY, *QTHR*, from whom further details can be obtained.

Bootle, Lancs.: At the Technical College, Balliol Road. Full details from W. Wade, Head, Electrical Engineering Dept., at the College, or from P. H. Jeffs, hon. secretary, North Liverpool Radio Club, 38 College Road North, Liverpool, 23.

Boreham Wood, Herts.: At the College of Further Education, Elstree Way, on Wednesday evenings, 7.0 to 9.0 p.m., starting on September 27. Apply K. Staple, Head of Engineering Dept., at the College.

Chatham: At the Medway College of Technology, Fort Horsted. Apply in first instance to P. Carey, G3UXH, 29 Miskin Road, Hoo, Rochester.

Colchester: At the North-East Essex Technical College, Sheepen Road, on Tuesdays at 6.30 p.m., starting September 19, with Theory and Morse. Enrolment evenings September 11-13. The course instructor will be A. J. Smith, G3UKJ.

Corbridge, Northumberland: At the County School, starting evenings in September (to be arranged). Apply in first instance to: V. Allison, G3TNX, 14 Silverdale Drive, Winlaton, Blaydon, Co. Durham.

Lichfield: At the School of Art & Evening Institute, enrolment first week September. Course lecturer will be J. H. Beaman, G3DZT.

London (Bromley): At the Evening Education Centre, 28 Beckenham Road, Beckenham, on Thursdays, 7.0 to 9.0 p.m. Fees are graded according to age, with a maximum of 40s. Enrolment at the first class meeting, September 28. Further details from: M. D. Bass, G3OJE, 42 Clevedon Road, London, S.E.20.

[cont'd over



"... Could I have 7/6 please, Pop—I want to convert to short wave—please, Pop..."

COURSES FOR THE R.A.E.—cont'd

London (Chingford): At the Chingford Community Centre, Friday Hill House, Simmons Lane, Mondays 7.30-9.30 p.m., starting September 25, enrolment evenings previous week on application to the Secretary; fee 30s., with reduction for juniors. Course instructor, E. Johnson, G2HR.

London (Holloway): At the Evening Institute, Montem School, Hornsey Road, Holloway, N.7, Mondays 7.0-10.0 p.m., commencing September 25, instructor R. H. Smart, G3MMC. Morse class Wednesdays, 7.30-9.30 p.m. Fees, complete course (Theory and Morse) 40s.; or 30s. either course separately. Enrolment at the Institute, evenings September 18-22, 7.0-9.0 p.m. This very successful course, which has been running for many years, is organised by the Grafton Radio Society and has passed a large number of students, who attend from all parts of London.

London (Ilford): At the Ilford Literary Institute, Cranbrook Road, starting on September 20, enrolment September 4-7, 7.0-8.30 p.m. at the Institute, for Theory and Morse. Fees vary from 40s. to 20s. for juniors. This also is a very successful course, which has been passing students through the R.A.E. since 1948. Apply in the first instance, with s.a.e., to: W. G. Hall, G8JM, 48 Hawkdene, North Chingford, London, E.4.

London (Kennington): At the Evening Institute, Kennington School, Cormont Road, S.E.5, on Thursday evenings, 7.30-9.30 p.m., commencing on September 14, with B. R. Meredith, G2CYV, as the course instructor.

London (Walthamstow): At the Markhouse Youth Centre, on Tuesday evenings. Apply in the first instance to the course instructor: K. Smith, G3JIX, 82 Granville Road, Walthamstow, E.17.

Lowestoft: At the College of Further Education, St. Peter's Street, commencing in September, with A. F. Ward, G3HSP, as the lecturer. Enquiries to the Principal, at the College.

Northampton: At the College of Technology, St. George's Avenue, starting in September, one evening a week, 7.0-9.0 p.m., with Morse tuition and Operating Procedure, in addition to Theory. Enrolment September 4-8, and further details on application to: A Parthenis, Head, Dept. of Engineering, at the College.

Peterborough: At the Technical College, Eastfield Road. Information from: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

Port Talbot, Glam.: At the College of Further Education, Margam, enrolment week September 4-8.

Saltburn, North Riding: At the Evening Institute, Secondary Modern School, with N. Larsen, G3EHB, as the instructor. Apply for details to the Principal, J. F. Benbow, at the Institute.

Sheffield: At the Western Road Evening School, starting on Wednesday, September 20, 7.0 p.m. Full details from: J. Bell, G3JON, 25 Edala Road, Sheffield, 11. (Tel. 61281).

Slough: At the College, William Street. Apply for details: H. Loukes, Head, Dept. of Engineering, at the College.

Additional courses, for the supplementary list to appear in the September issue of SHORT WAVE MAGAZINE, should reach us as soon as possible, and in any case not later than August 7 to ensure inclusion, addressed to: Editor, Short Wave Magazine, Buckingham, and marked "R.A.E. Course."

