

The SHORT WAVE Magazine

VOL. XXI

JUNE, 1963

NUMBER 4

K.W. ELECTRONICS for all your Amateur Radio Requirements



The KW Station comprising (left to right) KW 500 Linear Amplifier, Hammarlund HK 1B Electronic Keyer, KW 77 Triple-Conversion Receiver and Speaker, Gelo-Table mic., KW Viceroy transmitter, CDR Beam Control Unit, KW Match SWR indicator (Vibroplex bug-key and 'phones in desk drawer).

Your station can be attractive and efficient with equipment supplied by K.W. We can also offer the KW Vanguard transmitter; KW 160 Top-band transmitter with high-level mod; KW-Geloso Converter, Low and High Pass Filters, Beams, Trap dipoles, Co-ax Relays, Crystal and Mechanical Filters, etc.

We can now give quick delivery on most items including the KW 77, KW "Viceroy," KW "Vanguard," KW 160, KW 500—Easy terms available if required.

In addition we can offer equipment by COLLINS, HAMMARLUND, DRAKE, GELOSO, HALLCRAFTERS, MOSLEY, HY-GAIN, TELREX.

Agents for MASTS and TOWERS also NOMBREX Transistor Signal Generator

Importers of U.S.A. Equipment

KW

ELECTRONICS LTD Vanguard Works

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Phone: DARTFORD 25574

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2 METRE BEAM, 5 element W.S. Yagi. Complete in box with 1" to 2" masthead bracket. Price 49/- P. & P. 3/6.

SUPER AERIALX, 70/80 ohm coax, 300 watt very low loss, 1/8 per yard. P. & P. 2/-.

FOR THE DX ENTHUSIAST MOSLEY TRAP BEAMS

Vertical 3 Band V3 ... £7 10s.
3 Band 3EL Beam TA 33dr. £24 15s.
Also the NEW Single Band Power Beams. Send for details.
50 ohm, 300w. 1/4" coax Low loss. Ideal for Mosley and other beams, 1/9 per yd. P. & P. 2/-.

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The ideal power Transformer for the Table-Top rig

This Parmeko-made transformer has the following conservative ratings. Primary: 230v. 50 c/s. Secondary: 620/550/375/0/375/550/620v. Rated at 275 VA. It will give 620 or 550 volts at 200mA simultaneously with 375v. at 250mA. All the H.T. you require for R.F. and Modulator. Also 2-5v. 3A. windings for suitable rectifiers such as 5R4GY, 5Z3, 83, 5U4, etc. Weight 24½ lbs. Size 6½" x 6½" x 5½" high. Worth at least £7. Our Price £3 only, carr. paid. C.W.O. only. No. C.O.D. We regret that we cannot accept orders for these from Eire or abroad.

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SCREENED MICROPHONE CABLE. 1st grade, 9d. yard. Plus postage.

10 CORE (5 PAIRS) SCREENED CABLE. 1/8 yard. All plus 2/6 P. & P.

ROTARY TRANSFORMERS. 12v. input 490v. 65 Ma, output, 17/6 each. P. & P. 3/- 6v. and 250v., 125 Ma, only 17/6. P. & P. 3/-.

FERRITE BEADS for the S Band Aerial, 50 for 15/- or 100 for 30/- post paid.

150 OHM VERY LOW LOSS BEADED COAX. 20 yard lengths, only 10/- each. Post free.

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Type ML1 (100 lbs.) 2d. per yard or 12/6 for 100 yards. Type ML2 (220 lbs.) 4d. per yard, or 25/- per 100 yards, post free.

ABSORPTION WAVEMETERS. 3.00 to 35.00 Mc/s. in 3 Switched Bands. 3.5, 7, 14, 21 and 28 Mc/s. Ham Bands marked on scale. Complete with indicator bulb. A MUST for any Ham Shack. ONLY 22/6 EACH. Post free.

VARIABLE CONDENSERS. All brass with ceramic end plates and ball race bearings. 50pf, 5/9, 100-6/6, 160, 7/6, 240, 8/6 and 300pf, 9/6. Extension for ganging, P. & P. 1/-.

RACK MOUNTING PANELS: 19" x 5½", 7", 8½", or 10½", black crackle finish, 5/9, 6/6, 7/6, 9/- respectively. P. & P. 2/-.

EDDYSTONE TRANSMITTING VARIABLES. Type 611, 25 x 25 pF, .08" Gap, 612, 50 x 50 pF and 725, 100 pF. Diff. All 10/- each. Post free.

GELSO VFO UNITS. 4/102 with new dial and escutcheon. Outputs on 80, 40, 20, 15 and 10. For 2-807 or 6146 Tubes. Only £8 13 6. 3 valves to suit, 24/-, ALL POST FREE.

SHADED POLE MOTORS, 230 v. or 110 v. operation, ideal for fans, blowers or models. Single Unit 12/6 plus 2/- P. & P. or Pair £1 plus 2/6 P. & P.

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Telephone No.: as before CEN 1635

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Improved internal assemblies.

Re-styled scale plate for easy rapid reading. 2 basic scales, each 2.5 inches in length.

New standards of accuracy, using an individually calibrated scale plate: d.c. ranges 2.25% of full scale deflection, a.c. ranges 2.75% of full scale deflection.

Available accessories include a 2500V d.c. multiplier and 5, 10 and 25A shunts for d.c. current measurement.



Mk4

MULTIMINOR

D.C. Current: 100µA f.s.d. —1A f.s.d. in 5 ranges.
A.C. Voltage: 10V f.s.d. —1,000 f.s.d. in 5 ranges.
D.C. Voltage: 2.5V f.s.d. —1,000 f.s.d. in 6 ranges.
D.C. Millivolt range: 0 —100mV. f.s.d.

Weight (including case): —
1½ lbs. (0.675 kg.) approx.

RESISTANCE: 0-2M Ω in ranges, using 1.5V cell.
SENSITIVITY: 10,000 Ω/V on a.c. Voltage ranges.
1,000 Ω/V on a.c. Voltage ranges.

Dimensions (including case): —
7½ x 4 x 1½ ins. (197 x 102 x 41 mm.) approx.

● For full details of this great new pocket size instrument, write for descriptive leaflet.

AVO LTD

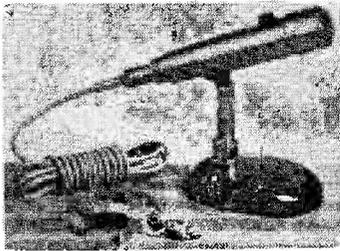
AVOCET HOUSE 92-96 VAUXHALL BRIDGE RD LONDON SW1

Tel: VICTORIA 3404 (12 lines)

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GROUP

GREEN & DAVIS 5 Weir Hall Gardens, London, N.18

3-WAY SLIM CRYSTAL MIKE



MODEL 100. C.

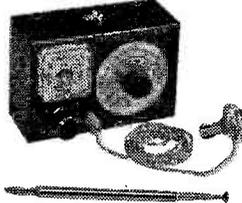
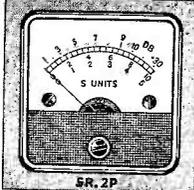
SPECIFICATION:
 Sensitivity: -52 dB at 1000 c/s lv/Microbar.
 Frequency Response: 60-10,000 c/s.
 Termination: Above 500k ohms.
 Directional characteristics: Non-Directional.
 Stand Screws: 1/2".
 Finish: Aluminium diecast casing with satin chrome finish.
 Length: 5".
 Diameter of Head: 1 1/4".

Incorporating on/off muting switch. Supplied complete with 7' of screened cable. Lavalier cord for chest use. Chrome finished desk stand with black base, 48/-.

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Quality Panel Meters—All having D'Arsonval movements, dual bearings, 2% full scale accuracy, silver dials, black numerals and pointers, front zero adjustment screws.
 1 1/2 1/2" square front, 1 1/4" overall front to back with 1 1/2" behind panel including 1/2" terminals. Requires 1 1/2" diameter hole in panel, four corner holes with 1/4" centre. Terminal polarity clearly marked. Supplied complete with mounting screws, individually boxed and guaranteed.

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MR.2P	0-50µA	39s. 6d.
MR.2P	0-500µA	32s. 6d.
MR.2P	0-1mA	27s. 6d.
MR.2P	0-5mA	27s. 6d.
MR.2P	0-300V.	27s. 6d.
5R.2P	"S" Meter	35s. 0d.



FIELD STRENGTH METER

1-250 Mc/s. 5 switched Bands. Dial calibrated in megacycles. 200µA basic movement. Magnetic base for convenient mounting. Very attractive design. Supplied with signal monitoring earpiece, and detachable 4 section telescopic aerial.

Only 69s. 6d.

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*Silverplated all copper chassis.

*ECC91—EP95 XTAL controlled OSC chain.

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● High signal/noise ratio. Freedom from spurious responses, cross modulation and I.F. breakthrough. Virtually any I.F. to suit any receiver as G. & D. Converters are built with wide choice of I.F.s.

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OD3 ... 5/6	6AK5 ... 5/6	6F33 ... 4/6	11E1 ... 2/6	11E2 ... 2/6	35ZAGT 2/6	AR33 3/6	ECC85 10/6	EN32 ... 10/6	PEN44 20/6	UBF80 8/6	
OD4 ... 5/6	6AK7 ... 6/6	6G6G 2/6	6G6G 2/6	11E3 ... 2/6	35Z5GT 7/6	ARF12 3/6	ECC82 8/6	EY81 ... 8/6	PL36 ... 11/6	UBF89 8/6	
IASGT/G 5/6	6AL5 ... 4/6	6H6 ... 1/6	6H6 ... 1/6	11E4 ... 2/6	35Z5GT 7/6	ARF12 3/6	ECC82 8/6	EY84 ... 7/6	PL38 ... 16/6	UBL1 13/6	
IATGT 10/6	6AM5 3/6	6J5G ... 3/6	6J5G ... 3/6	12A5 ... 10/6	35Z5GT 7/6	ARF38 12/6	ECC81 9/6	EY86 ... 7/6	PL82 ... 6/6	UCB84 8/6	
IHSGT 9/6	6AM6 4/6	6J6 ... 3/6	6J6 ... 3/6	12A6 ... 3/6	50B5 ... 8/6	ATP4 ... 5/6	ECC83 8/6	EY91 ... 3/6	PL83 ... 8/6	UCH21 9/6	
IL4 ... 3/6	6AO5 6/6	6J7G ... 7/6	6J7G ... 7/6	12A8GT 5/6	50C5 ... 7/6	AZ1 ... 9/6	ECC80 7/6	EZ40 ... 3/6	PL84 ... 8/6	UCH42 8/6	
INSGT 9/6	6AO6 8/6	6K6GT 7/6	6K6GT 7/6	12A1HGT 5/6	50K1G 9/6	C1C ... 9/6	ECC82 8/6	EZ41 ... 6/6	PM84 ... 10/6	UCH81 9/6	
IS4 ... 5/6	6AS6 ... 5/6	6K7 ... 5/6	6K7 ... 5/6	12A1H 11/6	50K1G 9/6	C1C ... 9/6	ECC83 14/6	PX24 ... 15/6	PX4 ... 16/6	UCL82 9/6	
ISS ... 5/6	6AS7G 20/6	6K7G ... 2/6	6K7G ... 2/6	12AT6 6/6	50L5 ... 5/6	CL33 9/6	ECC85 11/6	PX25 ... 10/6	PX25 ... 10/6	UCB85 8/6	
IT4 ... 4/6	6AT6 ... 5/6	6K8 ... 8/6	6K8 ... 8/6	12AT7 5/6	50L5 ... 5/6	CY31 ... 6/6	EF37A 8/6	FW4/500 7/6	PY33 ... 12/6	UF41 ... 9/6	
IU4 ... 7/6	6AU6 ... 7/6	6L5G ... 8/6	6L5G ... 8/6	12AU7 5/6	80 ... 6/6	DA30 ... 10/6	EF39 ... 4/6	FW4/800 8/6	PY80 ... 6/6	UF42 ... 9/6	
IU5 ... 7/6	6AV6 ... 6/6	6L6 ... 9/6	6L6 ... 9/6	12AX7 6/6	83 ... 8/6	DA41 ... 30/6	EF40 ... 10/6	GZ30 ... 10/6	PY81 ... 6/6	UF80 ... 7/6	
IX2B ... 7/6	6B6 ... 8/6	6L8A6 6/6	6L8A6 6/6	12B6 5/6	117N7 30/6	DF96 ... 7/6	EF42 ... 7/6	GZ32 ... 12/6	PY82 ... 6/6	UF85 ... 7/6	
2A3 ... 5/6	6B8 ... 5/6	6L7 ... 5/6	6L7 ... 5/6	12BE6 5/6	117Z6GT 10/6	DF96 ... 7/6	EF42 ... 7/6	GZ34 12/6	PY83 ... 6/6	UF86 ... 12/6	
2D21 ... 6/6	6B8G ... 2/6	6L8 ... 8/6	6L8 ... 8/6	12C8 ... 3/6	807 ... 9/6	DH63 6/6	EF50 ... 1/6	HL33DD 6/6	PY88 ... 9/6	UF89 ... 7/6	
2X2 ... 3/6	6BA6 ... 6/6	6Q7G 6/6	6Q7G 6/6	12E1 ... 20/6	813 ... 55/6	DK92 ... 9/6	EF80 ... 6/6	KTB ... 25/6	PY80 ... 10/6	UL41 ... 9/6	
2X2A ... 7/6	6BE6 ... 6/6	6SCT 7/6	6SCT 7/6	12J5GT 3/6	814 ... 20/6	DK96 ... 7/6	EF85 ... 6/6	KT33C 6/6	PY81 ... 10/6	UL84 ... 8/6	
3A4 ... 4/6	6BH6 ... 5/6	6SD7GT 5/6	6SD7GT 5/6	12K7GT 7/6	815 ... 40/6	DL96 ... 7/6	EF86 ... 7/6	KT41 ... 7/6	PZ30 ... 15/6	UJ4 ... 12/6	
3A5 ... 7/6	6B16 ... 8/6	6SCT 5/6	6SCT 5/6	12K8 10/6	832 ... 15/6	DM70 4/6	EF89 ... 6/6	KT66 ... 15/6	QP25 5/6	UY21 ... 6/6	
3B28 ... 15/6	6BQ7A 8/6	6SH7 3/6	6SH7 3/6	12Q7GT 5/6	954 ... 5/6	EABC80 7/6	EF98 ... 10/6	KTW61 7/6	QQV02-6 6/6	UY41 ... 6/6	
3D6 ... 4/6	6BR7 ... 12/6	6S7A 5/6	6S7A 5/6	12SA7 7/6	955 ... 3/6	EAC91 4/6	EF183 10/6	KTZ4 6/6	QV03-10 4/6	UY85 ... 6/6	
3E29 ... 50/6	6BR8 ... 5/6	6S17GT 6/6	6S17GT 6/6	12SC7 4/6	957 ... 5/6	EAF42 8/6	EF184 10/6	MU12/14 7/6	QQV03-10 4/6	VR40 ... 10/6	
3Q4 ... 4/6	6BW6 9/6	6SN7GT 6/6	6SN7GT 6/6	12SG7 3/6	958A ... 4/6	EBC21 7/6	EF184 10/6	N78 15/6	N78 15/6	VR53 ... 4/6	
3S4 ... 5/6	6BW7 9/6	6SOT 6/6	6SOT 6/6	12SH7 3/6	957 ... 8/6	EBC31 6/6	EL33 ... 9/6	PABC80 8/6	QV04-7 7/6	VR56 ... 4/6	
4X150A 50/6	6C5 ... 2/6	6S2K7 3/6	6S2K7 3/6	12SK7 2/6	957 ... 8/6	EBC41 7/6	EL33 ... 9/6	PC97 ... 10/6	RL18 ... 12/6	VR57 ... 6/6	
5R4Y 9/6	6C5 ... 8/6	6V6 9/6	6V6 9/6	12SR7 5/6	5718 7/6	EBC81 7/6	EL37 ... 7/6	PCCB8 6/6	RT18 ... 3/6	VR65 ... 4/6	
5R4WGA 15/6	6C5G ... 5/6	6V6G 4/6	6V6G 4/6	20D1 ... 9/6	5725 ... 10/6	EBF80 7/6	EL41 ... 8/6	PCCB8 8/6	TT15 35/6	VR100 6/6	
5U4G 5/6	6C6 ... 4/6	6V6GT 7/6	6V6GT 7/6	20D1 ... 14/6	5749 ... 9/6	EBF83 10/6	EL42 ... 8/6	PCC88 13/6	TZ40 ... 30/6	VR119 3/6	
5U4G 6/6	6C8G ... 7/6	6X4 ... 5/6	6X4 ... 5/6	25L6GT/GB 8/6	5763 ... 10/6	EBF89 8/6	EL81 ... 9/6	PCC89 11/6	UI2/14 8/6	VR135 2/6	
5V4G 8/6	6CB6 7/6	6X5GT 4/6	6X5GT 4/6	25Z4G 8/6	5842 ... 65/6	EBL1 ... 11/6	EL83 ... 7/6	PCF80 7/6	U24 ... 12/6	VR136 4/6	
5Y3G 4/6	6CD6G 7/6	6X5GT 6/6	6X5GT 6/6	25Z5 8/6	6005 ... 8/6	EBL2 12/6	EL85 ... 10/6	PCF82 7/6	U25 ... 11/6	VR137 4/6	
5Y3GT 6/6	6CH6 ... 6/6	6Y6 6/6	6Y6 6/6	28D7 7/6	6060 ... 8/6	EC91 8/6	EL85 ... 10/6	PCF84 13/6	U26 11/6	VR138 3/6	
5Z3 ... 6/6	6CL6 ... 10/6	6Z4 ... 5/6	6Z4 ... 5/6	30F5 ... 8/6	6080 ... 25/6	ECC32 4/6	EL86 ... 8/6	PCF86 11/6	UI91 12/6	VUI11 5/6	
5Z4G ... 7/6	6CW4 14/6	7C5 ... 12/6	7C5 ... 12/6	30FL1 9/6	6146 ... 27/6	ECC40 9/6	EL95 ... 6/6	PCL81 9/6	U251 ... 14/6	WB1M 6/6	
6/30L2 10/6	6D6 ... 3/6	7C6 ... 7/6	7C6 ... 7/6	30FL15 12/6	7193 ... 2/6	ECC70 15/6	EM34 ... 9/6	PCL82 8/6	U281 ... 15/6	X65 ... 5/6	
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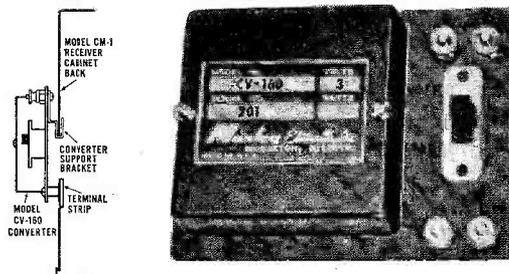
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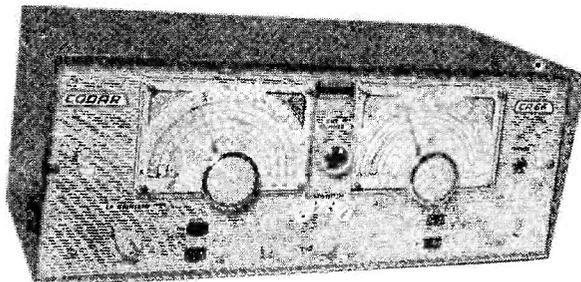
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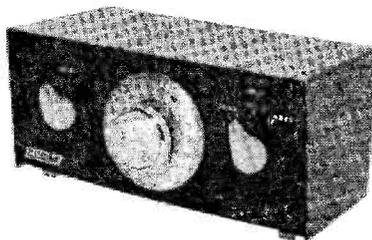
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The SHORT-WAVE Magazine

EDITORIAL

Social *It is often said that most radio amateurs are content to sit in their stations, working or listening to their fellows, with no desire whatever to make personal contacts outside their own particular circle of intimates. This is probably fairly true of the majority still, but the pattern is beginning to change, as this issue shows — it carries several reports on what could be called recent social occasions in the world of Amateur Radio.*

While in the early pioneering days most amateurs were only too glad to meet and discuss with others what were then problems common to them all, this tendency became less evident as methods and techniques became more standardised, with the latest ideas available to all, bringing far more stations on the air. At that time, too, it was quite unknown for there to be any feminine interest or presence at amateur gatherings, unless the lady happened to hold a callsign in her own right when, of course, she was welcomed — but only because she was qualified to be within the fold.

And here, too, there has been a significant change. Not only do amateurs get together far more than they used to even ten years ago, but on such occasions nowadays it is usual for them to be accompanied by their wives, girl-friends or eldest unmarried daughters. And, of course, there are now far more of the latter who are licensed.

Unquestionably, the main reason for this change in the social habits of radio amateurs is the great increase in mobile working, in its turn brought about by the far wider possession of cars. This has led on naturally to an increasing circulation of people on occasions such as mobile rallies, which have become in effect family outings.

Whether or not this trend is a good one is a matter of opinion — those who don't like it can always keep away — but we can foresee another tendency developing, which would be a reversion to the pre-war form: That of confining certain radio amateur occasions to "holders of callsigns only." For one thing, the organisation is so much less complicated!

*Austin Fostell
G6FO.*

100-WATT RF AMPLIFIER

FOR ALL BANDS 10-80 METRES
DOUBLE-TETRODE VALVE

G. W. McDONALD (G2OX)

This is an interesting and practical design for an RF amplifier which can follow either an existing driver source capable of about 3w. output on the band(s) required, or as the companion unit to the all-band exciter already described by our contributor in the January 1962 issue. He also shows how series-gate modulation can be applied to this PA, for casual phone operation.—Editor.

THIS article is written for those who want to increase PA power, and who are interested in operating on any of the HF bands. The amplifier is designed to work from the writer's Three-Stage, Four-Band Exciter Unit, as described in the January 1962 issue of *SHORT WAVE MAGAZINE*. The design embodies simple construction at low cost, although a modern type of HF PA valve is used.