USAFE/UK BID SALES

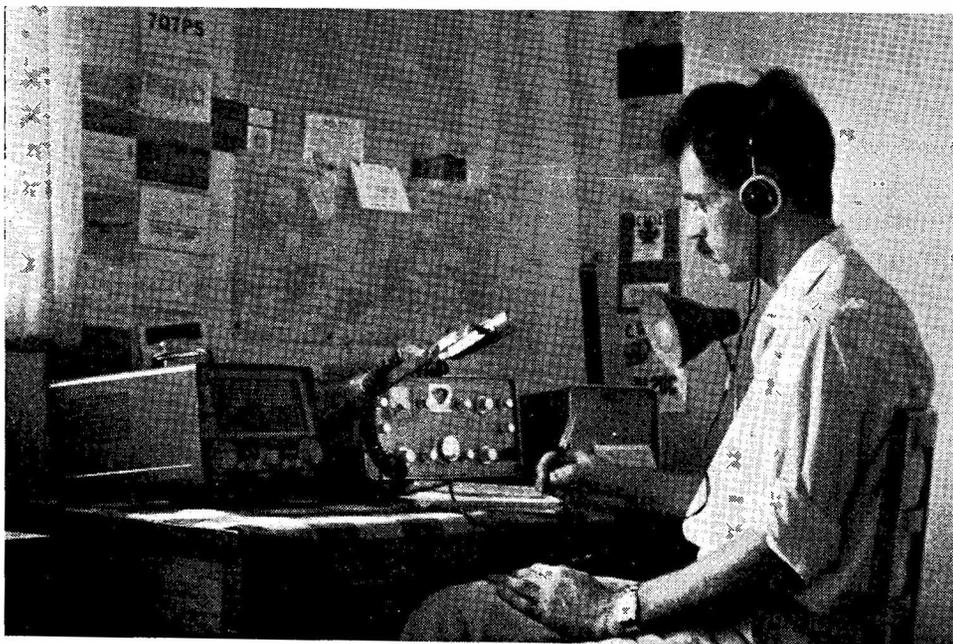
There are, at the old R.A.F. Station at Molesworth, near Huntingdon, large hangars which have become warehouses for the U.S. Air Force (Europe and the U.K.) Redistribution and Marketing Centre—which means the organisation for the selling off of a very wide variety of unwanted or surplus American equipment and stores of every imaginable description. This includes, of course, radio and electronic apparatus of all kinds.

Sales in the various categories are held periodically. The last covering an assortment of radio/electronic items was on July 18. The method of sale is the Spot Bid procedure. That is to say, having obtained the current sales catalogue (which is fully descriptive) for the category of merchandise in which you are interested, you make a postal bid for the items you want on a form provided with the catalogue. This is sent in with a deposit of 20% of the price you offer. If, by the specified closing date (or "date of sale") your bid is accepted, the goods are yours for collection on payment of the balance. If not, you get your deposit back.

The catalogue also specifies when the goods can be viewed (at Molesworth), with the 'phone numbers of the officials concerned with the sale arrangements. You can also be asked to be put on the mailing list for the category of merchandise in which you are interested. The address to write to in the first instance is: Sales Support Section, USAFE/UK Redistribution and Marketing Centre, R.A.F. Station, Molesworth, Huntingdon. (And when you get the catalogue, read the terms and conditions of sale carefully, as we have not the space here to reproduce all the small print.)

SSB FOR GPO COAST STATIONS

As the advantages of Sideband for long-distance marine working—e.g., good quality telephony at up to about 300 miles from Lands End Radio, GLD, on 1911 kc—become more evident, so the wider fitting of SSB equipment in ships is being encouraged. On the landward side, the Post Office Coast Stations in the 2 mc marine band are being equipped for SSB. Some of these stations and their working frequencies for Sideband are: Anglesey, GLV, 1925 kc; Humber, GKZ, 3528 kc; Lands End, GLD, 1911 kc; and Niton, GNI, 1925 kc. These stations also have other working frequencies, but outside the 1.8 and 3.5 mc amateur bands. The ship channels are on a wide range of spot frequencies between 2009 and 3542 kc.



THE OTHER MAN'S STATION

7Q7PH

AFTER many years of messing about with electronics and listening on the short wave-bands, it was finally decided that it was time to get a licence. However, this was held off by studies and pressure of work and it wasn't until Peter Hancock, B.Sc., Dedza Secondary School, P.O. Box 48, Dedza took up this teaching appointment in Malawi that serious attention could be given to Amateur Radio. After the usual formalities a Malawi licence was issued in 1966. Luckily, just at the time 7Q7PS (G3STF) was returning to England and offering his KW-2000 rig for sale. Prior to this a Heathkit Mohican had been built and got up to a high standard of performance after many hours of very careful alignment. A SWR indicator was constructed, and dipoles erected.

The location of this station at 5,000ft. a.s.l. has made it possible to work JA's, VK's, PY's, VE's within the restricted electricity hours of 1600-2000 GMT, often more-or-less end-on to the dipoles. Most of the operation has been SSB on 15 and 20 metres, with occasional duplex working 20/80m. and 20/40m. on local QSO's, using the Mohican Rx in place of the KW-2000 Rx. All the neighbouring countries have been worked by Joystick.