Modulation is by the simple series-gate system, a method of screen-grid control which gives a low-cost good quality telephony system for those who require the facility of phone working only occasionally.

The amplifier is designed around the *Mullard* valve type QQV06-40. This valve can be run at its full rated power of 90 watts right up to 275 mc. It is a double-tetrode of special internal arrangement and permits push-pull layout with the symmetrical wiring which is so important in HF construction. The HT requirements are modest, being 600 volts at a total current of 200 mA. The plate efficiency can be as high as 70% depending on how hard the valve is driven, but an efficiency satisfactory to average amateur requirements can be achieved with only 3 watts drive. The valve is available on the surplus market at a cost of around 40s. and is well worth the money.

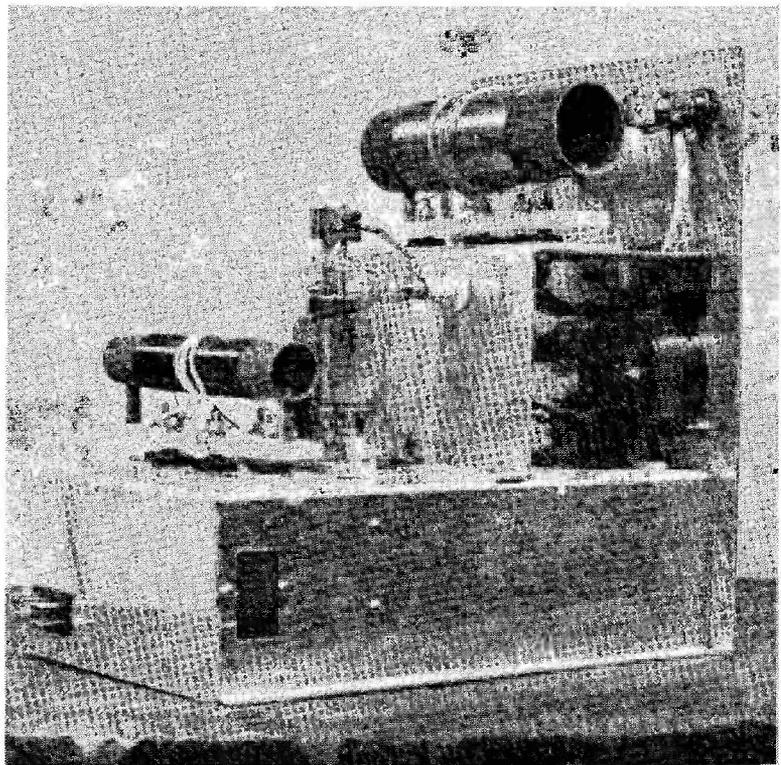
Drive input to the grid of the PA is by low-impedance link from an exciter giving an output of around three watts. Plug-in coils are used because it is of

importance to present the correct impedance to the valve anodes on each band; this matching impedance depends on using the proper L/C ratio and makes the easy way out (of having one coil to tune over two or more bands) an unsatisfactory proposition.

Parallel feed in the anode circuit is used in order to keep the HT voltage off the coils, a wise precaution where coils are to be handled. This method of feed requires RF chokes in the anode circuits of the valve. These chokes are a common cause of instability, especially if they are used in the grid circuit as well as the anode; TPTG-type oscillation is easily set up in such a circuit even when the inductance of the grid and anode chokes differs. To obviate this, it will be noted that no RF chokes are used in the grid circuit and the HT appears on this coil in the form of the 150-volt bias supply only.

Circuit Points

The grid and anode circuits are tuned by series-gap condensers. The *Eddystone* type chosen are working at or near their voltage limit in the anode circuit, but no flash-over has been experienced. However, should the amplifier be operated under high-level Class-B modulation conditions flash-over



General appearance of the HF-band RF amplifier as designed and constructed by G2OX, and described in the article. Coils in place are for the 80-metre band. The s/o insulator up against the valve, a QQV06-40, is to mount one plate of a small neutralising condenser, as explained in the text. The series-gate modulator (see Fig. 1) is built as a separate unit.

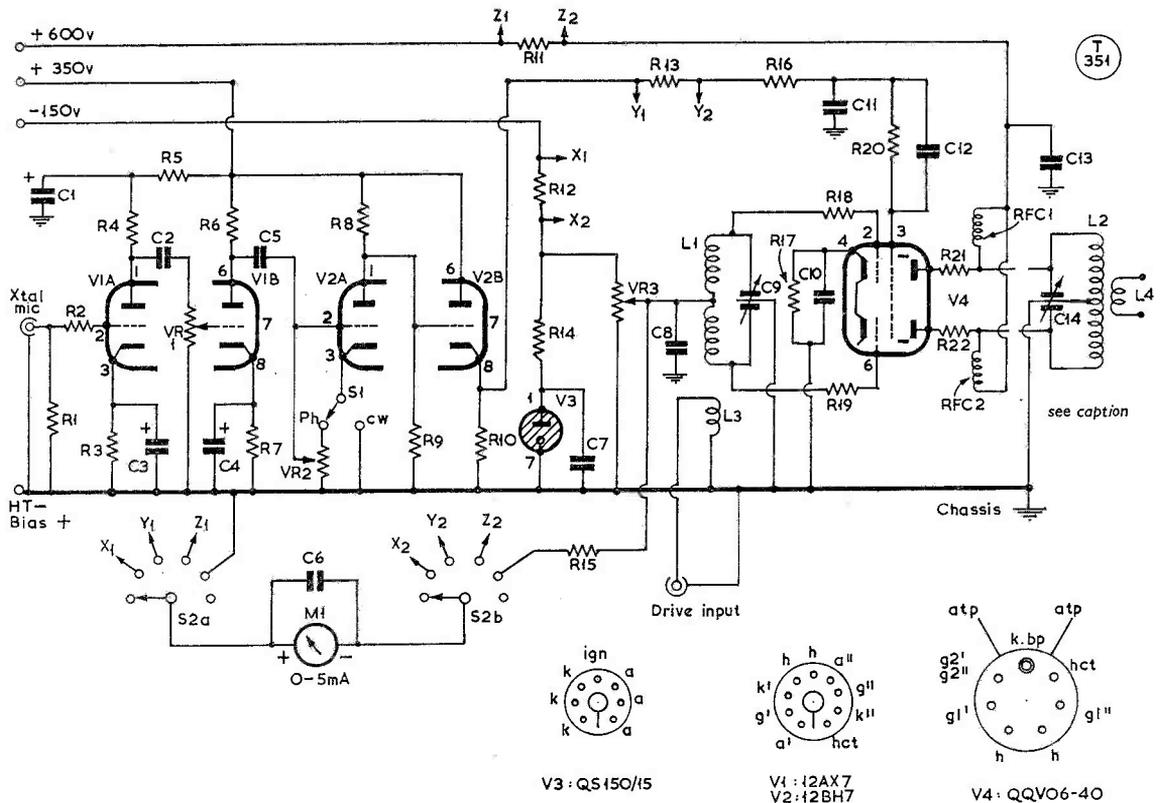


Fig. 1. Circuit of the HF band RF amplifier, using a QOV06-40 double beam-tetrode, with its series-gate modulator. The QOV06-40 lends itself to a symmetrical layout, while providing the QRO capability. The tank circuit is arranged for parallel feed in the push-pull configuration, which means that the RF chokes must be good ones. Drive can be from any suitable exciter giving about 3 watts of RF — the companion Exciter Unit for this PA was described in the January 1962 issue of "Short Wave Magazine" — and the modulator shown will give full control at maximum carrier power. Note that .001 μ F mica condensers rated 1.5 kV must be inserted in the anode leads, as indicated by the gaps in the L2 plate connections.

may occur. The risk of flash-over also depends very much on the L/C ratio used in the tank circuit.

The grid drive required for about 40 watts RF output into a test load was 3 watts. Doubling this drive figure increased both the power output and the anode efficiency but TVI then increased considerably, a point worth noting by those who are having this trouble. The grid bias voltage is adjustable by a resistor VR3 brought out to the front panel, and bias is supplied from a regulated source. The regulator valve is in the station power supply in the writer's case, but for the benefit of the constructor a circuit is given so that the bias regulation may be included in the amplifier chassis if more convenient. This is V3 in the diagram.

Resistor R17 is included in the cathode circuit purely as a safety measure to limit the valve current in the event of bias failure. This resistor is worth including when a relatively costly valve may be destroyed by a moment's error on the part of the operator, or a fault in some other part of the circuit.

It should be noted that although the screen derives its voltage *via* the series-gate modulator, the R20, C12, combination which forms a screen stopper

Table of Values

Fig. 1. Circuit of the RF/PA and Gate Modulator

C1 = 16 μ F	R11, R12,
C2, C5 = .005 μ F	R13 = Meter shunts
C3, C4 = 25 μ F	R14 = 10,000 ohms, 3-W.
C6, C10,	R15 = see text
C11, C13 = .01 μ F	R16 = 25,000 ohms
C7, C8 = 0.1 μ F	R17 = 100 ohms, 10-w.
C9, C14 = 50 + 50 μ F,	R18, R19,
series — gap	R20, R21,
C12 = 100 μ F	R22 = 47 ohms
R1 = 1 megohm	VR1 = 1 megohm, var.
R2 = 100,000 ohms	VR2 = 25,000 ohm poten-
R3 = 5,800 ohms	tiometer
R4, R9 = 470,000 ohms	VR3 = 10,000 ohm poten-
R5 = 47,000 ohms	tiometer
R6 = 250,000 ohms	V1 = 12AX7
R7 = 6,800 ohms	V2 = 12BH7
R8 = 250,000 ohms	V3 = QS150/15
R10 = 220,000 ohms	V4 = QOV06-40

should be fitted directly to the screen pin of the valve holder. For the constructor who does not require the telephony facility, the screen may be taken to any 200-volt supply, although including the last two stages of the modulator provides a useful screen clamp circuit.

Neutralisation of the anode-grid capacities may or may not be necessary—a lot depends on the

symmetry of the wiring and the layout. The usual cross-connected anode-to-opposite-grid is the easiest neutralising method to use in the circuit. It can be simply arranged by fitting a plate parallel to each anode of the valve, the plate being mounted on a small stand-off insulator. This can be seen in the photograph. As a further precaution against parasitic oscillation 47-ohm 2-watt resistors are fitted in series with each anode, close to the anode connectors of the valve.

A metering circuit is included so that circuit performance can be checked and the PA properly set up. The necessary shunt and multiplier resistors are wound by the well-known method of cut-and-try, and will as usual depend on the meter used; R15 must be calculated.

The Modulator

The working of the Series-Gate Modulator is fully described in the handbooks so no detailed description of the circuit will be given here. The modulator uses, very conveniently, only two valves, both double-triodes. The first valve, a 12AX7 operates as a voltage amplifier and is shown in the circuit set up for a high impedance crystal microphone. Alternative valves for this position are 12AT7 and 12AU7, but they will require different values of anode load resistors.

The following valve is a low-impedance 6BH7, its first section operating as an amplifier and the second section as a cathode follower. Briefly, the voltage applied to the screen of the RF amplifier depends on the voltage drop across the anode load of V2A. The higher the current in V2A the less will be the screen voltage on the RF stage, and *vice versa*. It is seen that any variation in the grid input voltage of V2A will cause variations in the screen voltage of the RF amplifier, and if these variations are at audio frequencies the screen current of the amplifier will be modulated accordingly.

To operate the amplifier on telephony, first set up the tuning as for normal CW operation; then, with the modulator audio gain at minimum adjust the carrier-level by VR2 so that the amplifier plate current drops to about one-tenth of its CW value. The audio gain is now advanced until speech into the microphone causes the anode current of the amplifier to peak to near the previously found CW value. Note that this process can be overdone—it is only speech peaks that should be allowed to drive the PA to "full CW output."

Construction

This amplifier, being arranged to work in push-pull, demands a symmetrical layout, and as the QQV06-40 is quite capable of oscillation at frequencies around 300 mc, some care is necessary to ensure that odd paths in the wiring do not constitute circuits which will resonate at high frequencies, thus causing spurious oscillation. Short direct wiring is essential, as is the necessity to connect all by-pass condensers directly to the point it is desired to by-pass. All earth-return leads from the various

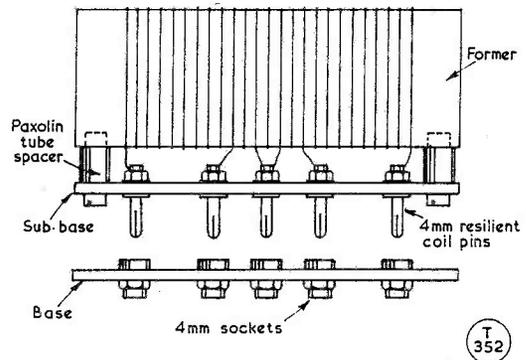


Fig. 2. PA coil construction for the RF amplifier. The mounts and bases are made of $\frac{1}{8}$ -in. perspex, or similar insulating material, in strips 5 in. long by $1\frac{1}{2}$ in. wide, carefully drilled through together to ensure accurate register.

COIL WINDING DATA — RF Amplifier

BAND	Former o.d. ins.	Turns	Wire SWG	Winding lgth. ins.	Spacing
<u>3.7 mc</u>					
L1	$\frac{7}{8}$ "	110	28g.		close wound close wound
L2	$1\frac{1}{2}$ "	70	24g.		
<u>7.0 mc</u>					
L1	$\frac{7}{8}$ "	40	20g.		close wound close wound
L2	$1\frac{1}{2}$ "	40	20g.		
<u>14.0 mc</u>					
L1	1"	23	16g.	$3\frac{1}{4}$ "	wire diam. wire diam.
L2	$1\frac{1}{2}$ "	21	16g.	$3\frac{1}{4}$ "	
<u>21.0 mc</u>					
L1	1"	16	16g.	$3\frac{1}{4}$ "	wire diam. wire diam.
L2	$1\frac{1}{2}$ "	16	16g.	$3\frac{1}{4}$ "	
<u>28.0 mc</u>					
L1	1"	13	16g.	$2\frac{1}{2}$ "	2/wire diam. 2/wire diam.
L2	$1\frac{1}{2}$ "	11	16g.	$2\frac{1}{2}$ "	

Notes: L1, L2 are centre-tapped in each case. L3, L4 are link coils, centred on the appropriate main windings; for each band, L4 is three turns insulated wire. For the 14-28 mc bands, L3 is 3 turns; for 3.7/7.0 mc, L3 is 6 turns. Except for the link windings, for which insulated flex or a flexible p.v.c. covered wire can be used, all coils are wound with enamelled wire of the gauges shown.

valve electrodes should be connected to a single point on the 16g. aluminium chassis. Coils should be mounted so that no coupling is possible between the anode and grid circuits. The writer had no difficulty with the layout shown in the photograph apart from the necessity to use a small amount of normal neutralisation.

Results

The results from the RF amplifier as described and shown here have been very satisfactory on all

bands from 3.5 mc to 28 mc and almost all the tests have been conducted working into a load resistance of 80 ohms. The writer prefers to judge the results of a test this way rather than by the more usual method of "contact," because contact and distance are purely a function of the aerial and the time of day, both highly variable factors.

It is hoped that this inexpensive, efficient and compact amplifier will increase the interest in multi-band working with low-cost equipment, and that the layout will encourage constructors to try it at frequencies much higher than the 10-metre band, which is the limit of the writer's exciter unit as already described.

MOBILE WHIP FOR TOP BAND

WING-MOUNTING, USING ADAPTED CAR AERIAL

N. J. GREGORY (G3LCV/M)

THE writer set out to build a mobile whip for 160 metres with neatness and size as the objectives—this being prompted by the YL—which at the same time would give good results over a reasonable range.

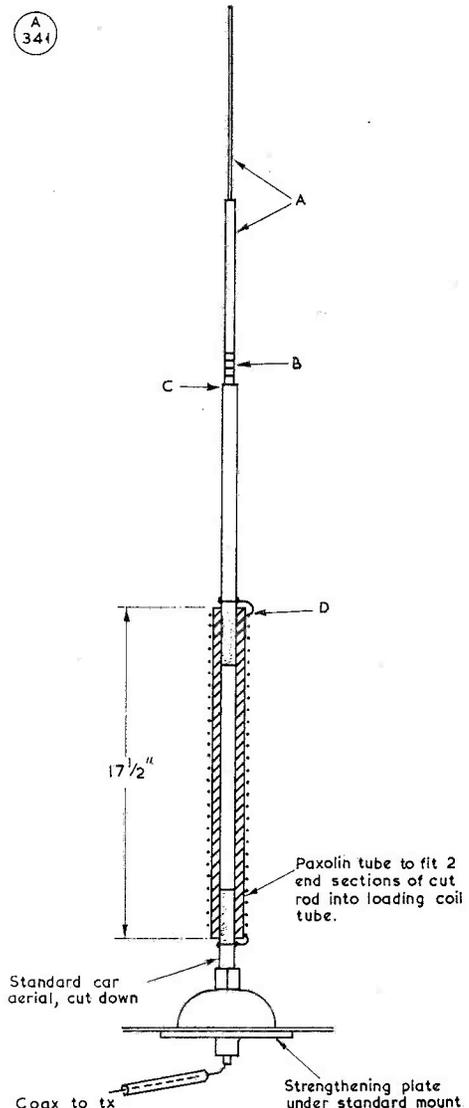
A wing-mounting three section telescopic car-aerial was acquired, extending to 48 inches. A $17\frac{1}{2}$ in. length of $\frac{3}{8}$ in. o.d. paxolin tube former has two small holes drilled at each end, through which a wire terminal was made to secure the ends of the loading coil turns. A total length of $16\frac{3}{8}$ ins. of the tube was close-wound with 28g. enamelled copper; this left sufficient at each end for the securing holes to hold the loading coil wire.

The bottom section of the car-aerial rod was cut at a point 2 ins. above the locking nut, first having extended the inner section to avoid damage. A $2\frac{1}{2}$ in. length of paxolin tubing was inserted in each end of the loading coil former. This adapted the former to the outside diameter of the sections of the aerial rod which had been cut. About $1\frac{3}{8}$ ins. of the cut ends of aerial rod was found sufficient to hold the sections, including the loading coil former, together; to help, a strong adhesive was used. From the soldered ends of the loading coil a short length of wire was brought from the joint to the aerial rod at each end, and soldered. See sketch for layout details.

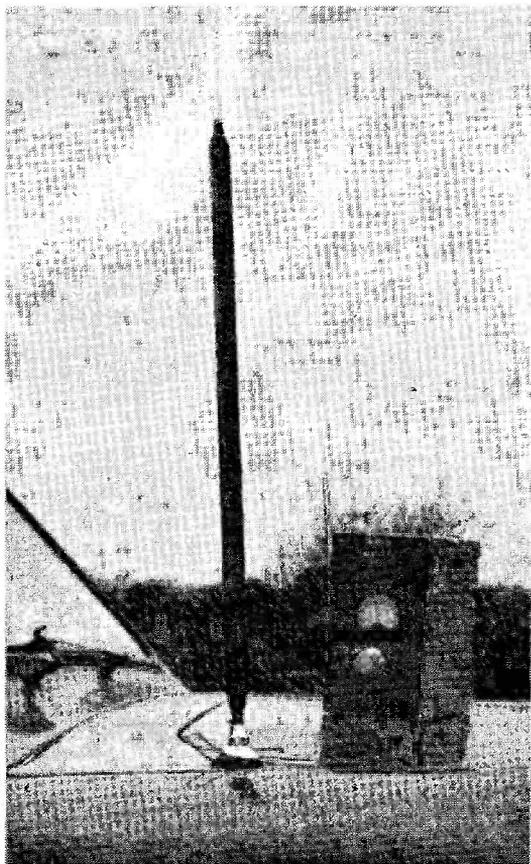
To give it a tapered look, p.v.c. tape was tightly bound at each end of the loading coil and wound off the ends on to the rod. Three coats of shellac were applied over the tape and coil as a protection from the weather.

Installation

Mounting was done in the normal way, on the offside wing, with an additional aluminium plate under the wing to strengthen the mounting. The coax from the car aerial was run direct to the change-over relay on the mobile transmitter. Resonance was achieved by adjustment of the middle or top section of the aerial rod, no extra loading coil being found necessary. Small marks were made at different frequencies between 1900 and 2000 kc, so that resonance could quickly be obtained on QSY. These set-



Diagrammatic layout of the G3LCV/M whip aerial. The top and middle sections (A) collapse into the upper part of the loading coil, with a pip at the top end to prevent it disappearing completely; (C) is the maximum height in the telescoped condition. (B) are the calibration marks for different frequencies through the band. A soldering termination (D) is provided to connect the loading coil to the mast section, and is repeated at the lower end of the coil. Feed is by 75-ohm coax.



General appearance of the 160-metre whip assembly as designed and described by G3LCV. A standard type of telescopic car aerial is cut near the foot, the wing mounting strengthened, and a loading coil inserted. The F/S meter-monitor is to adjust for resonance at the required frequency, and it is found that adequate frequency variation within the band can be obtained by adjustment of the telescopic section.

tings were arrived at by the use of a field-strength meter on the bonnet of the car, with the frequency set on Tx. (In the writer's case, the transmitter has a 5763 PA, with a 5-turn link off the PA coil into the base of the aerial.)

Contacts achieved, using a home-built transistor Rx and this aerial, have been as good, if not better than, with the larger centre-loaded whip used before, and mounted at the rear. When the whip is pulled down to its minimum (*see sketch*) it seems to go unnoticed by most people unless they have their attention drawn to it.

AMATEUR IN SERIOUS CAR CRASH

Following a motor accident in which there was one fatality, John Murray, GM3JOI, of Methilhill, Fife, is in Roodlands Hospital, Haddington, East Lothian, with serious injuries. As he is expected to be there some time, visits would be appreciated from local GM's and others within reach of Haddington.