One of the many pleasures of running a station in Malawi has been the large number of contacts with fellow Westcountrymen, not only those calling G3

but also 9J2's, 9Q5's, VQ9's and so on.

There being few amateur stations in Malawi and hence no bureau, cards have been handled by WIMRQ, acting as QSL manager.

The few faults which have occurred in the rig have been no joke in the absence of any local service facilities. There has been no other amateur or technician within 50 miles, so mysterious faults have led to the manning of panic stations! However, the good side of this has been that 7Q7PH has learned his way around his Mohican and the KW-2000 with the indispensable aid of a Nombrex transistor signal generator and home-made multimeter.

Output has been a steady (!) 120 watt p.e.p. from a 6146B in the final to simple dipoles usually 10-15ft. above ground level. Many hours have been spent raising and lowering these and clipping off an inch at a time to bring them to resonance. This has several times meant that the aerials have differed by up to 12 inches from the standard calculated lengths and it has paid off.

It has all been immensely enjoyable. After just a year, 7Q7PH still feels very much a beginner and on returning home hopes to continue gaining experience as a GC3 ---GPO reciprocally permitting, as the 7Q7PH licence was obtained under local Malawi regulations.

"Short Wave Magazine," established since 1937 and read by radio amateurs throughout the U.K., also goes to all English-speaking countries overseas.

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.

EI2BL, Fr. Pacificus, Capuchin Franciscan College, Rochestown, Co. Cork.

EI7BK, B. D. Cullen, 253 Swords Road, Santry, Dublin 9.

G3UDV, P. E. Lindsley, 47A St. Mary's Road, Ealing, London, W.5.

G3UUU, P. V. L. Newman, Betsoms, Westerham, Kent. (Tel. *Westerham 2193*.)

G3VOU, J. Barlow, 2 Lingdale Road, Cheadle Hulme, Cheadle, Cheshire.

G3VPZ, R. C. Hogg, 27 Shrubland Road, Dalston, London, E.8.

G3VUH, M. J. Blackwell, 31 Rush-ton Road, Wilbarston, Market Harborough, Leics.

G3VUX, D. A. Coupland, 39 Cromwell Avenue, Bromley, Kent. (Tel. *Ravensbourne 6815*.)

G3WCD, C. R. Dillon, 140 Mount Road, Southdown, Bath, Somerset.

G3WGL, N. I. Briggs, 127 Newshaw Lane, Hadfield, *via* Hyde, Cheshire.

G3WGS, J. J. Justice, Roysten, St. Mary's Hospital, Stannington, Morpeth, Northumberland. (Tel. *Stannington 333*.)

GI3WHA, L. Hanna, 11 Canberra Park, Dundonald, Belfast.

G3WHM, A. G. Coker, 48 Charlock Way, Burpham, Guildford, Surrey.

G3WJW, L. N. Watts, 30 Steyne Road, Seaford, Sussex.

G3WKW, R. Thornton, The Anchorage, Cuttinglye Road, Crawley Down, Crawley, Sussex.

G3WLC, J. McIntyre, 3 Firs View Road, Hazlemere, High Wycombe, Bucks.

G3WLD, J. W. Hall, 11 Pinewood Close, Iver Heath, Bucks.

G3WLJ, K. R. Jones, 2 Waring Close, Green Street Green, Orping-ton, Kent. (Tel. *FNS-1615*.)

G3WLL, P. I. Peters, 59 Manvers Road, Swallow Nest, Sheffield. (Tel. *Aston Common 645*.)

G3WLM, R. A. Joyce, 395 Dunstable Road, Luton, Beds. (Tel. *Luton 52429*.)

GW3WLN, Dr. A. H. Pritchard, 15 Wingfield Road, Whitchurch, Cardiff. (Tel. *Cardiff 63211*.)

G3WLO, E. R. Denton, 11 Highland Road, Amersham, Bucks.

G3WLS, C. S. Town, 43 Coleridge Road, West Melton, Rotherham, Yorkshire.

G3WLX, J. L. Green, 34 Walkwood Rise, Beaconsfield, Bucks.

GM3WML, D. G. Smith, 44 Commerce Street, Lossiemouth, Morayshire. (Tel. *Lossiemouth 3078*.)

G3WMO, W. H. Davis, 23 Hillside Crescent, Enfield, Middlesex. (Tel. *01-363-5814*.)

G3WMP, J. Hopton (*G8AXF*), 330 Wetmore Road, Burton-on-Trent, Staffs.

G8AYN, R. Whitbread, 108 Gascoigne Road, New Addington, Croydon, Surrey, *CRO. ONE*. (Tel. *Lodge Hill 4671*.)

G8AYY, P. T. Gaskin, 58 Elmcroft Road, South Yardley, Birmingham 26. (Tel. *STeChford 2996*.)

GI8AYZ, I. J. Kyle, Ardvernis, Fenaghy Road, Cullybackey, Ballymena, Co. Antrim.

G8AZT, J. A. Jones, 88 Barnsdale Avenue, Thingwall, Heswall, Wirral, Cheshire.