SPECIAL-ACTIVITY STATIONS

Following the note on p.144 of the May issue of SHORT WAVE MAGAZINE, the list of amateur stations to be operated in connection with some public occasion or local event is now as follows:

G3MDW/A, June 15: Organised by Northern Heights Amateur Radio Society, in connection with the Halifax Gala; all bands 10-160m. will be used, with special QSL cards for contacts and SWL reports. Address: A. Robinson, G3MDW, Candy Cabin, Ogdon, Halifax, Yorkshire.

GB3BOS, June 22: Operated by members of Burnham-on-Sea Amateur Radio Club, in connection with the local Summer Fête. QTH for QSL's is: D. Birt, G3GIW, 99 Stoddens Road, Burnham-on-Sea, Som.

GB3RIW, June 22: In connection with the University of Keele "Societies Day," operated by Univ. of Keele Radio Society on all bands 10-160m. Contacts may be QSL'd through: V. J. Reynolds, G3COY, 90 Princes Road, Hartshill, Stoke-on-Trent, Staffs.

GB3WRC, June 26: Garden Party at Whiteness Manor, Kingsgate, Broadstairs, Kent, for the Boys' Home, when the station will be operated by Whiteness Radio Club members and supporters, on all bands 20-160m. and two metres. There is also an invitation to /M's to attend the Garden Party. Details from: D. Griggs, Whiteness Manor.

GB3RCS, June 28-30: Organised by the Royal Signals Amateur Radio Society in connection with the Corps Birthday and Reunion Weekend, at Catterick Camp, using all bands 15-80m., phone and CW, and looking for contacts with past and present members of the Corps, at home and overseas. Address for cards and information: J. E. Hodgkins, Catterick Amateur Radio Club, 2 Sqn., 8th Signal Regt., Catterick Camp, Yorkshire.

GB3WYE, June 28-July 1: Exhibition station for the Wye College (University of London) cricket week, operated by G3LZZ and members of Canterbury Radio Club, on 15-160m. but principally on 80m. Contacts with other school and university stations and reports from SWL's will be specially welcomed, and QSL'd by card. Address for further information, and QSL's: A. M. Pomfret, G3LZZ, Wye College, Ashford, Kent.

GB3BCW, July 6-13: Operating on the Saturdays of the Basingstoke Carnival Week, from the Memorial Park, running gear on the HF bands for DX working, and on Top Band and two metres for mobile talk-in. This is a carnival event, with fairground attractions. QSL's and information from: P. J. Sterry, G3CBU, Ashley, Orchard Road, Basingstoke, Hants.

GB3SS, July 12-13: In connection with the Great Southampton Show, running all bands 2-160m.

and operated by members of the Southampton group. The Show itself covers a wide variety of interests and activities, including hobbies, horticulture, show jumping and arts and crafts. Mobiles are invited on the Saturday, July 13, when talk-in will be available on Top Band and two metres. QSL address and further details from: P. A. L. Shoosmith, G3MDH, 7 Fairfield Close, Hythe, Southampton.

G30JE/A-G3PIZ/A, July 12-14: East Cheam Wireless Society at the Middlesex Senior Scout Camp, Chalfont Heights, Bucks. QTH for cards: D. C. Griffiths, G3RDQ, 7 Chatworth Road, East Cheam, Surrey.

G3PRT/A, July 17-19: At Cray Valley Technical School, Sidcup, Kent, in conjunction with their annual radio and electronics exhibition. The station will be on all bands 2-160m., with 80m. in use during day-time. Contacts with R.A.F. stations will be particularly appreciated. All QSO's will be QSL'd by special card. QTH: C. P. Cadle, G3PRT, 88 Lancing Road, Orpington,

Kent, for information and schedules.

GB3KEC, July 25-August 9: For the Summer School of the Kent Education Committee, when the station will be running gear on all bands Top to two metres, CW and phone. QSL cards direct to Kent Summer School, Folkestone, Kent, to arrive during the activity period, will be much appreciated, otherwise *via* bureaux. All contacts and reports will be QSL'd. Schedules for teachers, students and others interested in education can be arranged direct with: D. J. Bradford, G3LCK, 42 Mount Road, Canterbury, Kent.

July 28: Royal Armoured Corps Open Day at Bovington Camp, near Wareham, Dorset, when a great variety of vehicles, radio-equipped and otherwise, and the latest Army communications apparatus will be shown in the Signal School, staffed by R.A.C. instructors and students. G3RRZ, who is at the School, will be present to welcome visiting amateurs and show them round—ask for C.O.H. J. Kingston, at the R.A.C. Signal School.

SENSITIVE MAINS VOLTAGE MONITOR

USEFUL STATION ACCESSORY

P. G. MARTIN (G3PDM)

THIS device was built to observe the variations in the mains supply voltage at G3PDM, but it would prove a useful accessory in areas liable to large voltage variations, or for portable-supply voltage monitoring, when say, a 230 volt AC petrol generator is in use.

The circuit diagram shows that the unit consists of a simple HT source and a meter bridge. The voltage regulator tube, VI, provides a fixed reference potential at point P, and the meter M measures the difference between it and the potential at the point Q, which varies linearly with supply voltage. The meter M should be a 1-0-1 mA centre-zero type to show variations of *plus* or *minus* 10 volts—or less sensitive to measure larger deviations.

The whole unit can be built into a small steel meter case, provided the earth pin of the supply socket is connected to the case, and the "live" and "neutral" conductors are insulated from it. The positive terminal of the meter should be connected to point Q.

Table of Values

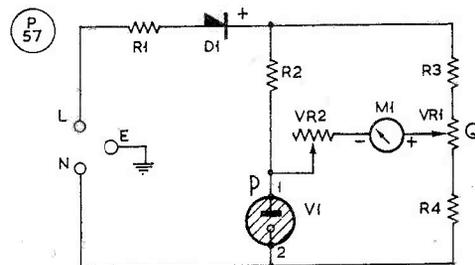
Circuit of the Monitor Device

R1 = 100 ohms, $\frac{1}{2}$ w.	VR2 = 500 ohms w/wound potentiometer
R2 = 22,000 ohms, 1w.	M = 1-0-1 mA, centre-zero
R3 = 7,500 ohms, 1w.	VI = OA2, or any 150v. stabiliser
R4 = 15,000 ohms, 2w.	D1 = BY100, SX638, or any 800 p.i.v. diode
VR1 = 10,000 ohms w/wound potentiometer, pre-set	

Setting Up

Before the unit is switched on for the first time, the meter should be disconnected and VR1 adjusted so that point Q is close to 150 volts positive with respect to the neutral line, otherwise a rather destructive current may flow through the meter. To calibrate the unit, VR1 should be adjusted for zero meter current at the desired centre voltage. Then, using a low-impedance voltage divider across the supply, the AC voltage to the monitor should be dropped 10 volts, and VR2 adjusted for a meter reading of -1 mA. (A change of 10 volts can be measured to a fair degree of accuracy on a standard voltmeter.) Now, a rise or fall in supply voltage will cause a proportionate increase or decrease in the meter reading, where a deflection of one tenth of a milliamp, indicates a deviation of 1 volt.

From the attic-shack where the unit is in use, long mains cables to the company boxes result in large drops in supply voltage when the electric fire is switched on, and even visible decreases when a 10-watt transmitter is keyed!



Circuit arrangement of a device for monitoring the mains. A reference voltage is obtained by use of the stabiliser tube, and any variation across the resistor network R3, VR1, R4 throws the bridge off balance, giving an indication on the meter. By calibration in the setting-up process, the variation plus or minus can be read off on the meter.

TEN-METRE ACTIVITY SUNDAY

(April 21, 1963 — 0900-1900 GMT)

THIS attempt to investigate the suitability of the 28 mc (10-metre) band for inter-G working under present conditions was even more successful than we had hoped. A great number of U.K. stations took part, and though many were not able to work over distances of more than 20 miles or so, quite a few managed to cover 50-mile ranges with trouble-free contacts, whether on CW, SSB or AM.

Following is the list of stations who were active on the 10-metre band on April 21, all of whom made various inter-G contacts of some sort:

G2ARN, 2BLZ, 2BOJ, 2BTY, 2CD, 2CDI, 2DRT, 2FHV, 2FLC, 2HLU, 2JB, 2MR, 2NN, 2PX, 2TA, 2UV, 2XY, 2YK, 2YS; GB2SM; G4AL, 4DH, 4OM, 4PL; G5BB, 5BU, 5HA, 5HZ, 5LH, 5LQ, 5SD, 5TZ, 5VU, 5WW, 5YM/M; G6BX, 6FO, 6OX, 6QB, 6VC; G8JK, 8VG; G3ABK, 3ACM, 3AEX, 3AJX, 3AVZ, 3BQR, 3BX, 3BYV, 3CAZ, 3CIO, 3EUJ, 3EUQ, 3FGP, 3FXB, 3GFG, 3GHH, 3GQV, 3GXQ, 3HCU, 3HFB, 3HEY, 3HFV, 3HIW, 3HLY, 3HWR, 3HXN, 3HZJ, 3HZL, 3IDG, 3IJ, 3II, 3IMV, 3IXO, 3JAF, 3JCX, 3JDG, 3JKY, 3JLZ, 3JON, 3JVC, 3JW, 3KFT, 3KLG, 3KMA, 3KOE, 3KPS, 3KQW, 3KRR, 3KSL, 3KWH, 3LCB, 3LED, 3LIG, 3LIL, 3LNQ, 3LSG, 3LXP, 3LYH, 3MBL, 3MCG, 3MDW, 3MEA, 3MJF, 3MNV, 3MTB, 3MVL, 3MWU, 3MXG, 3NBP, 3NEO, 3NFV, 3NKS, 3NMI, 3NND; 3NRZ, 3NST, 3NVE, 3NWG, 3NX, 3NXN, 3NYD, 3OBB, 3OBL, 3ODC, 3OFA, 3OFF, 3OGL, 3OHN, 3OHP, 3OKX, 3OLM, 3OLU, 3OML, 3OMU, 3OOZ, 3OTY, 3OWB, 3OWX, 3OYY, 3OYZ, 3OZT, 3PDW, 3PGA, 3PGS, 3PJY, 3PLI, 3PMX, 3PRP, 3PSA, 3PTN, 3PU, 3PWX, 3PYE, 3PZO, 3PZP, 3RBB, 3RDC, 3RDG, 3RDW, 3RHM, 3RHQ, 3RKJ, 3RIX, 3RNX, 3RRL, 3RUS, 3RVB, 3SM; GW2AP, 3KWB.

The total count is 172 stations, which we consider a fairly good turn-out on what has hitherto been a

little-used band. No doubt the results achieved by many of the operators concerned will encourage them to use ten metres far more; for quite a few of them, their very first 28-mc contacts were made on this occasion.

Spread of Activity

The greatest level of activity, naturally enough, was reported from London and the Home Counties, with G6QB (Hastings), G5TZ (Isle of Wight), G2NS (Bournemouth) and G6FO (Buckingham) more or less representing the extremities of the area.

Yorkshire was also well represented, with interesting reports in from G3CIO (Catterick), SWL C. Marsden (Leeds), G3RNX (Otley), G3JLZ (Doncaster), G3GXQ (Leeds).

The report from farthest North came from G5LH (Newcastle), who heard G6QB (Sussex) on CW at 559—distance, 290 miles. This was the longest distance mentioned by anyone during the day and was very surprising. (G6QB is on a good site, 440 ft. a.s.l., and used a 270-ft. long wire.)

There were two other little pockets of activity, one in the Birmingham/Stafford/Leicester region and one in Somerset, but hardly any of the stations concerned worked outside their own regions.

G3HCU (Peaslake, Surrey) had a very successful day, with 21 QSO's at distances up to 87 miles (with G3KFT at Cheltenham). G6FO (Buckingham) worked down to G6QB, a distance of 105 miles, for the longest haul of all the actual two-way contacts reported. (On CW, of course.)

Comments

"Nothing was heard between 1430 and 1900" (G5LH). . . "Very short bursts of CW were heard—none of sufficient length to yield any callsigns. Perhaps Sporadic-E?" (G3PSA). . . "Best contact with 80 watts and a ground-plane was 50 miles, though I had always considered 20-25 miles the limit" (G3GXQ). . . "Pleasantly surprised in view of the fact that in previous weeks several CQ's were put out without any results" (G3RNX).

"The chain of my beam motor came off three times and I had to climb up the tower each time, but the new TH-4 Hygain seems to work out very well" (G3HCU). . . "The only station audible from Leeds (40 miles) was using a ground-plane" (G3CIO). . . "Why don't we use it more? Much better than having to squeeze in here and there on Top Band" (G5BB). . . "It is quite evident that the local Top Band Sunday-morning net can, with advantage, be transferred to Ten" (G3OZT). . . "Of particular note were the rock-steady S-meter readings obtained from even the weakest signals, in contrast to the fading and phase-distortion prevalent on even the strongest LF-band signals" (G3RKK). . . "Most surprising feature of the day, as far as I was concerned, was the reception of *seventeen* stations on CW" (G3IDG).

Several correspondents comment on the rapid flutter-fading heard on some signals at various times. This was almost certainly aircraft-flutter and not due

to ionospheric activity of any kind. There was no evidence of Sporadic-E on that date, although two weeks later (May 5) the band was full of Russian FM stations (callsigns mostly unreadable) with the occasional Eastern Europe station on CW.

ZE2JA was listening on April 21, but logged nothing; on the other hand a few of our correspondents report hearing ZE3JO calling CQ on CW. And G2JB remarks that he found ZP3AL on phone at S9 on the previous day (1900 GMT). During the sunspot minimum in 1951, SWL John Underwood reports, he heard PY's, ZS6, OQ5's, and 4X4 during April, all on AM.

Summary

This event was certainly successful enough to call for more, which will be laid on shortly. Many thanks to all those who reported the goings-on, not forgetting useful SWL reports from J. L. Underwood (Leicester), C. Marsden (Leeds), P. L. Ashley (South Croydon), N. A. T. Hardy (Guildford), and F. Pemberton (Rickmansworth). The general conclusion is that much more use should be made of the ten-metre band, especially for local net working during these days of low sunspot activity. It is indeed hoped that many of those who made their first acquaintance with the band on April 21 will keep it up—and that still more who read these notes will feel impelled to start up on Ten Metres.

VERY USEFUL INDICATING DEVICE

On p.92 of the April issue of SHORT WAVE MAGAZINE, the circuit was shown of about the simplest type of RF sniffer, or probe, imaginable—have another look at it, because it has turned out “even better than advertised.” Using an 0-100 microammeter, and a rod (consisting of a piece of 1/4g.) a quarter-wave long at two metres—say, about 20 ins.—it has been found possible to trace the radiation off a 4-ele Yagi on a 15-watt transmitter at distances about 150 feet from the aerial. Up to nearly full deflection can be seen at 100 feet or so. This means that, merely by moving the device about, a good impression can be obtained of beam width, maximum directivity, polarisation, and the comparative degree of RF leakage out to the sides and round the back of the beam. Placed anywhere in the radiation field where the meter is visible, the Tx can be quickly and accurately tuned for maximum RF output, and thereafter the wobble on modulation can be monitored. Since the device is aperiodic, there is the danger of burning it out if it happens to pick up too much RF from a higher-powered transmitter on some other band. The same sort of results can be expected using the 0-1 mA meter originally suggested—but, of course, with nothing like the sensitivity given by the 0-100 μ A instrument now used.

GRINDING A CRYSTAL

TO CHANGE THE FREQUENCY

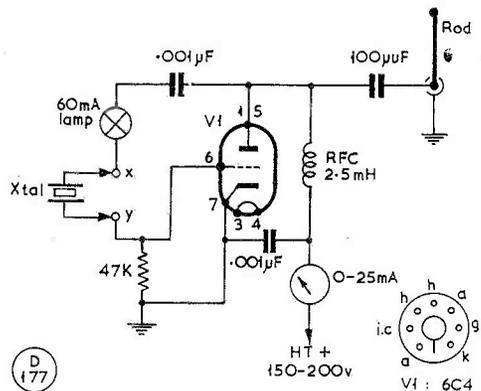
AN article on this subject in the December, 1962, issue of SHORT WAVE MAGAZINE dealt with the edge-wise grinding of crystals to obtain very small changes of frequency, of the order of a few cycles only.

However, as there are quantities of quartz crystals, outside the amateur bands, available and suitable for regrinding into the bands (involving changes of many kilocycles) a few words on the subject for the benefit of the relative newcomers to Amateur Radio might be helpful.

To change the frequency of a quartz crystal over a wide range—and, incidentally, the frequency can only be *increased* by this method—a positive grinding process is involved. The first necessity is a sheet of good plate glass about a foot or so square. Very fine grade carborundum paste can be used as the abrasive, but for the beginner a slower but surer alternative is one of the standard household scouring powders such as “Vim.”

To Grind the Crystal

Scatter a quantity of the powder on to the centre of the glass and add a little thin oil, such as “3-in-One,” to make a stiff paste, place the crystal in the centre of the mess and rub in a figure-8 pattern, applying medium pressure to the back of the crystal with the first two fingers of one hand. This motion



The sure-fire Pierce oscillator for crystal testing. An active specimen will show a low meter reading, 5-10 mA, and possibly a glow in the pea-bulb. If the RF choke is a good one, crystals as low as 500 kc can be tested for activity. Because of the wide variety of crystal fittings in use nowadays, it is as well to wire corresponding holders, in parallel, to the points X-Y, enabling any crystal to be quickly plugged in. An inactive crystal will show a high meter reading, with no sign of oscillation when the pick-up rod is touched.

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assists in keeping the crystal flat. If the crystal is hard to move across the glass add a few more spots of oil to the paste. As the paste becomes smooth more powder and oil may be added, a little of each at a time. What you are aiming to do is to make a lubricated grinding paste.

In general, about ten minutes of rubbing will increase the frequency of a 5 mc crystal by about 300 kc, but *checks of the frequency should be made regularly and often*, particularly in the later stages as the crystal approaches the desired frequency. It is not possible to be specific about grinding time against frequency—this technique is very much a matter of “cut-and-try.” It is advisable always to grind the same face of the crystal.

Before replacing the crystal in the holder for a frequency check, it should be thoroughly scrubbed in warm water using an old soft toothbrush and then carefully dried; remember that these crystals are easily cracked and should, therefore, be handled with great care. Another method of cleaning is to dip the crystal in a bath (egg-cup) of “Thawpit,” the well-known household cleaner, which is carbon tetrachloride. This will remove the greasiness.

Should the crystal fail to oscillate after a spell of grinding, provided it has not been fractured in any way the most probable reason will be dirt or moisture on the crystal itself or on the electrodes, so be sure

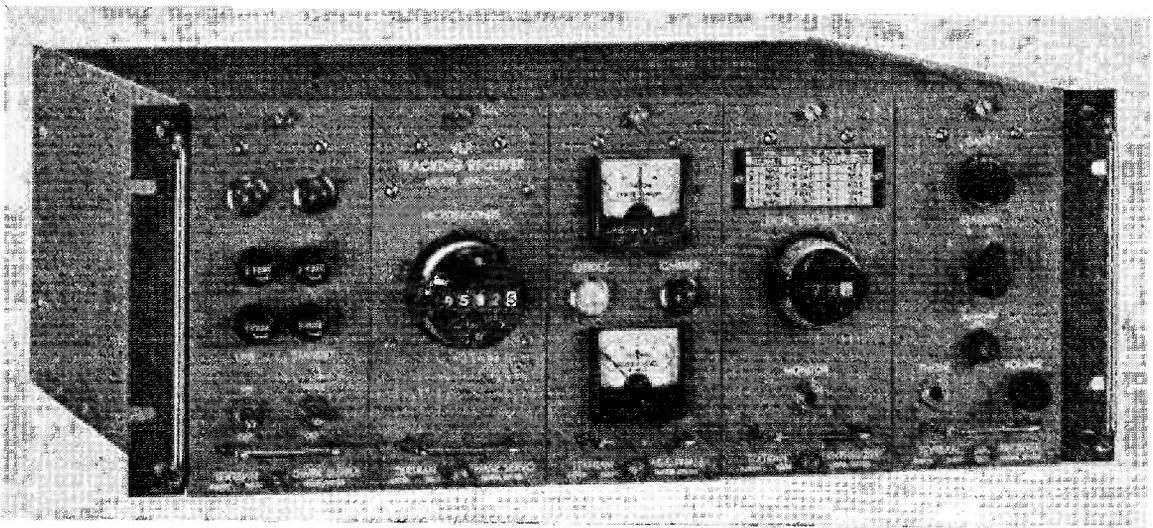
that these are clean and dry. If the activity of the crystal is still down, it can often be restored by bevelling all eight edges, but this will also increase the frequency of oscillation.

To test the crystal easily and quickly, make up a Pierce oscillator—as circuit on p.183—which being untuned will go off at any frequency from one megacycle upwards. Alternatively, the tuned CO which is to work with the crystal can, of course, be used. The station communications receiver will tell you where you are with the frequency.

The final operation is to check the crystal accurately for frequency. The best way of doing this is, of course, to beat the crystal through the receiver against a BC-221, LM-14 or any other type of standard frequency-meter which has a high degree of calibration accuracy, with a known error.

Lastly, since the oscillator shown in the circuit here will go off with any active crystal, it is as well to build it up with the points X-Y wired to a variety of crystal holders connected in parallel, so that any sort of crystal can be plugged in. The meter will show whether it is oscillating—by a low reading, and flicking of the meter needle as the pick-up rod is touched—and the lower the reading the greater the activity of the crystal. If you want to transistorise the device, use the circuit on p.520 of the December issue.