CHANGE OF ADDRESS

G2BAB, R. C. Harris, Cartref, Port Lane Close, Chillington, Kingsbridge, S. Devon.

G2BTY, L. J. T. Lewis, 10 Agar Meadows, Old Carnon Hill, Carnon Downs, Truro, Cornwall.

G2FLP, R. D. Horrocks, The Lodge, Greenleach Lane, Worseley, Manchester. (Tel. *061-790-4626*.)

G3ATI, R. W. Pinfold, 1 Chiltern Avenue, Bedford. (Tel. *Bedford 54504*.)

G3ERF, C. W. Liversidge, Vallis, Condicote, Stow-on-the-Wold, Glos.

G3GBS, M. L. Sandoz, Edelweiss, Broad Lane, Wood End, Solihull, Warks.

G3GPX, P. J. Bartram (*ex-MP4BFM*), 83 Gowing Road, Hellesdon, Norwich, Norfolk. *NOR.40-M*. (Tel. *Norwich 49351*.)

GI3HEA, J. U. Burke, Millbrook, Magherafelt, Co. Londonderry. (Tel. *Magherafelt 2411*.)

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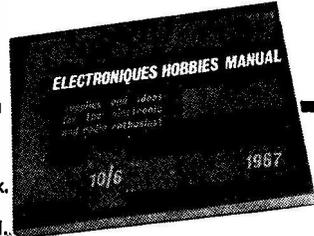
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FR-100B double conversion superheterodyne with crystal-controlled first mixer, 80-10 metres ...	112	0	0
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FL-1000 Linear Amplifier, 960 watts PEP with built-in PSU and designed to match any SSB exciter capable of 30-100 watts ...	90	0	0

Sommerkamp Transceivers			
FT-100 SSB Transceiver, 150 watts PEP 80-10 metres ...	180	0	0
TS-600-G mobile AM Transceiver for 10 metres ...	50	0	0
Tokai TC99 handsets (28.5 mc/s) ...	10	10	0

Swan Amateur Band Transceivers			
Swan 350 transceiver, 80-10 metres (up to 500 watts PEP) ...	205	0	0
230-volt a.c. Power Supply, speaker ...	45	0	0
Swan 400, Swan 500, and all accessories also available (details on request).			

C.S.E. Equipment			
CSE 2A10 solid state transmitter ...	43	7	0
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CSE Type II A.T.M.A. mobile/fix/portable antenna ...	9	15	0
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Extra coils (when more than one band required) ...	3	17	6

Echelford Communications 4 metre Equipment			
Echelford B1/4 transmitter ...	30	0	0
Echelford M1/4 transmitter ...	40	0	0
Echelford C1/4 converter ...	10	10	0
(Details on request.)			

Codar Radio Company		£	s.	d.	£	s.	d.
CR.70A Receiver ...	19	10	0	CR.45RB (ready built)	11	7	0
Codar PR.30 pre-selector	5	10	0	Codar AT5 12 watt, 2-band transmitter	16	10	0
PR.30X (built-in PSU)	7	4	0	250 volt PSU ...	8	0	0
Codar RQ.10 "Q" Multiplier	6	15	0	12/MS mobile PSU ...	11	5	0
RQ.10X (built-in PSU)	8	8	0	12/RC Control Unit ...	2	7	6
CC40 Station Control Unit	6	10	0	Codar T28 2-band receiver	15	10	0
CR.45K All-band Rx (kit)	9	10	0	Codar Mini-Clipper kit	1	19	6

Trio Communications Receivers			
JR-60 14-tubes Amateur Communications Receiver, 540 kc/s-30 mc/s plus 142-148 mc/s ...	61	19	0
9R-59 9-tube Communications Receiver ...	34	13	0

Lafayette Equipment			
HA-63A Communications Receiver ...	25	4	0
KT-340 Communications Receiver in semi-kit form ...	26	5	0
HA-500 Amateur Bands Receiver (with two mechanical filters)	44	2	0
HA-700 Communications Receiver ...	37	16	0
HA-150 10-80 metre SSB/AM/CW Amateur Receiver	78	15	0
Lafayette Navigator Grid Dip Meter ...	12	10	0
Monarch HAM-1 4-band Receiver ...	16	16	0

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KW201 receiver in stock ...	105	0	0
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Type 3 Tuner ...	2	15	0	Shure 444 microphone	10	12	6
Type 3A Tuner ...	3	12	6	Shure 401A microphone	5	10	0
Type 4 Tuner ...	4	4	0	Shure 2755K microphone ...	4	2	6
Type 4RF Tuner ...	6	6	0	Shira DX-75 microphone	3	3	0
Type 4H Tuner ...	3	10	6	Shira MC-110 microphone ...	1	11	6
Type 4H/RF Tuner ...	6	6	0				
Type 6RF Tuner ...	3	19	6				

SECOND-HAND EQUIPMENT

Many items in stock, including: LG-300's, K.W. Viceroy, MK-111 K.W. Vanguard, 840c, BC242, 1155's, AR8BL's, AR8D's, RA-1, Mohican, HA-14, LA-600, etc., your enquiries please.