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Not an amateur-band receiver, nor even a general-coverage Rx, but a type that will be of interest to every radio man — a VLF (“very low frequency”) receiving set designed to take in stabilised signals on frequencies between 14 and 20 kc. This Textran VLF Tracking Receiver will give a guaranteed performance — which means an accuracy of several orders of magnitude better than that obtainable by reception of WWV on the HF bands — on transmissions intended for time and frequency calibration, measurement and international standardisation. The general principle of operation is phase-locking, with blanking circuits for noise suppression and filters designed for optimum signal-to-noise ratio in a band of frequencies particularly susceptible to atmospheric disturbance. Apart from time and frequency measurement on a world-wide scale, the VLF band is of particular importance for submarine communication and aircraft navigation. The Textran VLF Receiver is marketed in this country by Racal Instruments, Ltd., and they have recently secured a £50,000 contract to supply these receivers to the Royal Aircraft Establishment, Farnborough, for research in the fields of radio navigation and wave propagation at VLF.

LONDON SIDEBAND DINNER

May 11, 1963

THE first London SSB Convention and Dinner-Meeting took place on Saturday, May 11, at the Waldorf Hotel, with a display, in a separate room, of communications equipment for amateur and professional users. The new SSB apparatus on show included the Mosley Commando II sideband transmitter; the American Sonar 4-band SSB transceiver for mobile and fixed-station operation; the new K.W. Electronics SSB transceiver; the Miniphase M1A receiving adaptor; the Labgear Sideband transmitter, and their wide-band tunable whip aerial for mobile use commercially.

Items of SSB interest on the Hammarlund/K.W. Electronics stand included the HX-50 transmitter, together with the wide range of K.W. and Hammarlund receivers, transmitters and ancillary apparatus. Associated with K.W. Electronics, I1HC was showing a new two-metre curtain aerial system with a claimed gain of 16 dB. One amusing piece of apparatus under the Hammarlund label was an enormous panel, with knobs and dials, designed specially for those who just like twiddling knobs at exhibitions—in this instance, they could indulge their craving without doing any damage.

About 200 people sat down to dinner, and amongst the overseas call signs present were the following: EI3AH, HB9TL, HV1CN, I1HC, I1SVZ, K7BGS (xy1), MP4BBW, OD5CT, PAØCS, PAØZD, SM5MC, W2BIB (Hammarlund), W2GHK (Hammarlund), W2JXH, W7TNA, 4S7ES, 4X4CJ, 5N2AMS, 5N2DMS (xy1), and 5N2HJA. At least sixty U.K.



Photo G3NMR

At the first London Sideband Dinner, on May 11 at the Waldorf Hotel, one of the speakers was Stuart Meyer, W2GHK, president of the Hammarlund Manufacturing Co., who replied to the toast of "The Overseas Visitors."

Sideband operators attended, and the guests included G3BVG and G6FO.

To signalise his 80th birthday, G6UT was presented with a microphone donated by Dale Electronics, Ltd. In the raffle, the Hammarlund HX-50 transmitter, put up by the manufacturers, was won by G3NMR, and the other major prize, a K.W.77 receiver from K.W. Electronics, went to G3IFB. One of the speeches of the evening was made by Stuart Meyer, W2GHK, president of the Hammarlund Company, replying to the toast of "The Overseas Visitors." The evening concluded with dancing and a cabaret show. The Convention and Dinner were organised by G3FPK and G3KZI, and they are to be congratulated on the great success of the whole affair—it should certainly be the forerunner of many such occasions.

PRESSURE FROM THE FAR EAST

A recent survey of Japanese progress in the radio and electronics industry shows that it is ideally suited for manufacturing development, in that labour is abundant and its cost very low by Western standards; moreover, as in electronics the costs of the materials are much less than in almost any other industry and their consumption relatively low, the result is that Japanese selling prices make their products more than competitive with similar productions by Western manufacturers. To take full advantage of the situation, the Japanese have developed expert production technologies, so that the output is not only cheap but also of a good standard of quality. One result of all this is that Japanese electronics exports have increased more than tenfold since 1955, and are now valued at over £500m. a year. As basic cost of the raw materials is about the same on the world market for any manufacturer, it follows that for Western factories the only way to compete is to cut down on labour costs by introducing more automation, on an ever-widening scale, and by reducing luxurious overheads.

CORRECTION NOTES

In the article by G3NVA in the May issue, on a reinforced Quad, the sketch Fig. 2 on p.122—which was intended only to illustrate the general principle—is slightly misleading, in that it suggests the Quad reflector elements as being on the wrong side of the boom. This is, of course, not the way G3NVA works it!

And for the circuit of the audio oscillator on p.143 of the same issue, the *Radiospares* T/T7 transistor output transformer should have been specified.

CONGRATULATIONS TO BOTH!

In sending in their call sign/addresses for the "New QTH" feature, G3SAG (Redditch) mentions that he and his son G3SAH took the R.A.E. and the Morse Test together and received their licences on the same date—the only difference between them is the trifling one of age. G3SAG is 51, and G3SAH 19 years old. Good luck to them both, for many happy years of Amateur Radio.

• • • *The Mobile Scene* • • •

SEASON'S FIRST RALLY REPORTS—TRENTHAM AND VERVIERS.

NEWS AND PICTURES—DISAPPOINTING WEATHER

AFFECTS MAY ATTENDANCES

THOUGH the weather generally has not been very inviting for any sort of outdoor event, the Rally season has nevertheless got off to a good start. With about 1,300 /M licences in issue in the U.K., there is no lack of enthusiasm for mobile working—but most rally organisers are finding that the crowds do not come if the wind is cold and there is no promise of at least some sunshine.

An exception was, as usual, the **Trentham** event on **April 21**, where they certainly did get a very good attendance—the official figures are around 2,500 people, with 450 cars in the parks, of which 250 were fitted mobile. Organised by the Midland and Stoke-on-Trent groups under the chairmanship of G3JPN, the event was given civic patronage, being graced by the presence of the Lord Mayor of Stoke and his Lady Mayoress. The attractions included an exhibition of Amateur Radio equipment, trade and otherwise; about eight Midlands clubs put on demonstrations, with closed-circuit ATV, fixed and mobile, by G3LGJ/T, and a 3-cm. link with talk-back by modulated light; the Police and the Services were represented by exhibits and working stations actually on the air; there was a varied programme of indoor and outside events intended to appeal to the distaff side and the juniors, such as water-skiing, model aircraft flying and cactus growing; the catering arrangements were very good, with three bars operating under extension; and the talk-in included out-station assistance for the two transmitters on site—G3MAR/A on two metres, and G3GBU/A on 160m. There were no competitive events on the strictly mobile side this year, as these are difficult to arrange at Trentham. It is reported that while there were some very good home-constructed and commercial mobile rigs, in far too many cases seen round the car parks the standard of installation and safety was low enough to be called little short of atrocious, the attitude to safety in particular leaving much to be desired. About 10% of the mobiles were on VHF, most of the rest being 160m. And again as usual, Trentham wound up with a grand raffle, in which there were some 70 prizes to be drawn.

* * *

Not at all usual was the next event on the Mobile Rally programme—the affair at **Verviers** on **April 28**, which was international in character in that visitors of foreign nationality were able to obtain temporary mobile licences under Belgian and Dutch callsigns—ON5 and PA9. Some 22 U.K. /M's took out these permits, and those who did in the end go over had the unique experience of working locals in a foreign country. As it turned out, the weather for the

Verviers week-end was very bad, and the final attendance in La Tourelle Park, the rally point being behind the Civil Hospital, was lower than expected. Among the G's who got there using their ON5/PA9 callsigns were: G2AMO, G2DHV, G2FUX, G3BNL, G3FPK, G3HGE, G3JFH, G3KVF, G3LZI, G3MSS, G3NMR, G3OHC and G3OSS. After a picnic lunch, the party headed for Eupen on a combined treasure-hunt and QSO rally, with a get-together at the Hotel du Barrage, on the Eupen Reservoir, five nationalities and about 100 people being present, including friends and families. Naturally enough, there were various odd incidents and experiences—one ON4 insisted that the visiting ON5's were unlicensed and should not be worked on any account; in fact, the ON5's had plenty of two-metre QSO's, one of the most successful being G3OHC and three SWL friends, who signed ON5ZT/PA9OHC, as appropriate. The language difficulty was no worse than usual, most contacts with the visitors being carried out in English! G2DHV/PA9DHV/ON5ZQ performed a public service in reporting a heath fire. Owing to the distances involved, many of the U.K. party camped out for two nights—though it is reported that some never got to the Rally at all! In spite of the weather, the G/M's enjoyed their experience and had a marvellous time, due mainly to the co-operation of the Dutch and Belgian authorities, the enterprise of G3BID of A.R.M.S. in arranging for the licensing, and the



Seen at the Rally at Verviers, Belgium, on April 28 — a Volkswagen camp-car with a centre-loaded whip about 20ft. long, sprung from the front bumper and tethered to the rear fender; the objects are avoidance of tree collision, better radiation characteristic, and a higher-angle sky wave.



G2ATK, president of the Midland Amateur Radio Society, addressing the gathering at the opening ceremony at Trentham. Between the Lady Mayoress of Stoke-on-Trent and the speaker is G3JPN, the Rally organiser; G3BVG, president of the R.S.G.B., is on the right.



General view of one of the car parks at the Trentham Mobile Rally on April 21, held in good weather and very well attended.



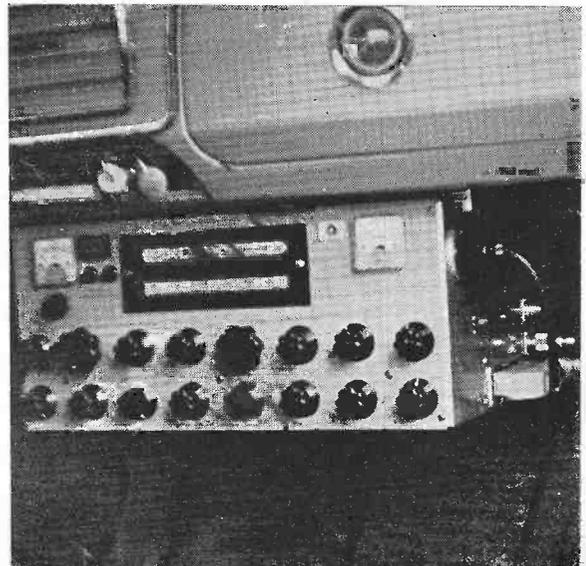
Some of the cars on the line for the Rally at Verviers, Belgium, on April 28. The puddles suggest the rather dreary weather conditions in which the event was held.



G3OBD was at Trentham from Poole, Dorset. He has a two-metre halo on his Morris Traveller for /M working, and when he goes /P a beam assembly can be pushed up on the mast sections carried on the roof.

*Rally pictures from
Trentham and Verviers*

Judged to be one of the best-engineered mobile installations seen at Verviers — the two-metre and 10-80m. band-switched transceiver shown by DJ1MC, Cologne, who radiates off a tunable whip aerial remotely controlled from the boot.



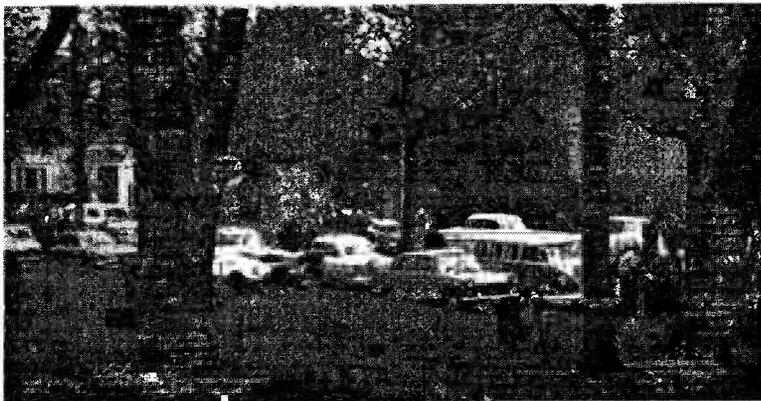
arrangements for the Rally made by the host society, the U.B.A. (Union of Belgian Amateurs). The general impression of the G's was that the standard of EU mobile equipment and installation was no higher than one would expect to see at any Rally in the U.K.

* * *

The **Thanet Mobile Rally** on **May 5** was held in what is described as "sunny intervals but no rain." Of the 40 vehicles fitted /M, 35 were on Top Band and five on two metres—all were worked by the talk-in stations, G3DOE/A and G3BAC/A respectively. With a total attendance of around 200, the support was rather greater than last year's event at the same spot near Ramsgate, and all Kent club groups were represented. Prizes were given for the best home-constructed transmitter (G3LCB, Sidcup); for the safest rig (G3JEQ), who also made the best long-distance contact, and then went on to win a third prize in the raffle; and for the best home-built Rx, which went to an SWL in SXO-266 (name not given). G3IEX from Bedfordshire travelled the greatest distance to get there. The organisers were G3BAC, G3BKT and SWL Cramp of the Thanet Radio Society; as they are a small club and had a larger attendance than at any of their three previous rallies, they feel, quite rightly, that the event was a success.

* * *

For **Loughborough** on **May 11**, it was a first Rally occasion—and a Saturday—and though they had expected more than the 50 people who turned up, things went off as planned, and ten mobiles were worked by G3RAL/A on 160m. Notable visitors were



Another impression of the Verviers Rally, in Belgium, on April 28, at which a number of G/M's were present, in very disappointing weather conditions. This is a general view of part of the car park at the Rally terminus.

G2CVV and G3BA, both of whom won useful prizes in the raffle, while the winner of the field-strength competition was G3PJH/M of Leicester, in a Ford. This Rally, organised by G3FYV, G3IPL, G3PXP and SWL Davis of the Loughborough Radio Club, was in conjunction with the Toc H Brass Band Contest and Gala, which provided plenty of entertainment for the visitors.

* * *

Grimsby struck a very bad patch of weather for their event on **May 12**, with a much lower attendance than had been hoped for, the mobiles present numbering six only. However, the organisers (G3ELZ, G3NJV and SWL Walster) feel that the effort was worth it, particularly as they had Dr. Jenison, ex-G2AJV, from Jodrell Bank to lecture on space research. (We suggest that had this been advertised, it might have made a significant difference to the attendance.) For those interested, prints of the group photograph can be obtained at 2s. 6d. from B. Walster, 47 Richard Street, Grimsby.

* * *

CALENDAR OF FORTHCOMING EVENTS

Mobile Rally fixtures, and details as notified to us, are now as follows:

June 15: Mobile Rally organised by Wolverhampton Amateur Radio Society, in collaboration with the sports clubs of Boulton Paul Aircraft, Ltd., Marston Excelsior, Ltd., and H. M. Hobson, Ltd., on Hobsons Sports Ground, Fordhouses, Wolverhampton, opening at 2.0 p.m. Site is on the A.449, Stafford-Wolverhampton, about three miles from the town centre. The firms named are giving prizes for the best-fitted /M installation; the safest mobile equipment; and for the longest distance travelled to the Rally. As this is a sports-day and gala occasion, there will be plenty of non-radio attraction for visitors and children. For mobiles, the talk-in station on Top Band will be G8TA/A, and there will probably also be talk-in on two

[cont'd p.190



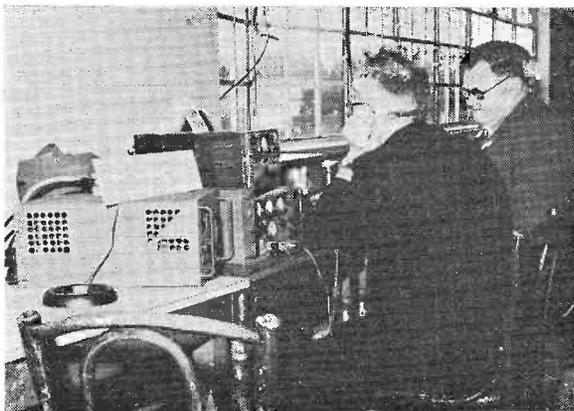
"... CQ, CQ, CQ any Mobile ..."



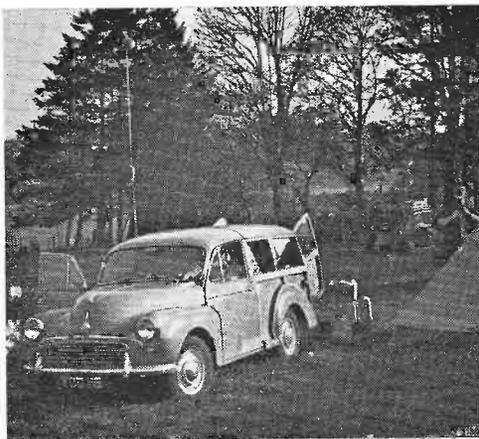
Another car park scene at the Trentham Mobile Rally.



Neat Top Band aerial installation shown at Trentham by G3GWR/M, from Manchester.



The two-metre talk-in for the Trentham Rally was by G3MAR/A, provided by the Midland Amateur Radio Society, and here we see G2DCI and SWL Kingston doing their stuff — they worked 30/M's on the 144 mc band.



G3JFH/M, from Cheltenham, and an inveterate rally enthusiast, who signed ON5ZN/M for the trip through Belgium to Verviers on April 28. He camped at Berstogne, 7 km. from the Luxembourg frontier, for the night of April 27.



Meeting at Trentham, left to right, were : G3AO, G3AOS, G4QU.

Rally pictures in these pages supplied variously by G3BA, G3GMN, G3JFH, G3NMR and G3OHC.



Not actually at, but in connection with, the Verviers Rally — PA0UHF and his oddly-shaped 2m. transceiver for strictly portable working. The bottles are of, course, for size comparison only.

metres. Further information from: J. Rickwood, G3JJR, hon. secretary, Wolverhampton A.R.S., 738 Stafford Road, Fordhouses, Wolverhampton.

June 15/16: Proposed radio exhibition and Mobile Rally to be held by the Cornish Radio and Television Club—no details available at time of writing. For information, contact: A. Laidler, G3OJY, Trevarrack Cottage, Helston Road, Rosudgeon, Penzance, Cornwall.

June 16: Amateur Radio Mobile Society Rally at Barford St. John, near Deddington, Oxon. At Deddington on the A.423, Oxford-Banbury, take the B.4031 westwards and look for the sign-posting. This will be the regular Barford-style affair, with full American co-operation, and something to interest everybody. Talk-in will be provided on both bands, and there is ample covered accommodation in the hangars if the weather should turn out—well, inclement. Information: N. A. S. Fitch, G3FPK, 79 Murchison Road, Leyton, London, E.10.

June 30: West of England Mobile Rally at Longleat House, near Warminster, Wilts.—no details available at time of writing.

June 30: Rally organised by Pembroke Radio Club for all GW amateurs, at Regency Parish Hall, Saundersfoot-on-Sea, Pems. Top Band talk-in by GW2OP/M and G3LXI/M on 1876 kc. Tea will be provided at 5s. adults and 2s. 6d. juniors; lunch facilities available locally. Bookings, by June 25 latest, to: G. C. Price, GW2OP, hon. secretary, Pembroke Radio Club, Hillcourt, Freshwater East, Pems., West Wales.

July 7: Harlow and District Radio Society Mobile Rally at Magdalen Laver, Essex. Details from: A. S. Hall, hon. secretary, Harlow D.R.S., 107 Blackbush Spring, Harlow, Essex.

July 7: South Shields Mobile Rally at Bents Park Recreation Ground, Coast Road, South Shields. The control station will be G3DDI, tuning the 160m. band from 11.0 a.m. and looking for GD_X/M contacts for the award of a prize. Mobile events will include a driving competition and a transmitter test, commencing at 2.0 p.m. Refreshments will be available on the site. For details write: D. Forster, G3KZZ, 41 Marlborough Street, South Shields.

July 14: Chiltern Mobile Rally, West Wycombe, Bucks.

July 28: Mobile Rally at R.A.F. Stradishall, 10 miles south-east of Newmarket on the A.143. GB3RAF will talk-in on Top Band and two metres. Admission and parking are free, there will be two refreshment stands and ample indoor accommodation if the weather is wet. As this is an active R.A.F. station, and the event has full Service co-operation with displays and demonstrations, it should be of more than usual interest to visiting mobiles and their friends. Information from: Flt.-Lt. G. C. Moore, G3MCY, R.A.F. Stradishall, Newmarket, Suffolk.

August 11: Mobile Rally at the Royal Naval College, Dartmouth, South Devon.*

August 18: Derby Amateur Radio Society annual Mobile Rally.*

August 25: Reading Amateur Radio Club mobile picnic at the Childe Beale Memorial Trust, Basildon, Pangbourne, Berks.*

September 15: Lincoln Short Wave Club Rally and Hamfest.*

*For these events details as available will be given in later issues.

Organisers of Rally events are asked to note that the firm closing date for programme details for the July issue is *June 18*; and for August issue it is *July 16*. These dates apply *only* in respect of "The Mobile Scene" feature, and no undertaking can be given to take in information received late. Report forms on Rally events should be returned by the date stated on the form.

TWENTY-FIVE YEARS AGO

In the issue of *SHORT WAVE MAGAZINE* for June, 1938, the main constructional article was on the "Amateur Three," a 1-V-1 bandspread receiver for the five amateur ranges 1.7 to 28 mc, using screen-grid valves in RF and detector stages. A. J. Devon, writing about VHF then as he still is now (though in those days it was 5 metres, or 56 mc) described a 120-watt PA with a neutralised TY1-50. Other articles covered a converter for the lower frequencies, including Top Band (1715-2000 kc, as it was then); the continuation of the "Transmission for Beginners" series, with constructional details for a speech-amplifier/modulator for a Hartley (!) Tx, previously described; and the second in the regular "Club History" series featured the Southend & District Radio Society. It is also interesting to find that two of the advertisers in that issue of 25 years ago—Avo and Webbs—also appear in the *Magazine* now in your hands.

DX COMMENTARY

L. H. THOMAS, M.B.E. (G6GB)

WE have had another good month, but a rather puzzling one. On the whole the DX conditions have been very good indeed, but short skip from Europe has become much more troublesome and the peak times for the bands have changed a lot. Only a month ago one could pass a leisurely afternoon working good DX on *Twenty*; and a month before that, on *Fifteen*. Nowadays both bands are liable to be full of Europeans, with the DX three layers down; but later in the day they come into their own.