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SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: K.W. Viceroy Mk.III Tx, in first-class condition, £105 or near offer. VHF signal generator, 100-150 mc, £3. — Sykes, 8 Uplands, Ashtead, Surrey. (Ring Ashtead 2546 after 7.0 p.m.).

SALE: Codar A.T.5 Top Band Tx, with mains PSU, £17. BC-221T, with original charts and mains PSU, £16. Heathkit RA-1 receiver, with 100 kc calibrator and manual, £28. Minimitter converter, £5. Or near offers.—G3TYH, QTHR.

SALE: Twomobile Rx, £17. T.W. 12-volt PSU, £6. TW-2, £15. — Short, G3GNR, 3 Park Meadow, Princes Risborough, Bucks.

SELLING: BC-221M with PSU and calibration charts, etc., £25. Heathkit 0-12U 'Scope, £20. Heathkit VTVM, V7-AU, £11. Home-built SSB rig, running 180 watts, £50. RTTY equipment—FSY-1-I, FSR-1-2, CRM-1, price £20. For list and details send s.a.e.—Cooke, G3LDI, 163 Norwich Road, Wymondham, Norfolk.

DON'T BUILD a Heathkit Mohican Mk.II — buy mine! Brand new and professionally aligned, FB on all bands, price £35 or near offer. — Leeming, G3LLL, QTHR, Blackburn 58594. (Callers evenings, not Sundays, pse.).

ASTRONOMICAL Telescope, 3-inch refractor, mounted on equatorial base with slow-motion drives; solar diagonal moon filter, spare objectives; small object-finding telescope mounted on main tube. Price £35.—Hassall, G3EMD, 45 Gower Road, Halesowen, Birmingham.

VALVES: One only Eimac 4CX1000, cost £85, new and unused, what offers? Also 4X150D at 30s., 4X250 at 50s. Some (used) bases available at 30s. each. R.C.A. 8121, £4; and 8122, £7 10s. (Essex area). —Box No. 4516, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

G3PHS Going QRT. Pair walkie-talkies, one-watt, 14 miles in field, worked Sweden, £25. Top Band transceiver, with AC and transistor PSU's, £25. CR-100 receiver, £12. Self-contained Tx for Top Band, £4. Unused 4-metre J-Beam, 40s. Mains Rx, 60s. BCC 69D, 20s. Two-metre converter, 20s. Cosor 4-track tape recorder, £13. Guitar amplifier, single unit 6-channel, with tremolo/echo and built-in Gelos G.256 tape, £25. Futurama solid guitar, £8. Copies "Practical Wireless", 1946-'60; "Short Wave Magazine" and "RSGB Bulletin", 1961-'66. Also various odds and ends.—Kates, G3PHS, 253D Coulsdon Road, Caterham, Surrey.

SALE: Professionally realigned HRO, resprayed grey hammer and lettered, coil packs include GC 1-7 to 30 mc and BS for 10-20-40m, in black case, with PSU, and on LS plinth, price £30 or near offer? (Sussex).—Box No. 4517, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Transceiver for 160 metres, basically the "Paddington" design as described in this Magazine for January 1967, but modified for mobile operation. Case measures 15in. x 5in. x 6½in. deep, containing transistor PSU and speaker. Incorporates 6BW6 final, and I.Tx.T., I.Rx.T. and pi-output, with provision for working from mains PSU (250/300v. DC and 12v. DC/AC) by means of C.O. switch. Only requires mike and aerial to operate, and complete with mobile mount tailored to unit. Price £15, carriage paid.—G3RDG, QTHR. (Tel. 01-455 8831.)

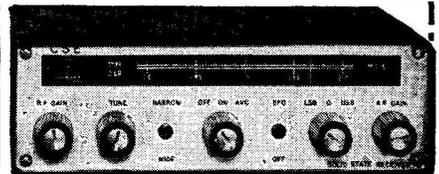
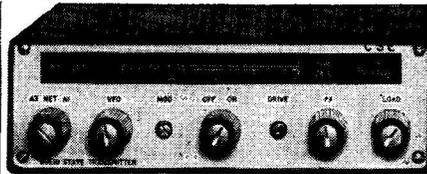
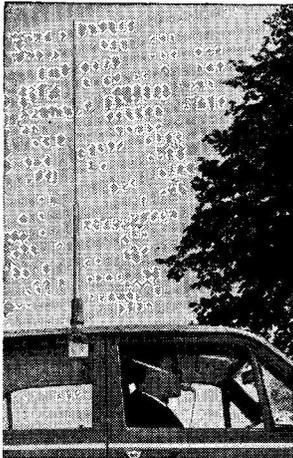
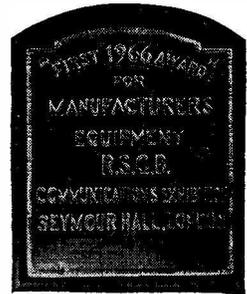
ALL ADVERTISEMENTS You See in these columns are genuine Reader offers and have been paid for—therefore, they represent something worth having, either to buy or exchange.