WV's propagation numbers continue to run at a higher figure than the forecasts. Shown on p.192 are the comparative figures for April, which show the general tendency; since those curves were drawn, the check has been continued right up to mid-May, and WV has been sending "7" on many consecutive days. However, May 16 was remarkable for one reason—WV's actual figure was only "6," whereas the *CQ* forecast gave "7" for that day. This is the one and only occasion, up to date, on which reality has fallen below prediction.

With six bands—Top to Ten—in reasonable use still, we are far better off than was generally expected for this year. *Twenty* still carries the real rowdy rabble of DX—at any time of day or night there's someone hot on the scent of someone else. *Fifteen* is more leisurely but still yields terrific signals from quite rare places if you strike it at the right time. *Ten* gave remarkable results on our recently-arranged Activity Sunday (but only within ground-

wave range); the following Sunday it opened up by Sporadic-E to the whole of Europe.

The LF bands are in their seasonal doldrums, but none the less full for all that. On *One-Sixty* you can hear W's if you can get out of bed early enough—and if you put up a good enough aerial there is no doubt that you can work them even now. *Eighty* and *Forty* are two separate and distinct kinds of a mess . . . the one from commercial and service activities and the other from amateur romps of the more primitive kind. But six bands are well and truly open.

DX News from Readers

This month we lead with the real "horse's mouth" gen., which can be compared with the later paragraphs culled from the various DX sources from all over the world.

From G2DC: The Yasme Foundation were to have sponsored a visit to Willis Is. (VK4) but the VK authorities refused a permit, saying that the spot is too tough (water rationed, no food available, and a battery supply of 32 volts). But the Christmas Island sortie is all set, and ZS6LM should arrive there on June 14. As VK6ZS/9, he will be on 14003, 010 and 053 CW, and 14120 kc SSB; QSL's to KV4AA . . . VQ9HB *en route* for Agalega . . . The Hammarlund expedition was duly on sked from VR1N, and after their Nauru call (VK9BH) they may ship the gear to Christmas Is. to augment the other station . . . WØMLY was due to open from Cocos Is. (TI9) on May 18, after which he would make for Swan Is. . . Gus, after all his sorties around FR7 and 5R8, will probably appear next from FL9.

From GW3AHN: Gus recently said that his proposed stint from AC5 and AC3 had been postponed by 90 days . . . Strong representa-

tions on the way to the DXCC committee regarding Europa Island's claims to separate status . . . HC8CA (Galapagos) very active in early May, with excellent SSB signals in Europe . . . Despite the cancelled Willis Island trip, it seems that the relief party due there next month will include a licensed amateur . . . VQ9HB's attempt to reach Agalega failed because of weather, but he is said to be trying again.

From DL2OX: PX1OX will be operating from Andorra, June 25 to July 6, mainly SSB, but with occasional CW spells, all bands from *Eighty* to *Fifteen*. K.W. Viceroy, Drake 2B and dipoles proposed, but just a possibility of a beam. This operation is hoping to succeed, where previous ones have failed, by working portable from a point 7,500 feet up in the Pyrenees.

DX News from Everywhere

PY4AS/PYØ should be on from Trinidad, June 22, for 20/30 days of operation . . . YA1AW has been replaced by YA1AK. K5YYP is QSL manager for both . . . AP5JA (East Pakistan) active on 14 mc CW . . . W4BPD's second spell from the Comoros (FH8CE) brought his total number of QSO's since April 1962 up to 102,000. (We make that about 250 per day! Exclusive of travelling time, too.)

The Hammarlund DX-pedition opened up from VR1N (Ocean Island) but using only the exciter and a temporary aerial; hence the initially weak signals, which will doubtless have improved long before this is published.

CEØAB and ØAC, both Easter Island, work 14 mc CW 0100-0300 . . . ZL1ABZ (Kermadecs) is heard nearly every morning, 0700 onwards, either 14035 CW or 14280 kc SSB . . . DUØDM was

CALLS HEARD, WORKED and QSL'd

a special commemorative station operating from Corregidor, May 17-18.

FU8AG (New Hebrides) is on CW at the low end (sometimes as low as 13998!) of 14 mc most mornings, 0800 . . . FK8AU and 8AC are on 14 mc SSB week-ends, 0400-0700 . . . KB6EPN and KB6CB (Canton Island) both monitor 14275 kc SSB daily (0300-0600) and a "blind call" has been known to raise one of them.

Danny Weil, of *Yasme* fame, is now said to be forsaking the DX-pedition business in favour of domestic life. His first tour covered five Pacific islands; his second, ten Caribbean islands; and his third seven Pacific. And now he will have a call-sign prefixed (probably) by an ordinary "K." (It will be interesting to see whether the DX bug bites him in the reverse direction!)

Chatham Is.: ZL3VB is no longer active, but ZL2GX has a mind to take himself and his KWM-2 there . . . Meanwhile ZL4JF on Campbell Is. seems to stay on 7010 kc CW (0600-0700) . . . Ethiopia is now activated by ET3USA, sometimes on 14 and sometimes on 7 mc . . . Brunei is on the air again, thanks to VS5CW (14 mc CW, 1400-1600).

Splenetic Interlude

Perhaps it is silly to worry any longer about our "public image." What all those people out there really think of us — does it matter? Most of the time your conductor devoutly hopes that it doesn't, because some of the stuff you hear these days really makes you blush.

This conversation was heard a few days ago—and it's on the tape to prove that it's genuine . . . "Very fine business old man, and that's for sure. Didn't get your handle there, maybe you forgot to pass it along, or maybe the Queen Robert Mary got you. Pass along the handle there, would you? Break-break." . . . "The name is Jack — Japan America Canada Kentucky. Break." . . . "OK there. Mighty fine on the handle, and that's for sure. Yeah, Jack. Sure fine business on the handle, aitch-eye."

There you are, kiddies—your

week-end holiday task. Parse, analyse, translate and explain "Sure fine business on the handle, aitch-eye." Anyone writing down "OK, Jack" will be expelled for over-simplification.

Another World

Some statistics about aerial systems used by U.K. stations would be interesting. Plenty of three-element beams for Twenty, no doubt, but would there be any like the "twin-stacked wide-spaced five-element" job confessed to by a W6 the other day? And consider W2VCZ, whose beams start at the 112-ft. level with a rotary dipole for Forty and proceed upwards to the tune of a six-element job for Twenty (on a 46-ft. boom), five-el. for Fifteen, another five-el. for Ten, and finally (at 132-ft.) twenty elements for two metres. Just to see that lot going round would frighten possible competitors off the air!

How about a full-sized five-element beam for Forty, with a 100-ft. boom? This monster was put up by W6HJT, but the interesting footnote to that is that he promptly retired to Hawaii (whence he is now signing W6HJT/KH6) and left the monster, with other beams to W6VSS, whose signal now proves it.

Others worth noting are owned by K3UPG (5-el. at 70 feet); W9ADN (two bays of 4-el. at 80 feet); and W9EWC (6-el. on a 50-ft. boom, 75 feet high). When you consider that most of these installations have a full kilowatt down below, that little squashed three-element job at 25 feet (with 150 watts or less) begins to look like a "piece of wire." (Funny how it gets out at all, isn't it!)

Coincidences

The recent comment on the strange coincidences that turn up from time to time prompted a note from DL2DJ (G3PYN). He just finished building a Heathkit HX-20 (the 90w. SSB mobile Tx in the American list) and put out his very first call. Back came a DL4, with a DL6 on the side, who said he was using one also. At this the DL6 broke in and said he, too, had the same transmitter. Not

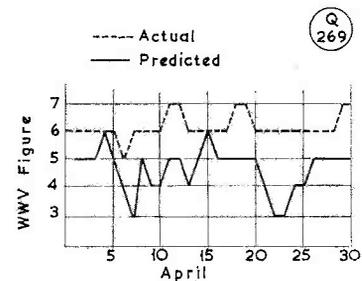
content with this, a DL3 then chipped in and . . . yes, you have guessed correctly. So there was a QSO with four HX-20's in it; yet later on the same night DL2DJ worked *another* DL4 who was using an HX-20, said he had had it going for nine months, and that DL2DJ's was the first he had ever heard on the air.

The other evening, two really ghastly signals were encountered on Twenty, about 30 kc apart. Both were S9, chirpy almost to the point of unreadability, and somewhere between T6 and T7. Both were calling CQ DX, and we suspected that they emanated from the same transmitter. However, inspection revealed one as UA1KFA and the other as UA1KFR—so unless some ingenious "dot-injector" was in use there must have been two identical rigs at work. Probably the operators work on a jamming station and borrow some of the bits.

Sometimes, when working on phone, it seems that one only has to think of a particular station to hear him come up on the frequency. This has happened so often lately that we are getting quite nervous. Unfortunately it doesn't happen in the case of rare DX . . . one has only to think of VR1N to be called by an LZ or a UB5!

The "CQ" Contest

The list reproduced on p.194 makes it clear that the U.K. did not figure too well in the results



Curves to show the comparison between WWV's transmitted propagation figure (dotted line) and the conditions as forecast long-term (solid line). Once again, there is a remarkable disparity—see p.137, May issue — and the WWV figure has been better than the forecast on every day of the month except two; on April 22/23, the WWV rating was three points above the forecast.

of the CW section of the CQ Worldwide DX Contest. G2DC and G4CP were the only stations in these islands to top the six-figure mark in their scores, and not a single U.K. station made the roll of honour in this half of the event. (The three top scores ran into seven figures!)

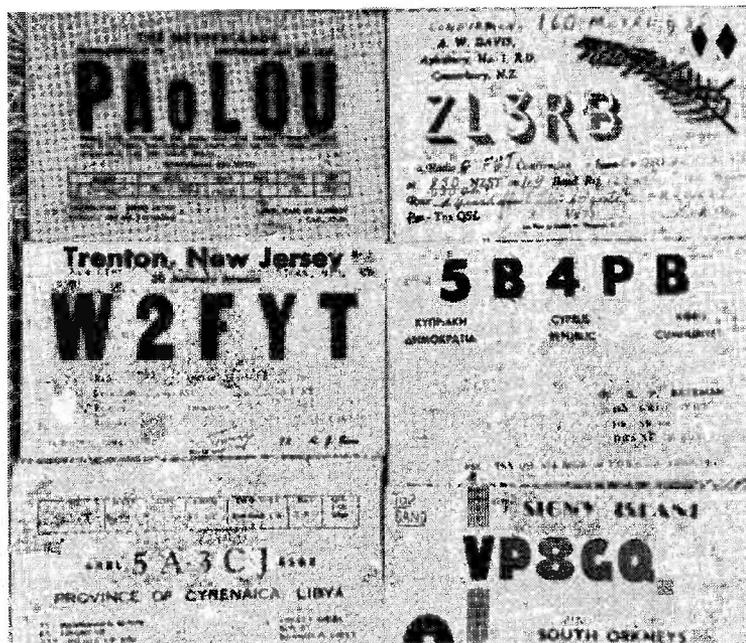
There were 24 G entries, two GI's and two GM's—and that was it. Compare this with 74 OK's, 37 OH's, 48 SM's, 43 SP's . . . but why go on? Hundreds of G's took part in the event, without a doubt, but they simply were not sufficiently contest-minded to send logs in. And if this is the way they want it, who can blame them? Certainly the preparation of a log, when one has a really big score, is a monumental chore, and not everyone wants to impress his friends by demonstrating his ability to swap numbers at higher speed than they can.

Contests in General

GW3AHN, whose record as one of the top DX men speaks for itself (300 countries on 25 watts, remember?), writes as follows: "I think that many amateurs who have been licensed for a fair time have had their fill of this number-exchanging business. Contests, in general, are of too long a duration, and to get a reasonable score involves upsetting the family routine, which violates the 'Amateur's Code' . . . It is ludicrous when you think that an international CW contest can easily be won by an amateur who is incapable of taking down perfect copy of plain-language text for a duration of five minutes."

And he goes on to suggest that the contest calendar should be reduced to one contest per continent per annum; also that if 95 per cent of the certificates were dispensed with, the honour rolls suspended, and no scores quoted over and above 100 countries worked, the bands would be much more peaceful and the operating of a higher standard.

With all this one could agree, but grudgingly have to admit that without the intense competitive angle we might possibly not have progressed to our present level of efficiency. All the same, the rat-



The 160-metre DX cards held by G3FGT — L. F. Crosby, 35 Robin Hood Estate, Streetsbrook Road, Shirley, Birmingham — for his WAC on Top Band, surely an outstanding achievement by any AT station operator, anywhere in the world.

race and The Joneses are two of the less pleasant aspects of modern life, and we could well do without them in what is supposed to be a hobby.

Around the Bands

Every now and then we have to remind ourselves, and readers, that the title of this offering is "DX Commentary," not "DX Catalogue"; and that readers' comments are often, to other readers, more interesting than the DX they have worked.

Lists of stations are tending to become longer and longer, and they have always been drastically pruned before they appear in print. This month, however, the rationing process has been carried still further, until, in most cases, only the "six best" have filtered through. This has, at least, given the chance to quote more of what our correspondents have to say; and it shouldn't make the actual DX lists any less interesting, because one person's "top six" look very different from another's.

We have often asked for more details of time, frequency, and type of aerial system, and perhaps we

shall eventually win over this—if you no longer feel that you have to write out an enormous list of DX, you may possibly feel inclined to slip in a few more details of other things! Anyway, there it is—let us have more of the Commentary and less of the DX. It's what you want.

Top Band Doings

Naturally the emphasis is no longer on real DX, though it's still there for the keen ones. Several 'chasers who have got up early have reported hearing W's at good strength, and the likelihood is that this will continue right through the summer. If everything goes right, we are heading for an even better season than the last, and there should be no limit (except our 10 watts!) to next winter's possibilities.

G3IDG raised PA0PN at 1300 GMT on Easter Day, for his first PA; no freak contact, for it was repeated the following Sunday. GC3NQF/A was another useful one, giving G3IDG eleven countries, "all worked without lack of sleep."

GM3KLA (Shetlands) was de-

lighted to raise GC3RPB/A (Sark), for a much-needed new county. He adds that he rarely calls CQ, but on one of the rare occasions he landed HB9T and PAØPN, within a few minutes of each other; he awaits the DX-pedition season with great interest.

G3PMR (Bangor) puts himself back in the tables, having worked three new countries (OH3NY, PAØCD and GD6UW). He suggests that a *phone* section for the G3P - - and G3R - - boys would be interesting, as there are many of them who work phone only. And we shall soon have to be thinking about the G3S - - starters.

G3PLQ (m.v. *Sobo*) was very hurt to have missed out on the ZL excitement. Meanwhile he has been finding the North-South path mighty interesting during listening spells around Takoradi, Abidjan,

Cape Verde, Canary Is. and such places. Many G's were heard, but he particularly thanks G3PU, 3OQT, 3OUV, 3LYW, 3MYI, 3PQA and 3CHN for their co-operation. His present trip will be taking him to Takoradi again, returning home mid-July or perhaps a little later. Interesting snippets: Rolf Rasp, a PY SWL, has heard G3PU, 6BQ and VP8GQ . . . Personal QSO's will aim at stirring up activity from 5N2, 9G1, EL, VQ2, VQ4 and ZS . . . U.K. stations logged on the trip, apart from those mentioned, were G3FGT, 3ORP, 3GNR, 3GRL, GW3JI, G3PJT, 5AQ, 3RSP, 3RIN, 3RKS, GM3JFS, 3FXM, G3OLI, 2FIX, 3PGN.

When G3PLQ was home for a short stretch he worked 200 stations in 521 QSO's. On May 5 he heard several W's; on May 7 LX3AH, who was called but not raised. 9G1EE, also heard on the band, was just a plain phoney.

G3OLN (Cheltenham) finds the supply of sheepskins for Top Band rather limited, but has managed to Work All Welsh Counties and has applied for the "G 300." Now he is chasing WAGM. On the daylight side, he has worked 26 counties (15 confirmed). For the future—a vertical! And he remarks that he acquired about 50 feet of 27 mm. galvanised steel tubing very cheaply from a local scrap yard. Finally, G3OLN reminds us that he handles the QSL's for VP8HF/MM and G3RFH/MM.

In the recent *Grafton* Top-Band Contest, the Open section was won by G3NFV, with G3IGW as runner-up. They were the winners, respectively, of the phone and CW sections. G3ERN was third and G3RBP fourth. In the Members' section the first four were G3RPB, 3NYK/A, 3PIH and 3RJN. Of interest—the winners' scores were the highest yet, with 85 contacts on phone and 58 on CW.

G3IGW finds OH3NY easier to work now than at any previous time (peaking 599 one night). Signals from UB5CJ were also good but he had QRN and only worked OK's. G3IGW was pleased to raise OK, PA and some GDX with an indoor whip propped up against the operating bench.

G3ABG (Cannock) also heard the UB5, and worked ZB1BY, two PA's, and GM3FXM and GC3KAV on phone. For his coming DX-pedition see later paragraph.

G3FGT (Solihull) sends us a picture of his Top-Band WAC, and says he certainly would not part with the actual QSL's!

Top Band DX-peditions

If you can't afford to fly off, loaded with expensive gear, to a remote island which does not yet appear in the DXCC list, you can at least gladden the hearts of keen Top-Banders by making for some of the "rare" spots within the U.K. Quite a lot of keen types are doing this very thing during the next few months, as follows:

Channel Islands: G3OUF, 3PCL, 3PCR, 3PSH, 3ROP and two SWL's have organised the following routine: *Jersey*, August 8-22, GC3OUF/P and GC3PCL/P; *Sark*, August 9-12, GC3PCR/P; *Alderney*, August 15-18, GC3OUF/P. The Jersey station will operate on all bands, the other two on One-Sixty and Two. Enquiries and applications for skeds to G3OUF, 80 Argyle Road, London, W.13.

Rutland: G3RQT/A, June 10-15, using SSB around 1900 kc and CW elsewhere on the band. Half-wave aerial available; all contacts will be QSL'd.

Selkirk and Berwick: GM3OWM/P, June 17-24. Operators will be G3NOQ, 3RVM, 3OYP, 3PDM and 3OSW, all of Kings College Radio Society, University of Durham. CW and phone will be used.

Sark (past history): G3RFS, 3NQF and 3RPB made a successful sortie between April 12 and 19, covering four bands and making 414 contacts in 40 countries. For all bands they used a 320-ft. long wire and a B.2 transmitter running at 20 watts (reduced to 10 watts for Top Band, of course). Stations worked on One-Sixty included OH3NY, ZB1BX and 1BY, PAØPN, OK's, GM3KLA (Shetlands) and G1.

Isle of Arran (Bute): Activity promised by GM3ABG/A for

"CQ" WORLDWIDE DX CONTEST, 1962

(CW Section)

Six-figure Scorers in Europe

All Bands, Single-Op.

UT5AA	816,408
SM5BLA	317,580
OK1ZL	299,455
HB9JG	248,834
OK1GT	219,912
OK3AL	211,703
UA4LE	204,590
UB5CI	203,841
OE1RZ	189,924
G2DC	157,170
HB9KO	146,216
SP6FZ	141,768
DJ1PN	140,456
DJ7IK	123,930
DJ4DN	122,537
DJ2HH	120,150
HB9ZY	118,770
HB9NL	113,976
SP5AFL	104,490
SP5ADZ	104,375

14 mc only

UC2AA	183,580
G4CP	102,600

TOP BAND LADDER

(G3P-- and G3R-- stations only)

(Starting Date, July 1st, 1962)

Station	Counties	Countries
G3PLQ	80	14
G3RBP	77	20
GM3PBA	75	18
G3REA	75	15
G3RRU	71	15
G3PVK	68	14
GW3PPF	61	12
G13RCB	54	9
G3PRT	53	10
G3PPE	49	10
G3PMR	46	10
G3RQT	46	9
G3RJI	45	5
G3RDO	42	8
G3RFT	42	5
G3RJH	39	9
G3PWY	37	12

(Note: New entries for this ladder will be accepted only up to July 1st. The ladder will continue until the end of 1963.)

about five nights, Sunday, August 11 onwards. Certainly CW and possibly some phone. The QTH will be the shack of Cameron Black (see p.154, May issue) and G3ABG says he will not be on every night, as he intends to go out with the herring fleet—not /MM! Gear will comprise a long wire aerial, 19 Set and SX-24.

Twenty Metres

This is where all the real DX has been, mainly because the DX-peditionary types all use it. On the one hand there has been Gus (FR7ZC/G, 7ZC/E and FH8CE); on the other all the rare Pacific stuff in the mornings (KJ6, KS6, ZK1 and the Hammarlund affair at VR1N). There are a few who have worked them all!

G3FKM (Birmingham) came pretty near to that, having raised Gus at all his stops on both CW and SSB, to say nothing of 9N1DD and 1MM and all the Pacific types. Despite this, he has a grouse: "We suffer from well-known DX types who not only make protracted 'CQ DX' calls on the frequency of a known rare DX station, but also like to impress

by raising fairly rare ones like KJ6BZ every morning, thereby preventing a lot of the less fortunate boys from getting QSO's. This business of the CQ call on, or within splattering-distance of a DX-pedition frequency should be denounced, as it often results in a 'knitting circle' QSO developing." Agreed, and we gladly join in the denouncing ceremony.

GW3AHN says that the VQ9HB sortie (which didn't come off) gave rise to a kind of rat-race in which all the "big boys" were busy making friends before he departed; and VQ4GT was actually instructing him not to forget so-and-so! GW3AHN himself competed well with the lot of them; SSB raised Gus and the Pacific stuff, as well as HC8CA, VQ1GDW, KC4USX and 9N1DD, while CW accounted for Gus at all three locations.

G3LMD (Southport) has gone over to SSB and says that results with a Viceroy and an end-fed long wire really amaze him. On SSB the best were HC8CA, HI8AKU, KJ6BZ, W4EIL/KS6 and VQ1GDW. The virtues of the short call. . . Heard from HZ1AB:

"QRZ the SM station. OM, I'm quite familiar with my own call, but what is yours?"