OFFERS invited for RSGB "Bulletins," unbound volumes covering 1963 to 1966. Selling Lafayette speaker, brand new and boxed, 25s.; also 15-ohm speaker, 8in., new and unused, no cabinet, 12s. 6d. (Glamorgan).—Box No. 4522, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

OFFERING: An Eddystone 680X receiver, excellent performance and complete with speaker, at £64 10s. Hertfordshire address, please state when able to call.—Box No. 4518, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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SMALL ADVERTISEMENTS, READERS—continued

WANTED: National NCX/D power supply and the 15m./20m. resonators for the Hustler mobile antenna. Must be in excellent condition. All replies answered.—Box No. 4519, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

£25 Will be paid for working Eddystone EC-10, EB-35 and EB-36. Selling at 10s., handbook for the Hallicrafters SR-150. (Essex area).—Box No. 4520, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Minimitter 10-15-20m. aerial system, with mast, hoisting gear and locking.—White, 30 Giants Grave Road, Briton Ferry, Neath, Glam., South Wales.

WANTED: K.W. Z-match ATU. For SALE: K.W. low-pass filter, 52-ohm, 60s. Unused 6146B, 40s. Various used 6146's, 10s. each. Lustraphone ribbon microphone, 40s. Bolex C8 cine camera, price £15 or Exchange for a K.W. Z-match ATU.—de la Mothe, G3VIE, 35 Brookside, Wokingham, Berkshire. (Tel. West Forest 4048.)

EXCHANGE or SELL: Solarscope Type CD-10142, dual beam, 3in., as new, £40. Kinghill regulated power supply module G.301, 0-30v., 1 amp., £15. Home-made bench PSU, 0-30v. 0.5 amp., with 4in. meter, in Imhof case, £15. Or accept in Exchange a well-built Tx, Rx or stereo amplifier. Collect.—Dahele, 46 Primrose Field, Harlow, Essex.

SELLING: Cathode ray tubes, brand new and unused. Type 89D, 91D. 4EP1 and 4EP31, £5 each. Also QV1-150A, 10s.—Wood, G3JGY, 23 George Avenue, Mile Oak, Tamworth, Staffs.

WANTED: Recent British transistor Rx covering long, medium, short wave and FM bands. State age and model number. (Essex).—Box No. 4521, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Eddystone S.740 Rx, coverage 500 kc to 30.6 mc, with S-meter and in good condition, price £20, cheaper if collected.—Bibby, 167 The Green, Eccleston (213), Nr. Chorley, Lancs.

SALE: National NC-303 and two-metre Converter to match. Nine amateur bands on 10in. scale. Double superhet, perfect on AM/CW/SSB reception. Cost over £200, accept £90 or very near offer?—G3AAJ, QTHR. (Tel. 01-989 6741.)

FOR SALE: S.B.E.-33 Transceiver, European coverage, perfect working order, internal AC and external DC PSU's (pos. or neg. chassis), with Vox unit and Shure microphone, price £110. K.W. Viceroy Mk. III, with extra half-lattice filter, £110. KW-77 Receiver, with matching speaker, £80. Beautifully built Linear Amplifier, four 811A's, 2000v. HT, three meters on engraved panel, £70. T.W. nuvistor two-metre converter, self-powered, £10.—Jacobs, G3OGB, 41 Queenborough Gardens, Ilford, Essex. (Tel. CRESENT 1697.)

FOR SALE: Heathkit VFO VF-1U, new, £8. Wide-spaced Tx variable condensers: 25, 45, 65, 75 and 95 mmF, 4s. each. Ceramic formers, 2in. diameter by 5in. long, 2s. Multi-plugs and sockets, coax, etc., every conceivable type, cheap, state wants. Beam direction indicator system, with compass head, for AC mains, 50s. Pair Selsyns, AC mains, 40s.—Briscoe, 335 Eton Road, Ilford, Essex. (Tel. TREVELYAN 8141.)

EXCHANGE or SELL: Hallicrafters SX-99, in excellent condition, with handbook, price £38, or exchange for R.216 receiver. Free collection and delivery.—Ring: Jason, Hereford 66292, business hours only.

SALE: KW-2000A and AC/PSU, in excellent condition, £180 or near offer. Also, friends, a Viceroy Mk. III with AC/PSU, a bargain at £100. (Oxford area).—Box No. 4525, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