G3HCT (Henley-in-Arden) was fetched out of bed at 0330 GMT by the children, and found ZL4JF at 579. (He tested his keying for about ten minutes and then worked nothing but W's!) Best contacts, all CW, were with Gus at all three stops; FO8AA, HC8CA, HI8MMN, CP5EZ and ZD3A.

GM3JDR, on SSB, found three new countries with HC8CA, VR2BZ and 9N1DD and 1MM. BV1USF and HL9KH and a big batch of Africans were also raised. GM3JDR's full list shows how different conditions are up there in the North.

G3HZL (Isleworth) stuck to CW and worked HL9KH, M1VU, JT1AD, 5R8CE/FH8, VS4RS and 6W8BL. . . G3BHJ (Norwich), on SSB, collected CR9AH, FG7XT, HC8CA, HI8AKU, PJ3AO and ST2AR. . . G3ABG, on CW, raised Gus (all three), VS4RS, VS5CW, HL9's, 9U5JH and CE1AD. His "heard" list for the band reads like a young call book!

G3RFS (East Barnet) worked



The station of GM3PBA, J. S. Martin, 10 Oliphant Court, Lochside, Dumfries, who runs a 40-watt Tx on the 20-40-80m. bands, with a separate 10-watt rig for 160 metres; this Tx is CW-only, and functions as a driver unit for the HF-band transmitter. Aerials are dipoles for Top Band and 20 metres, and the receiver is an Eddystone S.640, somewhat modified. GM3PBA is one of those who gives a lot of time to Civil Defence training and exercises.

CW with VP8GQ, KR6ML, JA5FQ, UWØ and VK2. . . G3RDC (Pett), same mode, made it with FB8ZZ, FR7ZC/G, VP8GQ, HL9KH, HC8CA, XZ2ZZ and VS4RS. . . G3HDA (Stratford-on-Avon) used SSB for CP1BH, HC8CA, KJ6BZ, the two 9N's, Gus and W4EIL/KS6; CW with FR7ZC/G, HC8CA, VR2EH, ZD3A, ZK1BV and ZL1ABZ.

G2DC collected Gus three times, as well as FB8ZZ, ZL4JF, VR1N and VQ9HB; he reports conditions holding up well, especially with the Pacific in the mornings.

G3DO raised just about all the "usual" super-DX, so from his list we select some different ones, such as BV1USF, HC5EJ, KB6EPN, VP2SY, YN3KM and

ZP5CF—but all the others are there, too! SSB, throughout.

G3NOF, also on SSB, found the band open for W's from 0930 until midnight, with evening conditions specially good for the West Indies and the northern part of South America. His selected six were FG7XT, HC8CA, HI8AKU, PJ3AO, YN7GJ and YS1RGM, but his list was strong, as always, in/MM and /AM stations.

Fifteen Metres

G2DC had a spell on this band with a 7-watt portable transmitter, and raised OA4FM, 9Q5AB, ZE3JJ and 5A's; normal input fetched in FR7ZC/G and /E, ZD7AD, VQ8AB and VP8GQ—all CW.

G3HDA, also on CW, worked FR7ZC/E (1515) and VK9LA (1230) . . . G3NOF has TVI difficulties on 15 metres, but worked some W's on SSB around 2300. Heard, early evenings, TN2AA, VP2SL, 9G, 9U5 and so on . . . G3NWT used AM phone to work VS4RS, 6O2HH, 5T5AB, VP3FM and VQ4DS, plus "the usuals."

G3ABG, on CW, raised 9Q5AB, VS9AAA and ZS2NG . . . G3BHI, with SSB, collected FG7XT, HB9UD, 5X5IU, VQ4AA and ZB1's . . . G3RJK (Portsmouth) found the band "about average" and raised CE3OB, CR7IZ, PY's, VQ4IV and ZE1BK—all CW. 9Q5CA and 5R8CE/FH8 were heard . . . G3HZL mentions a QSO with VS1LV; G6QB also heard and worked this station several times at 599 when the band appeared to be quite dead.

To show how different it all is when you get a little farther South, 5B4TJ, on AM, worked VU's, VK5 and 6, TN8BE, 5R8BX, FR7ZD, 4S7YL, 5U7AC and lots of ZS's.

Ten Metres

The results of the Activity Sunday (all ground-wave!) appear elsewhere in this issue—on p.182. The DX is being worked occasionally, but not by G's. VS1LV passed along the information (via 21 mc) that he and VK6QL have a very reliable path between them. His own best, northwards, is 5B4TJ; VK6QL's best is 9K2AX. The KR6's are very active on 28500 kc, and looking for DX.

5B4TJ, using AM between 0900 and 1600, worked lots of ZE's and ZS's . . . G3NWT reported the band alive with Europeans on the evening of May 16, also 5B4TC at S9 plus (CW) and an OD5 at S7 . . . G3NOF worked some Europeans on SSB, but heard no DX. However, on AM he logged CX4CX, ZE8JY, 5B4TJ, 5H3IW and Europeans.

ZE2JA's report covers only the early part of April, during which he raised DJ7CL, VE3FFW/SU, VS1LV, KR6TAB, HB9's, EA, DL's, VK6QL, ET3MEN and 5B4TJ. He says that daily observations since April 14 have shown "nothing doing." He was active on April 21 for the test period and gave many calls to G, but didn't hear a sound from the U.K.

G3RFH/MM (VP8HF/MM) reports on the band during his passage home from Bermuda in H.M.S. *Protector*. DX worked included 9Q5AB, LU6MI and 5H3HD; Europeans were not worked until he was in the English Channel, but they were quite glad of even that! He thinks that if only some more G's would come on the band regularly, they would get plenty of QSO's.

General Chat

G3NWT is very glad to read that the effects of the U.S. "Rainbow Bomb" may be with us for several years. He asks "Can you see the point of all this beefing about the earth being rendered useless as an observation platform for the Universe? It was a pretty hopeless one in the first place . . . think of all the marvellous other platforms that are in due course going to be fixed up."

G2DF (Warrington) has just made his DXCC with an indoor aerial, and asked ARRL if this was the first of its kind. They replied that it was the first they had been notified of; he uses 40 watts only, on the HF bands and says "Indoor antennas are worth considering."

G3IDG refers to the "shortest call" argument put up by G3POW last month, and says it is a pity that the present licence is not worded (as the earlier ones were) to the effect that the call-sign of the station being called must be

FIVE BAND TABLE

Station	21 mc	14 mc	7 mc	3.5 mc	1.8 mc	Countries Worked
G2DC	273	291	149	102	14	312
G3FXB	270	277	163	104	9	307
G3FPQ	256	269	139	113	26	296
G3DO	223	291	64	73	10	307
G3NOF	184	194	23	33	2	241
G3BHI	165	67	29	16	1	180
G3LHJ	139	174	54	24	12	206
G2YS	130	184	99	75	22	208
G3IGW	127	132	102	53	28	184
G3HZL	125	159	94	52	11	187
G3NFV	122	102	44	57	17	172
G2BLA	99	100	77	40	10	153
W6AM	87	316	59	30	8	321
G8VG	80	154	85	38	12	176
G3KMQ	77	182	65	47	12	202
G3JVJ	77	89	72	41	4	129
G3PEU	72	134	22	26	4	154
G3IDG	63	53	27	17	11	93
G3RFE	58	47	4	24	1	69
G3PEK	36	81	56	30	12	95
GW3CBY	32	80	54	36	19	100
G3PMR	20	37	20	5	10	48
GW3PSM	19	47	38	24	1	69

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

sent. Incomplete calls cause confusion, he says, and "let us have complete calls on CW all the time, rather than copy the antics of the SSB brigade, who seem positively ashamed of their call-signs." (In general we agree, but DX-peditions and Contests would become a bit cluttered!).

Late Flashes

VS1LP hopes to spend three weeks of each month in Indonesia, whence he will sign VS1LP/PK . . . PYØ (Trinidad Is.): the PY operators leave their homes June 22 and will use their own calls suffixed by /Ø, for three or four weeks.

Jamaica now uses prefix 6YA. It was expected to be 6Y5, but it seems that some admin. trouble has brought out this "6YA" business, which may possibly be

put right later. VP5XG becomes 6YAXG, and so on. If they ever reach what would normally have been three-letter calls, we might have a "6YAAA" on the air! Turks & Caicos, also Cayman Is., retain VP5.

Danny Weil has been heard signing VP2VB/MM—*en route* from Tahiti to the Marquesas . . . VP9BH (Nauru) is at present scheduled to remain on until June 12-13 . . . Another trip to the Kamarans is promised. VS9KAA on CW, VS9KDV on phone—and they may have Gus along as spare operator!

Top Band: ZS2FM has worked W6ML several times, has heard W1BB and has worked ZE3JO. At least 25 ZS's are now active on 160 metres. ZS2FM works on 1950, 1976 and 1987 kc . . . Another new DX station on One-Sixty is

KL7JDO, who has already worked many Eastern U.S.A. stations and heard KP4 . . . DL1FF will be on next season with a full-size 160-metre ground plane!

Sign-Off

So there we are for another month, with thanks and acknowledgments to the *WGDXC*, W4KVX's *DX*, W1BB's bulletins, the *NCDXC Bulletin* and all our willing correspondents. Deadline for next month is **first post on Monday, June 17**, and please do see that your letters are addressed "DX Commentary" (this is important), *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. The deadline these days really is the limit, so don't be late, even by one post, or you will be out! Meanwhile Good Hunting, 73, and—BCNU.

JOB FOR SIR HAROLD BISHOP

Having recently retired as Director of Engineering, B.B.C., Sir Harold Bishop has been appointed a consultant to British Insulated Callender's Cables, Ltd., and a director and deputy chairman of the Telegraph Condenser Co., Ltd., one of the constituent companies of the BICC Group. Under Sir Harold Bishop's leadership, the B.B.C. has reached a very high standard in the field of broadcast engineering and transmission techniques, unsurpassed by any other world broadcasting authority. The new chief engineer of the B.B.C. is Sir Harold's former deputy, Mr. F. C. McLean, C.B.E., B.Sc., M.I.E.E., S.M.I.R.E., a graduate of the University of Birmingham, who started with the Corporation in 1937.

/T's AND THE MORSE TEST

Anent the note on p.135 of the May issue, G3RJW/T (Mitcham, Sy.) writes to point out that even if the Morse Test is not necessary for ATV licences granted for operation on the 430 mc band, it is a good deal more difficult technically to get gear working properly on 70 cm. than it is on the lower frequency bands. That is, of course, perfectly true—even if the immediate intention is not so

much to transmit television but to get on the air. There can be no possible objection to this (certainly not from us), but the fact remains that relatively very few of the /T licence holders are in a position actually to transmit television.



For The Beginner

VARIABLE FREQUENCY OSCILLATORS (II)

The VFO is such a vital piece of equipment for the amateur that there is no point in designing or using one unless it employs the very best techniques. The building of an "elementary" VFO would be a waste of time, because there is no room for instability or erratic performance on the bands these days. Hence this discussion on the exacting requirements and how they can be met.

EVERY CW contact one listens to nowadays seems to include a T9 report in each direction, from which one might gather that nearly all CW notes are beyond reproach. Unfortunately this is not true, and many are the T7 signals described as T9 simply because the other operator doesn't think what he is sending. A real T9 or T9x ("crystal-like") note should be the ambition of every beginner, and certainly nothing less should satisfy him. And without a good VFO such an ambition will not be realised.

In last month's article on this subject we spoke of short-term and long-term stability of oscillators. Put crudely, if your short-term stability is bad, you will have a chirp or a "yoop"; if the long-term performance is poor you may have a beautiful note, but in two minutes' time you won't be on the same frequency.

There is nothing magic about attaining satisfactory stability; you don't have to go commercial to get it (in fact you can go commercial and still not get it). Correct circuit design, followed by good assembly and wiring of the parts, is all that is necessary, and the would-be or novice amateur should aspire to this in everything that he builds. The VFO is no exception.

Causes of Instability

To find out how to build a good VFO, let us first examine the obvious requirements of a satisfactory design. What is a VFO, anyway, but a coil and a condenser (forming a resonant circuit) with a valve connected across them? First, then, the coil and the condenser must be good—that stands to reason. This means that the coil must be *rigid*, shock-proof and wound with wire of adequate diameter; also that the condenser should have good bearings, be of the *two* end-plate construction, and should stay where it is put. Elementary requirements, these.

But it's pointless to put together a nice tuned circuit and then to connect across it something which can be varying all the time. A valve, for instance! From the moment it is switched on its temperature will be a variable quantity; when the HT is on, it will warm up still further, and when the HT is off it will cool down again. And its inter-electrode capacities will vary accordingly. The load put on the valve by the sections of the circuit following may also be varying. So what can we do but take all steps possible to *isolate* the valve from the tuned circuit of our VFO.

The problem then is in two parts—the electrical and the physical isolation of valve from tuned circuit. First, the electrical part of it. Fig. 1 shows in elementary form the common Hartley circuit, across grid, cathode and screen (earthed) of a tetrode. The arrangement shown at (a) would be pretty unstable and almost useless. (It might have got by in 1933, but not in 1963!) At (b) things have been improved by the use of a large fixed capacity across the relatively small variable condenser which does the tuning. One step forward, this, since C2 may well be as large as 500 $\mu\mu\text{F}$ and therefore will effectively "swamp" the grid-cathode capacity of the valve. The latter, by the way, is likely to be something between .02 and .15 $\mu\mu\text{F}$, so the swamping effect is pretty complete. Remember, too, that it is *changes* in the inter-electrode capacity that cause the trouble.

At (c) the position is still further improved by tapping the grid of the valve down the tuned circuit, which also reduces the effect of capacity changes; this is done by means of a kind of capacitive potentiometer, which not only taps the valve down the circuit but increases the swamping capacity still further.

To the novice the difference between (a) and (c) may appear quite trivial . . . on the air it might well be the difference between one of those terrible signals from LZ, YO, YU (for instance) and one from an expensive professional layout.

Temperature Troubles

But let us not be easily satisfied—what of the long-term effect, even if a nice T9 note has been arrived at for the first few seconds? There's not much point in making your tuned circuit independent of the valve electrical characteristics if you are going to put the said valve right alongside it, allowing it to act as an efficient hot-plate. And if you put the valve some distance away from the coil and condenser, that is going to mean long leads, which can always cause trouble through RF pick-up.

One of the more obvious devices is to mount your coil and condenser inside a box and the valve outside. This can even lead to a *shortening* of the wiring, if you use a layout like that shown in Fig. 2. Leave the valve in the open air above the box—not alongside or underneath—and your tuned circuit should not warm up perceptibly as a result of heat radiated from the valve.

Here, again, if we are perfectionists (which it

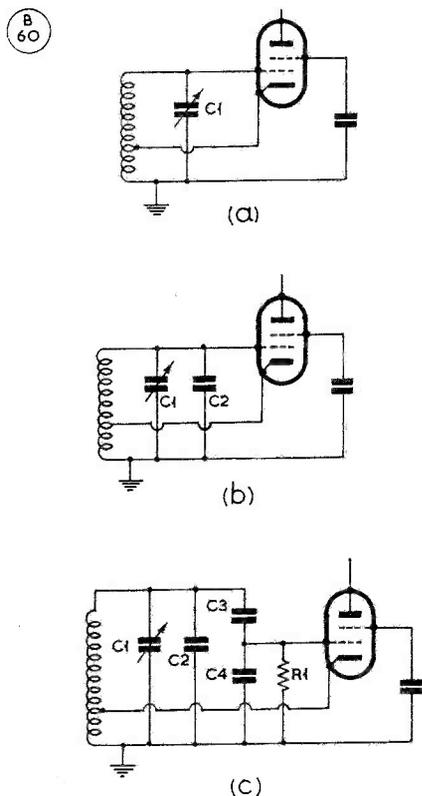


Fig. 1. The Hartley oscillator, as shown at (a), would be almost useless for modern requirements of stability. At (b), the tuning condenser C1 has been supplemented by a "swamping capacity" several times its own size. With a 50 μF variable for C1, C2 may be as large as 300 or 400 μF , silver mica. At (c), the addition of two more condensers C3 and C4 makes it possible to tap the grid of the valve down the tuned circuit. The values are open to wide variation, but typical figures are 200 μF for C3, 60 μF for C4. Note that the valve now needs a grid leak, R1 (47,000 ohms).

pays to be in these matters) we can improve things still further. As we have already gone to the trouble of added swamping capacitors, it obviously will not matter if we add the extra capacity of a few inches of coax cable to the circuit. By this means we can remove the tuned circuit still further from the valve ; in fact we can even move our little box containing the VFO components (but *not* the valve) to an operating position remote from the transmitter.

Too long a run is not recommended, but this scheme has been used with great success at distances of a foot or so from the main transmitter cabinet. For this purpose the Colpitts circuit seems to go best, since it already has two swamping capacities in use, and two lengths of coax may be added without destroying the symmetry of the circuit. Fig 3 (a) shows the normal Colpitts arrangement, and Fig. 3 (b) the physically-extended version. Comparison of the drawings makes the principle clear and shows that each of the swamping capacities is in parallel with the capacity of one of the lengths of coax.

What Frequency ?

VFO's are made for various purposes, and therefore are designed to cover various frequency bands and ranges. For this reason we can't give a table of turn-numbers, former diameters, condenser sizes and so on, saying "this is the VFO you want." It is to be hoped that the practice of frequency-multiplying in transmitters has almost died out by now, because of its proneness to causing TVI ; thus the old fashion of designing a VFO to cover the 3.5 mc band is no longer so popular.

That was an unsatisfactory business, anyway, because if you wanted to operate on that band your VFO range had to be the full slice of 3.5-3.8 mc, which gave very poor bandsread when it was quadrupled to 14 mc (14.0 mc-15.2 mc, actually !) and was pretty ridiculous when doubling to 7 mc (7.0 to 7.6 mc).

Receiver VFO's are often on or near the 3.5 band nowadays, because that makes a convenient first IF for a double—or treble—conversion receiver. When actually listening on the 80-metre band, the first IF is then done away with, and the mixer becomes an extra RF stage.

Transmitter VFO's tend to be designed in some range which gives convenient heterodyning into the amateur bands from a series of crystals ; thus one finds VFO's designed for 5 mc, or 9 mc, or some such frequency.

And, of course, there are always the Top Band enthusiasts, who must have one covering 1.8-2.0 mc (or, occasionally, 0.9-1.0 mc followed by a doubler).

So you will eventually have to get out your Data Charts to determine how much inductance and capacity will be needed to cover the range you want, and

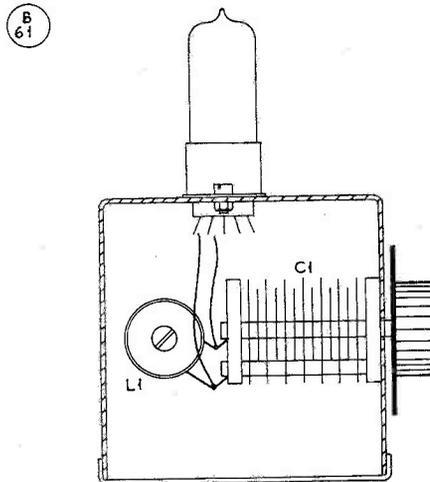


Fig. 2. By mounting the circuit components in a box (preferably die-cast) and leaving the valve outside, much of the heat developed in the valve is convected elsewhere, and the warming-up of the VFO parts is much reduced. Note that the leads between coil and condenser *must* be short and direct, and the coil former *must* be rigidly fixed to one side of the box, not left hanging on the wiring.

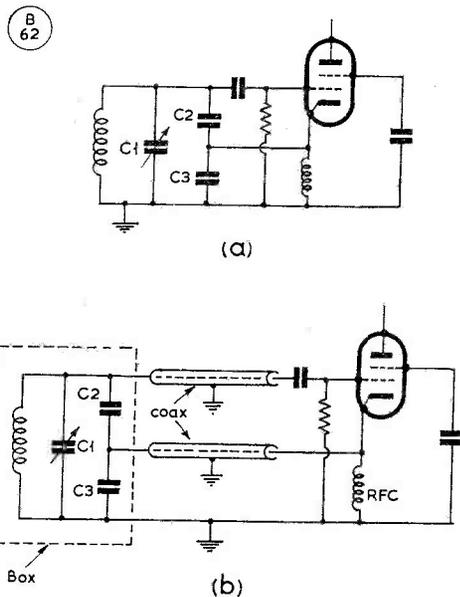


Fig. 3. The ordinary Colpitts circuit (a) may be modified by mounting the coil, the tuning condenser (C1) and the swamping condensers (C2, C3) in a box of their own, connected by two coax leads to the valve and the other components. Since the capacity of the coax lengths is very small compared with that of the swamping condensers, there is hardly any effect upon the performance of the circuit. C1 is the normal size (about 50 $\mu\mu\text{F}$) and the swamping condensers may be as large as 680 $\mu\mu\text{F}$ each.

for this, of course, you have to include the total swamping capacity introduced into the circuit. You will work to two capacity figures: (a) The swamping capacity *plus* the variable set at minimum, and (b) The swamping capacity *plus* the variable set at maximum; and from these find the value of inductance needed to cover your range, with a reasonable amount to spare. Then you can find from another table how many turns, and of what diameter your inductance should be.

As a quick guide, here is an example, taken straight from one of the many tables available: 500 $\mu\mu\text{F}$ and 4 μH will resonate at 3.5 mc; with the same inductance, 450 $\mu\mu\text{F}$ will tune to 4.0 mc. Thus, if you use a swamp capacity of 450 $\mu\mu\text{F}$ in parallel with a variable of 50 $\mu\mu\text{F}$, your tuning range will be 3.5-4.0 mc. (We are not suggesting that that is a favourable ratio, necessarily — you might want to increase the inductance to 8 μH and use a total of only 250 $\mu\mu\text{F}$.)

Having arrived at the inductance figure, look up your coil winding data and you will find that you can arrive at your 4 μH inductance with a certain number of turns and a certain gauge of wire, close wound on a former of a certain diameter (for example, one such coil would be on a 7/16-in.

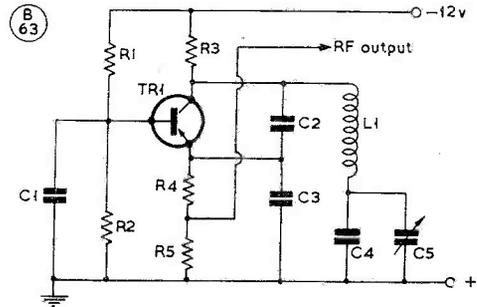


Fig. 4. A transistor VFO using the Clapp, or series-Colpitts circuit. Outputs may be taken either from the emitter circuit, as shown, or from a very small link winding coupled to L1. This circuit is not suitable for keying.

Table of Values

Fig. 4. Circuit of the Transistor VFO for Top Band

C1 = .01 μF	R2, R3 = 6,800 ohms
C2, C3 = 680 $\mu\mu\text{F}$, silver mica	R4 = 1,000 ohms
C4 = 150 $\mu\mu\text{F}$ ceramic	R5 = 2,500 ohms
C5 = 50 or 75 $\mu\mu\text{F}$, variable	L1 = 50 turns of 24g., close-wound on 1-in. former
R1 = 47,000 ohms	TR1 = OC170 or similar

former, with 24g. enamelled wire wound to make a coil length of 0.65 ins.). With this coil and a swamping capacity of 400 $\mu\mu\text{F}$, your 50 $\mu\mu\text{F}$ condenser would tune from 3.5-4.0 mc; with the swamping capacity reduced to 150 $\mu\mu\text{F}$, the tuning range would be roughly 4.7-5.5 mc.

We have quoted all these figures to show how many variables are involved—and in any case you may want to use a 1-in. former and 18g. wire, which means starting the whole thing over again! But don't be afraid you will run into the dreaded "maths." — there's nothing but simple arithmetic involved.

Transistor VFO

For low-powered Top Band transmitters there is much to be said for a transistor VFO. Early on, transistors acquired the reputation of being unstable, but that no longer applies to the good types. The heat problem is no longer present (in the sense that the transistor will not warm up the tuned circuit, as a valve will) and thus the thing can be made extremely small.

Further, all those Top Banders of the CO-PA type can readily be converted to VFO operation simply by making a self-contained transistor VFO which can be plugged in, in place of the crystal, the former CO then becoming a buffer amplifier. Fig. 4 shows a well-trying circuit (a transistorised Colpitts) which is sure-fire and extremely stable—but don't try to key it! Leave that for the buffer stage, which, with mixers and other following stages, will be described later in this series.

RTTY Topics

OPERATING NOTES AND NEWS—
 MODIFYING THE AP.66862 T.U.
 FOR FREQUENCY-SHIFT CHECK—
 MORE NEW EQUIPMENT
 ZA.39384/85 EX-ARMY SURPLUS

W. M. BRENNAN (G3CQE)

CONDITIONS on the HF bands have been very good lately and, as one correspondent remarks, "It looks as though someone forgot to switch off a few sunspots—or perhaps it's due to all that expensive debris up there!" Whatever the reason, the resulting conditions are reflected in the current mailbag. A recent "find" of various items of RTTY gear on the surplus market has also produced somewhat more mail than usual and it seems that quite a number of U.K. amateurs have been able to add such things as complete perforated tape equipment, Creed 7B page T/P's and a new type of surplus T.U. to their RTTY stable. These two facts seem to have increased the amount of actual activity at a time when it could reasonably have been expected to decrease in direct proportion to the longer days.

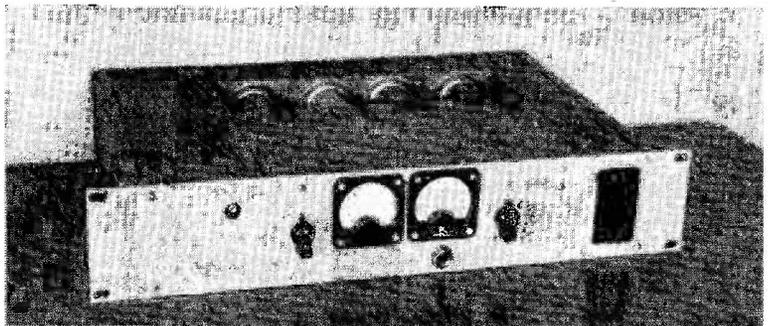
Operating News

W6CG writes in to report that an old friend of his, ex-KR6AK, is once again active on RTTY and this time from Korea with the callsign HL9KK. KR6AK was one of the first RTTY DX operators but upon his return to the U.S.A. a series of rapid QTH changes placed him on the inactive list. However, he is now making up for lost time and is on daily on 14090 kc, looking for European contacts between 0500 and 1200 GMT. K3GIF is still the most consistent W signal to be heard on 20m. He mentions that 5A2TC is returning to the U.S.A. and taking his RTTY gear with him. Along with several other correspondents, K3GIF also reports a new RTTY country for his score in the shape of HB9KU following this up a short time later with HB9FM. Both HB stations are using a speed of 50 bauds and so the speed problem is taking a little sorting out; nevertheless, from the number of reports on these two stations, the W boys are taking this problem well in their stride. This new European country seems to have slipped in unnoticed by almost all of the U.K. operators except GM8FM, who confesses only to run-of-the-mill W

QSO's — and HB9KU. GM3GNR is one of those who has been able to add tape equipment and a new T.U. to the inventory. He says it is a real pleasure to sit back and take life easy whilst the Creed 1B Auto-Tx warms up the channel on 20m. with a CQ tape! After signing out of a QSO with K3GIF recently a large commercial type RTTY signal appeared on the channel. However, after all the Rx gain controls had been screwed down and the T/P speed changed to 50 bauds the "commercial" turned out to be another newcomer to RTTY in the shape of 11BNO, whose powerful signal is fully in keeping with the style already set by 11RIF! 11RIF himself has recently been on the air on SSB from Monaco, signing 3A2CL, and now a further trip is being planned to the same spot but this time for RTTY operation. 11RIF is at present trying out narrow-shift whenever he is in QSO with those stations able to receive it. So far a number of DX tests have proved highly successful. Rumour (via K3GIF) has it that 11RIF promised his wife that he would stop smoking if he won the recent RTTY Sweepstakes Contest—and, of course, he was in fact the leading station by quite a fair margin; the latest information is that 11RIF is sticking (or being held?) to his word.

G3BXI was the leading U.K. station in this same Contest and was presented with a handsome certificate to this effect by *RTTY Magazine*, the contest organisers. He writes to say that although a new business venture has been taking up much of his attention he hopes to be able to have a little more time for operating very shortly. SWL D. F. Wadsworth (Nottingham) acquired one of the recently available IF type of T.U.'s and also a Collins 51N5 receiver; the latter is designed for fixed frequency operation on RTTY circuits. It uses xtal control of the local oscillator and the xtal is housed in a temperature-controlled oven. Plans are to use this receiver as a fixed freq. IF strip with a converter ahead of it; meanwhile the problem of sorting out the various power supplies needed for the new T.U. are being tackled.

G3PEU is a newcomer to RTTY, but he has already managed to get one of the IF T.U.'s working, along with a newly-arrived Creed 7B page machine. He is active on 80m. G3LDI (Norwich) is back on



The piece of apparatus known as the Adaptor Receiver Frequency Shift AP.66862, FSR.1.IX, as discussed in the April issue of "Short Wave Magazine." As a Terminal Unit with the modifications suggested here, it fulfils all requirements for amateur radio-teleprinter operation.

the air again after rather a long absence. The RTTY set-up is a Creed 7B T/P with a 1B Auto-Tx, a 7TR reperfector and an IF T.U. The Tx is a home-made SSB/RTTY rig with FSK applied to the VFO.

Another newcomer is G3NAE (Bournemouth) who runs a Creed Model 3 T/P with a modified W2PAT T.U. The Tx is a home-brew phasing rig, and activity is confined at the moment to 80 metres. G2HIO has returned to the fold again after being absent on a course for some time; here again a Creed 7B and tape equipment are new additions to the shack.

G2DSF is at present probably the most consistent RTTY operator on 80m. He is active almost every lunchtime during the week and for longer periods still at weekends. Although the QTH in the centre of Leicester leaves a great deal to be desired as far as aeriels are concerned, he gets out quite well on all bands with an old "Elizabethan" Tx and a 40-metre dipole with an odd length tacked on. He says he doesn't know how it works, or why, but the main point is it does! The arrival in the shack of a Creed 7B has ousted the Creed 3X. Two T.U.'s at G2DSF are the AP.66862 (described in the April SHORT WAVE MAGAZINE) and one of the newly released IF T.U.'s; the main receiver is a CR91, the Canadian version of the AR88LF. G2DSF mentions G3NGA, G3KKV and G3LMR as local stations who have RTTY gear but who have not yet taken the plunge, though G3NGA should shortly be active. G6CW (Nottingham) is a consistent 80m. addict. He has in fact been spending quite a great deal of time helping various people to put their newly-acquired RTTY gear into good working order. Nevertheless, he has still found time to run the 'printer over both 80m. and 2m. most days. G6CW is particularly interested in 2m. FSK QSO's and operates on 145.75 mc with 100 watts of FSK, putting out calls on various beam headings almost every evening. G6CW has printed the V.E.R.O.N. Bulletin radiated from PA0AA on two metres and comments that much better reception of this particular transmission would be possible if it was changed from AFSK to FSK—this is quite true, of course.

The RTTY Bulletin broadcasts from the V.E.R.O.N. Hq. station PA0AA are now transmitted simultaneously on three frequencies, 3.625, 14.1 and 145.14 mc. The recent addition of the 20m. broadcast has of course greatly increased PA0AA's coverage and reports of reception of the bulletin are coming in from both the East and West coast of the U.S.A. and also from South Africa. These V.E.R.O.N. broadcasts have now been taking place for about 18 months and this represents no mean feat—the weekly draft of a bulletin has to be transferred on to perforated tape and finally broadcast and must take up a fair amount of the leisure time of the three operators concerned. PA0YZ, chief operator at PA0AA, would like to receive more week-by-week reports on reception of the bulletin (and these are usually acknowledged in the bulletin) and it is perhaps the least we could all do in return for the service provided. For those who have never tried to print PA0AA, the transmissions takes place at 2030 GMT every Friday on the frequencies already mentioned.

The bulletin, which is usually transmitted twice, consists of RTTY news followed by a summary of DX news of a general nature, the latter being compiled from "DX-Press" the V.E.R.O.N. publication. All reports and news items for inclusion in the bulletin should be sent to PA0YZ (*QTHR*).

It is rumoured that the Belgian U.B.A. also have plans for transmitting a RTTY bulletin from their Hq. station ON4UB. If this is a fact it is good news and providing that the transmission comes over in English it should provide yet another weekly highlight.

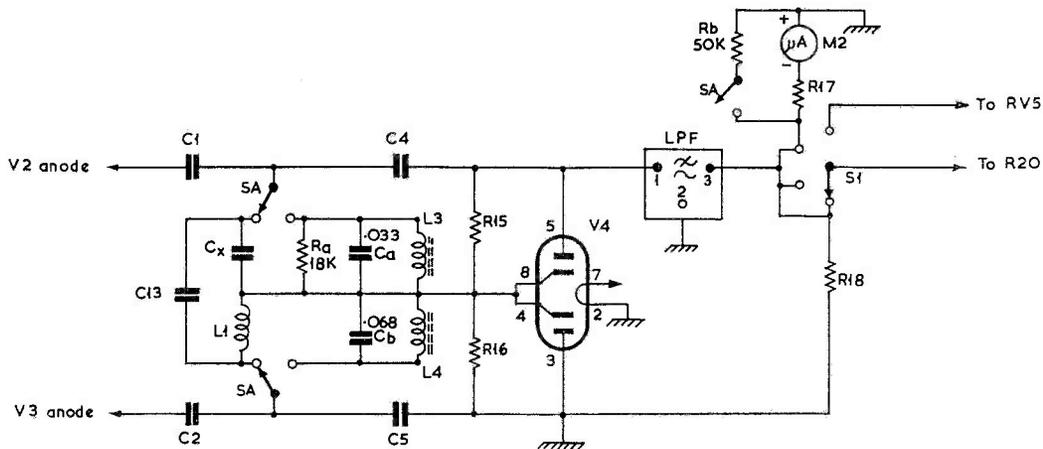
Re-Construction

Two stations that are in the process of re-building are G3HVB and VK3KF. G3HVB found that while he kept the 'printer on the air he was getting very little done towards accommodating new RTTY gear in the shack and so the big plug was pulled out. He has recently discovered a source of 425 c/s tuning forks which can of course be used to construct a standard AF source useful for producing the usual freqs. (850, 2125 and 2975 c/s) required for RTTY. Such a device is described on page 174 of *The New RTTY Handbook*, obtainable from the SHORT WAVE MAGAZINE Publications Dept. (see p.170).

VK3KF decided completely to rebuild his actual shack and so he dismantled the station and pulled the old building down, storing the RTTY gear in the garage. No sooner had he done this than the overwhelming urge to get back behind the keyboard overtook him. So for the last few weeks each weekend he has dragged all the RTTY gear out of the garage and fitted it up in the kitchen. After the weekend's operating it all goes back into the garage again!! W6CG (who is VK3KF's sparring partner) comments that this must surely be a form of "RTTY Alcoholism"—but then most of us hate to see all that machinery lying idle! Some shack changes are also taking place at G2FUD, but this time the project is an expansion rather than a re-build and the plan is to make use of the roof space to extend the shack. However, in his case the notice states "Remaining Open For Business During Alterations" and so G2FUD can be heard regularly on eighty metres.

Modification to the AP.66862 Terminal Unit

One of the problems of RTTY operation is the need to check the amount of frequency shift with a fair degree of accuracy. With the VFO/FD/FD/PA type of transmitter the frequency shift has to be adjusted with each change of band and therefore some simple but reasonably accurate means of checking the shift is essential. RTTY operators who have T.U.'s in which the discriminator is the Travis (two tuned circuits) type can and do back-tune the Tx to these filters. However, the AP.66862 Converter employs a linear discriminator and although this does in fact exhibit peaks in freq. at about 2 and 3.1 kc, the spacing between these two frequencies is not the required 850 c/s, and anyway the peaks are much too flat to allow accurate adjustment. However, it is a comparatively simple matter to fit the necessary tuned circuits and switch so that the discriminator stage can be changed to become either type.



Proposed modifications for the Terminal Unit Type FSR.1.1X, the full circuit of which was given on p.89 of the April issue of "Short Wave Magazine." As explained in the text, this is a matter of discrimination or frequency shift. Values here are for resonance at 2125 and 2975 c/s, near enough. The reason for resistor Ra is explained in the article, which also discusses the method of adjustment for an 850 c/s shift.

The circuit above shows the relevant part of the original diagram with the added modifications. Reference should be made to the AP.66862 circuit on page 89 of the April, 1963, issue. (Note that an earth connection was omitted from one anode (pin 3) of V4, the discriminator stage; a further connection between the cathodes of V4 (pins 4 and 8) and the junction of Cx and L1 should also be shown.) To return to the circuit here: The original components are numbered according to the April circuit and values are given only for the few additional ones required. Two 88 mH toroids are used for L2 and L3; each is tuned by the appropriate value of capacitor to resonate one at 2125 and the other at 2975 c/s. The values given are substantially correct for these two freqs., but obviously, the actual frequencies should be checked with the aid of a good AF signal generator. Due to the different L/C ratios of the two tuned circuits, the higher-freq. one produces a somewhat greater output from the discriminator than does the lower. At the cost of very slightly degrading the selectivity of this particular tuned circuit, a resistor Ra is shunted across it. In addition, the output voltage from the Travis circuit is higher than that of the linear circuit and can drive the centre zero milliammeter M2 to full scale deflection even though the preceding limiter stages are functioning correctly. To obviate this a further pole on the discriminator switch brings another resistor Rb into circuit. This also maintains the correct input voltage to the following keyer stages.

The original input level control of this unit (RV1) is rarely used since it is merely a duplication of the Rx audio gain control and in practice it is usually set at maximum and the input level to the unit adjusted at the receiver. It can therefore be removed from the front panel of the unit and the discriminator switch mounted in its place. There is ample room immediately behind the panel at this point to mount both tuned circuits and also accommodate the

relegated gain control with its terminals and spindle suitably taped up to prevent short circuits. Alternatively, the potentiometer can be removed from circuit and replaced by a fixed 1,000 ohm resistor—in which case the connection originally made to the slider of the potentiometer should be reconnected to the top of R2. The extra wiring involved in this modification should be carried out with screened cable.

Adjustment

The method of adjustment for 850 c/s shift is quite straightforward: With the discriminator switch in the Travis discriminator position and the receiver BFO on, the Tx is switched to "net." The receiver is then tuned until maximum deflection is shown on M2 (whether this is max. right-hand or left-hand deflection will depend upon which side of the IF passband the BFO is positioned). The T/P transmitting contacts are then manually moved over to the "space" connection and the Tx shift adjustment set for maximum meter deflection in the opposite direction.

The Travis discriminator will produce perfectly good copy when used in place of the linear circuit of this T.U., but it is very doubtful if it does produce any better copy and it has the disadvantage that it requires much more accurate tuning. It is therefore suggested that the linear circuit should be used for normal working and the other for shift adjustment.

The ZA39384/ZA39385 Units

SWL G. Harmer (Wolverhampton) asks for some information on the second type of Terminal Unit that has been mentioned in these columns as being available from surplus shops. He suggests that a short description and a photograph would be of real use to those who are interested in getting hold of such gear. At the time of writing the last "RTTY Topics" these particular units had only just become

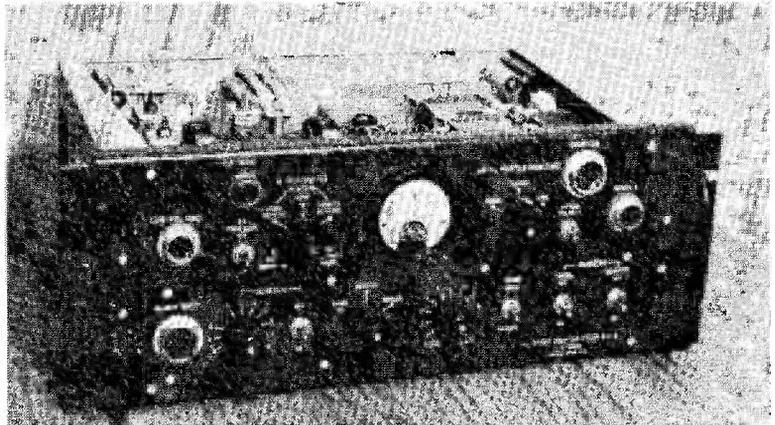
available and though mention was made of "One of two types of T.U. available on the surplus market" there was little time in which to obtain pictures. The photographs show both types of unit, one being the FSR.1.1X or AP.66862 which has now been fully described, and that here is of the recently released ex-Army unit, which has an associated power supply. Very few of the actual power units have as yet become available. The official Army title of the Terminal Unit is: "Receiver Adaptor Field C.F.S. (Carrier Frequency Shift) ZA39384." That of the power supply is: "Supply Unit DC AC No. 3, ZA39385." Both units have standard 19 in. rack mounting panels $7\frac{1}{2}$ in. high,

and their front panels are treated with a blue hammer finish. The T.U. (or converter) is of the IF variety, in which the discrimination between "mark" and "space" is carried out at an intermediate frequency. This particular unit was designed to accept an IF input in the range 440 to 470 kc and was generally intended to be used with either a R.206 or an AR88 receiver. The circuit employs a total of 19 miniature valves, five of which are stabilizers. It is able to accept carrier shifts of up to 1 kc, although 850 c/s is the design centre frequency. Another feature of this unit is its ability to compensate for receiver or transmitter drift up to a maximum of 3 kc. This is achieved by DC feedback, which corrects for the distortion caused by drift, and not by the more usual means of AFC. Indication of drift (or tuning accuracy) is provided by a panel mounted meter *via* suitable meter switching. Apart from being a converter this unit is also a switching unit between remote and local T/P's and between transmitter and receiver. The unit contains two Carpenter type polar relays, one for T/P loop operation and the other for transmitter keying from the T/P keyboard. There are also two other relays used for switching purposes and two barretters for stabilizing the T/P loop current.

The companion power supply unit ZA39385 operates from a very wide range of AC voltages and also from 27v. DC. It gives stabilized HT, heater supplies and also 160v. AC centre-tapped, which is rectified in the T.U. to provide the usual 80-0-80v. loop supply.

Obviously a great deal more could be written about these units and perhaps this can be done at some future date. Meanwhile, this brief description and the photograph should give some idea of their appearance and potentialities.

During a recent SSB QSO on 80m. a complaint was made to the writer that unless a newcomer was already able to print RTTY (and therefore already



The ex-Army T.U., now becoming available on the surplus market, and recognisable under the mark "Receiver Adaptor C.F.S. ZA.39384." Its scope and possibilities for amateur T/P working are discussed in the text.

fairly well versed in the subject) it was impossible for him to pick up any information about radio T/P working in the way that AM stations could learn by listening to or even joining in SSB QSO's. This would be quite true, of course, *if* RTTY stations used nothing else for their on-the-air activities. In fact, however, all RTTY stations run at least one other mode of communication (CW) and most have A3 or A3a as well. So, for the benefit of anyone who is interested in RTTY and may have some questions, here are the calls of active RTTY stations which also operate phone on 80m.: G2UK, G2DSF, G2HIO, G3BXI, G3CQE, G3FHL, G3HVB, G3NAE, G3PEU, G6CW and PAØFB. No guarantees are given, of course—but there's no record of any of them ever having bitten anyone who asked them questions about RTTY! 73 de G3CQE, BCNU.