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Hammarlund SP-600-JX, 540 kc/s.-54 mc/s.	£100 (30/-)
Eddystone 940, 480 kc/s.-30 mc/s.	£125 (40/-)
Eddystone 888A, Bandspread receiver	£85 (25/-)
Eddystone 680X, 480 kc/s.-30 mc/s.	£85 (30/-)
Heathkit Cheyenne Transmitter, Comanche Receiver, with p.s.u. and speaker	£85 (40/-)
Star, SR-600, Bandspread receiver	£72 (25/-)
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Hallcrafters SX71, 560 kc/s.-34 mc/s. and 46-56 mc/s., with bandsread	£65 (30/-)
Trio JR-60-U, 540 kc/s.-30 mc/s. and 142-148 mc/s., band- spread and xtal cal. (NEW)	£61/19 (25/-)
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R.C.A. AR88LF, 75-550 kc/s. and 1-5-30 mc/s.	£42 (40/-)
Eagle RX-80, 550 kc/s.-30 mc/s., with bandsread	£35 (20/-)
Heathkit RA-1, bandsread receiver	£35 (20/-)
Heathkit GC-1J Mk. II, 600 kc/s.-30 mc/s. with bandsread	£35 (20/-)
Trio 9R-59, 540 kc/s.-30 mc/s., with bandsread (NEW)	£34/13 (15/-)
Minimitter MR44, bandsread receiver	£32 (25/-)
Hallcrafters SX24, 550 kc/s.-43 mc/s. with bandsread	£25 (25/-)
Marconi CR100, 60-420 kc/s. and 500 kc/s.-30 mc/s., with noise limiter	£30 (30/-)
Eagle RX-60-N, 550 kc/s.-30 mc/s. with bandsread	£22 (20/-)
Hallcrafters SX-140, with H.T.-40-A and H.T.-18-A, complete station	£70 (40/-)
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NEW AVOMETERS, Model 7, Mk. 2, £22/5/-; Model 40, Mk. 2, £22/5/-; Model 8, Mk. 3, £24; Model 9, Mk. 2, £24; Multiminor, Mk. 4, £9/10/-;	
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SMALL ADVERTISEMENTS. READERS—continued

WANTED: S-meter circuit instructions for the Codar CR-66 receiver.—Varley, The Elms, Mansfield Road, Edwinstowe, Notts.

SALE: T.W. Two-Metre Communicator, 18 months old and in good condition, price £50.—Evans, 136 Bayham Street, Camden Town, London, N.W.1.

SEPTEMBER Issue will be published on August 25. Single-copy orders, 4s. post free, should reach us by Wednesday 23rd to ensure prompt mailing.—Circulation Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. (Small Advertisements to appear in this issue should be sent in as soon as possible.)

WANTED: SSB Transceiver, also Codar A.T.5 Tx and two-metre converter. All letters answered. For Disposal: National HRO Rx, needs attention, with five coil packs covering 550 kc to 30 mc, and BS on 28 mc, £8 10s. Also an AM rig, Geloso VFO, 813 PA, with T240 modulator, needs HV/PSU, price £15.—Stonehouse, G3HPC, 11 Torridge Road, Plympton, Plymouth (38234), Devon.

SALE: Zenith Royal Rx, Model 3000/1, new, £78 10s. Hallicrafters Mk. II, recently aligned by agents, with instruction book, £65.—Beard, Orchard Close, Springhill, Nailsworth, Glos.

CHANCE for someone at £25. Heathkit RA-1 receiver, with CL-1 calibrator, in perfect alignment and condition. (Birmingham).—Box No. 4523, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SELLING: Hallicrafters S.27 Rx, FB condition, £20. Also an S.27C for spares, £5. Marconi TF-144G Signal Generator, 85 kc to 25 mc, with leads, £15. Wee Megger (new), 500v. range, £10. AVO model 7X test meter, with leads, £10. Re-chargeable Deac Cells, 6-2v. one amp-hour, offers? DC/AC Converters, transistorised, 12v. to 300v. at 75 watts, £10. Transistorised xtal markers, 100 kc and 500 kc, £3 10s. each. Eddystone S.640 Rx, modified, all miniature valves, details on request, £25. OFFERS Wanted for the following, all in FB condition: Patterson dark-room lamp, orange; Yashica lens, 30 cm., plus 8mm. Cini titler; Ohnar 8mm. Vu Editor, mains lamp. Rondinax daylight developing tank; Patterson 35mm. developing tank. Mk. II. Linguaphone Spanish Course, complete with carrying case. Solartron CD.523G Oscilloscope, recently re-calibrated, cost over £300. Kokusai mechanical filter Type MF-455-CK, used but 100% OK. Hallicrafters SX-28 receiver, working but requires attention. Some BY-100 rectifiers at 3s. each. Carriage extra on all items, delivery up to 300 miles.—Stallard, 137 Underwood Road, Plympton, Devon.

SELLING: BC-348, unmodified, externally slightly rough but internally perfect, £10. Also a BC-348 chassis only, condition rough but suitable for spares, price 50s. Command transmitter, 4.0 to 5.3 mc, complete and in good condition, £4. Similar for 3.0 to 4.0 mc, condition fair, £3. TCS ATU, good condition, 60s. Xtal for Class-D Wavemeter, 27s. 6d.

WANTED: Xtal for BC-221. Could deliver Manchester/Liverpool or in North Wales, otherwise carriage extra.—Box No. 4524, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: Swan 350 Transceiver, mint condition and in original packing cases. Any inspection or trial. Price £200. (London).—Box No. 4526, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Correspondence Course for the R.A.E.—(Subject No. 55). Fair price paid. Details please.—King, Berry Lane, Aspley Guise, Bletchley, Bucks.

FOR SALE: Heathkit RA-1 receiver, with manual. £25. Two 0.3-5 amp RF meters, 5s. each.—Spencer, 1 Field Lane, Cam. Dursley, Glos.

OFFERING: Lafayette HE-40 receiver, in excellent order and very little used. Must sell, offers invited?—Wood, Home Farm, Angley Park, Cranbrook, Kent. (Ring Cranbrook 2176, evenings.)

SMALL ADVERTISEMENTS, READERS—continued

MUST MAKE Space to Sit Down! So disposing Advance Type 71 VHF Signal Generator, coverage 9.0 to 320 mc, with charts, price £14. Also a CT.53 Signal Generator, coverage 9-300 mc VHF, at £14. Geiger Counter, Model No. 1, £5. A 19 Set, price £3. Details and list for s.a.e.—Tarr, G3PUR, 81 Rectory Gardens, Worthing, Sussex.

FOR SALE: Signal Generator type CT.53, coverage 9.0 to 300 mc, with calibration charts and leads, price £10. RF power amplifier unit Type AM.912/TRC, for 100-225 mc, ideal for two metres; less its 4X150 but with suitable blower, price £12.—Haydon, G3BLP, QTHR. (Tel. Woldingham (Surrey) 3323.)

GOING COMMERCIAL, so I have a Home-built Station for Sale: Sideband phasing exciter, half-watt output on 15-20-80m., £7 10s. Linear amplifier, 150w. p.e.p., EL34 driving pair 807's, in 19in. rack mounting, £7 10s. Six-band receiver, using Electroniques coil-pack and Eddystone 898 dial, needs tidying up but does work, £14. Power unit and relays for the foregoing, £7 10s. Part-built G2DAF Mk. II, HF filter version, all valves and (home-wound) coils, no filter, £10. Heavy-duty HV/PSU, needs wiring out, with xformers 1000-0-1000v. at 500 mA, 300-0-300v. at 450 mA, various low-voltage windings (weighs a ton!), but price only £5. Codar A.T.5 Top Band Tx, in as-new condition, £14. Transipack HT Converter, 12v. input giving 250v. output, with relays, £8. Home-built transistor Rx, coverage 1670 to 5300 kc, 12v. working, price £5. Nearest reasonable offer accepted for any item listed. Buyer to collect, or carriage at extra cost.—Lock, GW3NWL, 23 Pontrilas Close, Culverhouse Cross, Cardiff, South Wales.

WANTED: Working BC-453, and good crystal-controlled amateur-band converter, or receiver (G2DAF?). Full details, pse.—Linton, 11 Talbot Crescent, Hendon, London, N.W.4.

SALE: Hallicrafters HT-40 Tx, £20. An Elizabethan Tx, less PSU and modulator, £7. A Geloso front-end five-band converter, £15.—Linney, G3UDA, QTHR, or Tel. Shrewsbury 51733.

SELLING UP: R.C.A. Tx type AT-3, 300 watts, 2-18 mc coverage, voice-operated carrier, with complete handbook, large job, suit Club, price £25. ART-13 Tx, as new, with PSU's and full handbook (PSU's not guaranteed), £30. Super-Pro Rx, with PSU, £20. Bendix radio-compass Rx, £5. Telefunken stereo amplifier, 3-watt output, unused, £5. Truvox tape deck, four track heads, £10. Teleprinter Type 3, ribbon inking, £5. Garrard 4HF deck, Deram cartridge, £12 10s. Vibrator PSU, 15s. Home-built receiver, similar Mohawk, with Electroniques front end, requires some completion, £15. Many other bargains, s.a.e. list; would deliver.—Hillier G3NSK, 23 Queen Street, Bottesford (446), Nottingham.

FOR SALE: Codar Preselector, Model PR-30X, in perfect condition, price £4.—Potter, 37 Wykeham Hill, Wembley, Middlesex.

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SWAN 500 with A.C. p.s.u.	283 0 0
KW600 lin.	100 0 0
KW Dummy Loads	5 5 0
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LAFAYETTE HE80. As new	30 0 0
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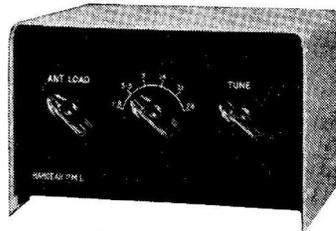
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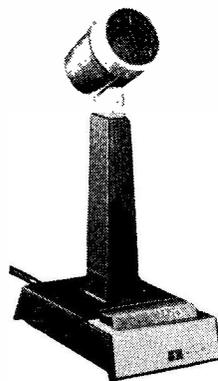
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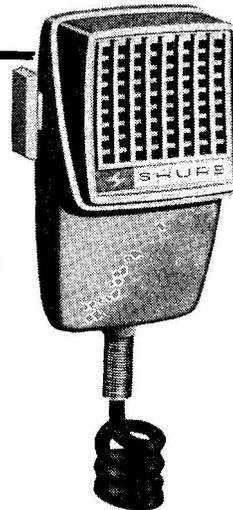
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