"STOP PRESS"

May 23: Death announced, suddenly, of S. E. Vanstone, G2AYC, Feltham, Sy. President of Sutton & Cheam club for many years, and well known in London radio amateur circles.

May 26: Good attendance in glorious weather at Cheltenham Mobile Rally (about 200 people and 75 cars); and at Hunstanton Party (over 200, with nearly 50 /M's present). Extended reports on both events in July "Mobile Scene."

June 15/16: Reference notice p.190, now confirmed that Cornish Rally will take place; at Sailors' Institute, Penzance promenade, with exhibition opening 2.0 p.m., Saturday 15th. Programme and details from G3OJY (QTHR).

VHF BANDS

A. J. DEVON

AS this went down, there were signs of an uplift in conditions after rather a long period of variable weather, which gave only occasional openings on the VHF bands. The general level of activity has remained fairly high, with a great many new stations appearing, and working to get a foot on the various ladders. Nowadays, especially in the southern part of the country, it is relatively easy to make the qualifying scores; the people who are in difficulty about finding new ones are those near the top of the tables—they need good openings in order to make progress.

Not that this business of "ladder'ing" is the be-all and end-all of VHF operation—but the fact does remain that our ladders have always been not only a yard-stick of progress, individually and collectively, but they have introduced that slight competitive element which helps to make the whole business of QSO'ing more interesting. Your A.J.D. is well aware that there are many VHF types, with great experience on the bands, who aver that they "don't go in for that sort of thing"—but almost without exception they *did* go in for it when they started on the VHF air themselves! A.J.D. has been long enough in the chair to have seen many callsigns come and go,

and many changes take place, and odd things happen in the pattern of VHF operating.

Going back to the beginning of the current period, the contest on May 5 produced the expected level of activity; this event, the R.S.G.B. Portable, has become a phone-station scramble, in that few of the /P's even think of working CW (there are some notable exceptions); signal levels over a wide area are high by reason of location; and in some areas the QRM is pretty terrific. If two or three portables settle themselves within sight of the same hill-top, the result cannot fail to be a high degree of mutual interference, irrespective of beam heading. However, it's all good fun, and most of the /P crews, while hoping to make a creditable score, are out mainly to enjoy themselves. For this, one important factor is, of course, the weather. On May 5, it was variable and cloudy, with some sunshine at times, not too warm, and the glass was on the low side. Conditions were not good, and any GDY worked depended purely on the location factor. Some of the scores noted, in terms of stations worked, were: G3PIA/P with 120S; G3GWB, 107S; G3EVV/P, 105S at 40 mins. to go before the deadline; and G3MAR/P finishing with 91S. G3KMT/P, putting out a very good signal from near Ludlow in Shrops., had 70S in the bag by 1555; G3EFX/P had made it 73S by 1745, and G3COJ/P 58S by 1735.

The rate of scoring was not as high as on some previous occasions, but livened up towards the end when, as usual, a number of fixed stations came on to give the portables a point.

On May 18, the London VHF/UHF Convention again turned out a very successful affair, the total attendance being 173, from all parts of the U.K. The lecture programme, which filled the afternoon, was followed with close attention, a wide range of VHF subjects being covered. There was a good display of amateur and commercial VHF equipment, and the first prize for home-

constructed gear went to G3NUV, for his two-metre transceiver. This year, the judges very properly decided that the entries by "professional amateurs," *i.e.* those engaged in the industry with access to commercial laboratory facilities, would be given secondary consideration. Though this meant that a particularly fine piece of amateur equipment, displaying outstanding design and constructional know-how, gained only a third prize, we feel sure that G3HBW agreed with the decision—anyway, he accepted it with his usual equanimity. The second prize was awarded to G3PBV, showing for the first time at this exhibition, for some well-constructed VHF gear. There were other interesting exhibits, by G2AIH (4-metre Tx); by G3LBA (2m. all-mode exciter unit); and by G3LTF, with large photographs of his new 15 ft. paraboloid for 70 cm.

Dinner places were taken by 108 people, and the speakers included Ed. Tilton, W1HDQ, who contributes the VHF feature to the ARRL's *QST*. A "professional amateur" of great experience, who has done much to further the



GW3KYT, of Rhos-on-Sea, set up /P at Llangollen. He spends all his spare time on two metres, and as the home-QTH site is very poor for VHF, GW3KYT is out /P, /M most week-ends and is liable to "pop up from odd places anywhere in Wales."

VHF art in the U.S.A., he has a modest and most agreeable personality, and made a very good impression as the official representative of the ARRL at the convention.

As always, the proceedings terminated with a prize draw followed by convivial gatherings

TWO METRES
COUNTRIES WORKED SINCE
SEPTEMBER 1, 1962

Starting Figure, 14
From Home QTH Only

Worked	Station
64	G3BA
61	G3BOC
57	G3EDD
53	EI2A
51	EI2W
50	G3CO
49	G3OXD/A
48	G3BNL
47	G3HRH
45	G4LU
44	G2BJY, G3PLS
40	G3JYP, G3PBV
39	G3JXN
37	G2AXI
36	G3NUE, G3PSL
35	G2BHN, G3FLJ
34	G3OJY
33	G3JWQ
32	G3DVQ, G3PTM
29	G3CKQ, G5QA
27	G2DHV/P
26	G3NOH, G5UM
25	G3GSO
24	G3BJR, G8VN
22	G3LQR, G3PTO
21	G3GVV
20	G3CCA, G3GWL, G3JHM/A, G3NPF, G3PKT
18	G13ONF
14	G2CDX, GW3ATM

This annual Counties Worked Table will close on August 31, 1963. New claims can be made at any time in the period from now to end-June 1963. After June 30, only amended scores from those already standing in the Table at that date will be accepted.

round the bar until it was time to catch the last train home.

Over the following two days, May 19-20, W1HDQ was entertained in Cheshire by the North-West VHF Group, who took him round the countryside, with visits to local two-metre stations and a demonstration of /M working; to Jodrell Bank, where the party was shown over by G3AKX, a member of the staff; and, on the Sunday evening, he was entertained to dinner by G3AOS, G3BA, G3EGK, G3KCB, G3LEE and G3MAX. Others who met W1HDQ or accompanied him at various times on this quick visit were G2HCJ and G8SB.

Turning now to the DX-pedition front, we find many interesting plans in prospect. First of all, Arnold is taking G3HBW/P to the top of Worcester Beacon—a superb VHF site, about 1,400 ft. a.s.l. and in the clear in all directions—for 23-cm. tests on June 23; he will also be on 70 cm. and two metres, using these bands as link channels; his UHF spots will be 1297·467 mc and 432·489 mc, with alternative frequencies 1297·935 and 434·70 mc. On the 23 cm. band, high-performance gear will be used, with 3 watts RF output into a large corner-reflector. CW or phone as required will be possible on all three bands, operation will be all day on Sunday, June 23, 10.0 a.m. till dark, and schedules for 23-cm. working, straight or cross-band, are invited (*QTHR*). Since this is essentially a UHF test, Arnold will naturally not have time for straight QSO's on two metres with those who simply want Worcs. for a new county. If the weather is reasonable—and it needs to be for working to be practicable from such an exposed site—the results on the 23/70 cm. bands should be extremely interesting. Arnold says that the only thing that could deter him would be “absolutely appalling weather.”

Back on to two metres: The City & Guilds boys will be taking GB2GC to Sark over August 9-11; to Alderney August 13-15; and to Jersey for August 17-21. Operation will be in the GC zone frequency

area, and the party will consist of G3OUF, G3PCL, G3PCR, G3PSH and G3ROP, with G3OUF (80 Argyle Road, London, W.13) as contact man for schedules and QSL's. As they will also be working the HF bands, these chaps are in for a pretty busy time!

Over June 7-14—just about when you will be reading this—G3KXA and G3RMB will be /P in Northumberland and, if conditions and results warrant it, will also take in Roxburgh, Cumberland and Westmorland. The frequency will be 144·65 mc as first choice, to avoid North Midlands QRM for the London area, and as they will be running 60/75w. on AM phone and CW with an 8/8 beam array, they should make themselves heard. The operating schedule is the p.m. of June 8, all day on Sunday 9th, and each evening from 6.30 p.m. for the rest of the week. (G3KXA, *QTHR*).

A note from F9OE (Paris) about an expedition of a different sort: He will be at Brest, Finisterre, throughout July and, on 145·27 or 145·35 mc, hopes to be able to work into the U.K. He should have no difficulty in getting contacts with the numerous G's along the South Coast and down in the South-West, as the path is almost entirely over water.

Now a look at the 4-metre band, on which things certainly are brightening up. First of all, EI2W/GW3MDY made it on May 12, this being Harry's 22nd “First” for Eire on the VHF bands. And, of course, GW3MDY clocks up a “First,” too. EI2W, who also worked G5JU (Birmingham) and several other G's during that same session, is on 70·296 mc; Harry says he hopes to take a large part in VHF activity this year, on all bands 70 cm to 70 mc.

G3JHM (Farington, Hants.) who has a /A location at Washington, Sx. is now up to 90 stations worked on 4m., with another 20S heard; there is a large and active 4-metre group in the area and, for the record, the following are now *mobile* on their net freq. of 70·26 mc: G3GFN,

G3GVM, G3IDX, G3JHM, G3LYH, G3ORR, G3PUR, G3RDT and G5QS. This is interesting news indeed, for if the 10-metre band is good for /M working, four metres is better still.

The counties-worked table for 70 mc shows G3EHY still well in the lead with 30C, the additional one for Louis being G3RPE, Herts. Looking north, we find G3IUD (Wilmslow, Ches.) making good progress on the band; he runs 48w. input with an 815 in the PA on 70·215 mc, his Rx is a CC converter with a g.g. RF stage, and the beam is a 4-ele flat-top hoisted to 30 ft. In other words, he is properly equipped for the operation, the result being 16C worked, including EI2W. G3IUD is there every Sunday morning and says that if many of the weak carriers he hears could be resolved as CW, a lot more stations would be worked.

From London, S.E.20, G3OJE is running 20w. to a 6146, with a bi-square ant. which, he says, seems to work better the wrong way round! To get out of QRM, G3OJE can go to 70·38 mc. G3OHH is regularly active from Macclesfield, Ches. and is now at 20C worked.

G3BJR (Harrow Weald, Middx.) started on 4 metres in December, and so far has raised 34 stations in 9 counties; he has a cubical Quad for this band and, though he can hear G3EHY at Banwell in Somerset, no contact has yet resulted.

Coming to the two-metre clip, G3PLS (Birmingham) can claim 44C for the Annual; he is a strong protagonist for that phone mode known as "sideways," *i.e.* NBFM, for which his CR-100 has been modified to include a properly designed NBFM IF strip; this is so effective on "sideways" as to suggest that there should be many more FM-phone signals on the two-metre air, especially as it permits the use of QRO telephony without fear of TVI in any situation where a steady carrier does not already cause TV interference. (In most cases of TVI, the trouble is due to the amplitude variation

of the radiated signal; the only communication mode in which strong amplitude variations do not occur is NBFM). G3PLS runs 100w. input.

For the field-day contest on May 5, G4LU went out as GW4LU/P on Long Mountain, Mont. and worked 102 stations—no mean achievement, as his was an entirely solo effort; just Stan and his gear. The GDX was disappointing, the best of the portables worked being G3GWB/P (I.o.W.) and G5ZT/P (Devon). G3FZL was heard and G3OSS worked from London, but nothing came through from EI, GI or GM. G4LU says the local /P QRM had to be heard to be believed. However, he raised 43 of the portables, and an interesting contact was with G3LYG/M near Bradford, at 92 miles.

G3PSL (Loughborough) moves up a couple in Annual Counties and hopes soon to be increasing power from ten to 90 watts. G3BOC at Willaston in the Wirral can claim 7C to bring him up to date in the Annual; he reports some seven stations newly active on Two in the district, and remarks that the stacked clover-leaf array seems to compare for gain with a 5-ele Yagi while having the advantage of omnidirectional radiation. (We will be having a note about this clover-leaf layout in a later issue.)

For many years a consistently active and modestly successful operator on two metres, using low power and indoor beams, G8VN (Leicester) joins issue with G3BA on the subject of the simple start on VHF, as quoted in our last. Having worked 24 different stations in about three weeks, G8VN feels that what Tom says is no encouragement to people to get going on VHF using simple gear. G8VN's own experience shows that this approach can in fact give very satisfying results on two metres—with which, naturally enough, we agree. What G3BA meant, of course, was that people coming on as starters should give the two-metre band a fair trial, whatever the gear they may be using. And to give two metres a fair trial involves two or three

FOUR METRES ALL-TIME COUNTIES WORKED LIST

Starting Figure, 8

From Home QTH Only

Worked	Station
30	G3EHY
26	G3JHM/A
22	G5FK
20	G3NUE, G3OHH, G3PIK
19	G3BNL
18	G5JU
17	G3LZN
16	G3IUD
14	G3OKJ
12	G2OI, G3AYT, G3LQR, G5DS
10	G3OWA, GI3HXV
9	EI2W, G3BJR
8	G3PMJ

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

months' more or less consistent activity, so that the right periods for local working can be found and variations in propagation conditions taken in. Conversely, one of the most disappointing experiences is to come on two metres for the first time when the band is wide open for all sorts of EDX/GDX—and then to find that this is by no means its normal condition, and that in the ordinary way GDX can be hard work. Your A.J.D. could quote at least three instances of operators who, having come on the band during a spell of wide-open conditions and worked several countries (let alone counties) in a matter of 48 hours or so, have never been heard of since. Because their 'prentice effort was so unexpectedly successful, they were too easily discouraged by their subsequent lack of DX results.

G3GVV (Haywards Heath, Sx.) picked up several new counties in the portable contest, and also reports a contact with G2FXR,

for Suffolk, a county rather thinly populated in the VHF sense. G3GVV finds a new 6/6 a noticeable improvement over the old 4/4, and mentions G3SAR (Seven-oaks) as a very active new station putting out an excellent signal from a particularly good location.

G3HRH (Welwyn, Herts.) goes up four in the Annual, and is now on 70 cm., running a QQV03-20A as PA driven by a QQV03-20A tripling, the beam being a slot-fed 8/8, and the Rx an A.2521/GEX66 into a BC-348. In hand is a 4X150 PA stage, and Ray's intention is to improve the two-metre output by putting in a 4CX250B. This will make him even more over-powering where your A.J.D. sits!

TWO METRES COUNTRIES WORKED

Starting Figure, 8

- 20 G3HBW, G3LTF (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OE, OH, OK, ON, OZ, PA, SM, SP)
- 19 G5YV (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OE, OK, ON, OZ, PA, SM, SP)
- 19 G3CCH (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, OE, OH, OK, ON, OZ, PA, SM, SP)
- 18 G6NB (DL, EI, F, G, GC, GD, GI, GM, GW, HB, LA, LX, OK, ON, OZ, PA, SM, SP), ON4BZ
- 17 OK2WCG
- 16 G3GHO, G3KEO, G5MA, G6RH, G6XM, PA0FB
- 15 G2XV, G3AYC, G3BLP, G3FZL, G4MW, GM3EGW
- 14 G2CIW, G2FJR, G2HDZ, G3CO, G3FAN, G3HAZ, G3IOO, G3JWQ, G3KPT, G3WS, G5BD, G6LI, G8OU
- 13 G2HIF, G2HOP, G3BA, G3DKF, G3DMU, G3DVK, G3EHY, G3GPT, G3NNG, G3PBV, G5DS, G6XX, G8VZ
- 12 EI2A, EI2W, F8MX, G3AOS, G3GFD, G3GHI, G3JAM, G3NUE, G3OBD, G3WW, G5CF, G5ML, G8DR, GW2HIY
- 11 G2AJ, G2BJY, G2CZS, G3ABA, G3BDQ, G3BOC, G3GSO, G3HRH, G3IUD, G3JYP, G3JZN, G3KUH, G3LHA, G3OHD, G4RO, G4SA, G5UD, G6XA, OK1VR
- 10 G2AHP, G2AXI, G2FQP, G3BK, G3BNC, G3DLU, G3GSE, G3JHM/A, G3KOF, G3LAR, G3LTN, G3MED, G3OSA, G3RMB, G5MR, G5TN, G8IC, GC2FZC, GW3ATM, GW5MQ
- 9 G2BHN, G2DHV, G2DVG, G2FCL, G3BOC, G3BYY, G3FJJ, G3FUR, G3JLA, G3OXD/A, G4LX, G5UM, G8GP, GC3EBK, G3ONF, GM3DIQ, GW3MFY
- 8 G2DDD, G2XC, G3AEP, G3AGS, G3EKK, G3GBO, G3HCU, G3HWJ, G3JXN, G3KHA, G3PKT, G3MPS, G3OJA, G3PSL, G3VM, G5BM, G5BY, G8SB

An amusing anecdote from G3CKQ (Leicester), who has had a blackbird nesting on the turning motor at the beam-head; she got quite used to it, duly hatched out her brood, fed them and got them on the wing in the ordinary way—all while G3CKQ was swinging the beam to raise four more counties for the Annual. He describes the experience as "peculiar QRM, for me and the blackbird!"

G3JHM (Farlington) has strong views about the proposed changes in the awarding conditions for VHFCC (broached in this space last month). His primary argument is that VHFCC should remain open to all comers and that if any modifications are to be made, they should be in the sense of band discrimination, with a senior award for those who can show 100S worked on three different VHF bands. Well, as far as we are concerned, any changes affecting U.K. stations are still undecided—the award was in any case intended primarily for *Magazine* readers and, having been instituted originally in their interests, we feel it reasonable to insist that foreign claimants should be able to show a fair proportion of U.K. stations worked. And in this context, "fair and reasonable" looks to us like 50% of cards from G countries.

The needles business came into the news again on May 13, when the Americans achieved a successful launch of 400m. copper filaments into a near-Polar orbit to a height of about 2,000 miles. The needles are spreading out to form a continuous band round the earth. They are in effect dipoles, 1.77 cm. long and therefore resonant at about 8,000 mc (according to the *New Scientist*), and the object of the exercise is to use the belt of dipoles as an artificial reflecting layer at this frequency—in fact, transcontinental working has already been achieved between the East and West Coasts of the U.S.A. It is possible, of course, that there will be some random reflection effects at much lower frequencies, though this would depend upon the density of the belt in any

70 CENTIMETRES

COUNTIES WORKED SINCE
SEPTEMBER 1, 1962

Starting Figure 4

From Home QTH Only

Worked	Station
29	G2CIW, G3KPT
25	G3LQR
20	G3AYC, G3EDD
17	G3LHA
14	G3BNL
12	G5QA
9	G3NOH, G5UM
6	G3BIK
4	G3EKP

This Annual Counties Worked Table is reckoned from September 1st, 1962 and will close on August 31st, 1963. All operators who work four or more Counties on the 70-centimetre (430 mc) band are eligible for entry. Counties should be claimed as they accrue, and otherwise the rules are as for the Two-Metre Annual Table.

given area of space; on the quantities and distances involved, however, this would be quite low. In the House of Commons, the Prime Minister has stated quite categorically that the needles project is of considerable importance in the defence context. This it may well be, but like all radio measures, it has a radio counter-measure—in this particular case, the system can be used just as well by "the other side." In fact, it is a fair bet that their boffin-types are busily planning to exploit the possibilities.

Still on the space theme, we might wind up by mentioning that in addition to G2HCG's interest in E-M-E working, we hear that G2HCJ also has ideas and plans in the same direction.

So To Conclude—

Look out for a change in conditions and, whether it materialises or not, let us have all your news, views, comments, criticisms, ideas, claims and suggestions on VHF matters by **June 21**, addressed: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. With you again on July 5, all being well—till then, 73 de A.J.D.

DESIGN FOR A FOUR-METRE BEAM

LAYOUT, DIMENSIONS AND FEEDING

IT is nearly seven years since the 70 mc band (70.2-70.4 mc, 50 watts, all modes) became available for amateur operation—and though activity is now well on the increase, it is not as high as it should be for a band which is just about ideal for local and semi-local working, while yet being capable of giving GDX when conditions open up.

Shown here are the essential design details for a 4-metre 3-element beam, suitable either for direct feed using 300-ohm balanced line (Fig. 2), or by 75-ohm coax through a matching unit (Fig. 3).

Element dimensions and spacing are shown in Fig. 1. The material can be dural tube or (more economical) copperised steel rod of the surplus tank-aerial type. The mounting will depend somewhat on what sort of element material is used. In either case, a simple boom and element-supporting assembly could be put together using 1-in. square straight timber ("one-inch batten") made up into a framework 5ft. 8in. on the longest dimension, with element supports up to about 3ft. long at the ends and in the centre; a piece of 5-ply board at the middle of the framework can carry the vertical support at the point of balance.

A mounting as described here has been found to be perfectly satisfactory in practice—the timber was well treated with a wood preservative and the elements thickly coated with aluminium paint. They are held by Terry clips (obtainable from any good ironmonger or do-it-yourself store), which are themselves mounted on small stand-off insulators screwed to the wooden framework. This type of construction will—and has—stood several years of weathering.

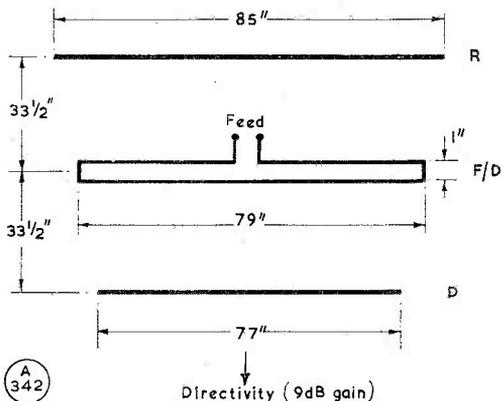


Fig. 1. Layout dimensions for the 70 mc (4-metre) beam, calling for a maximum dimension (boom length) of less than six feet — see text.

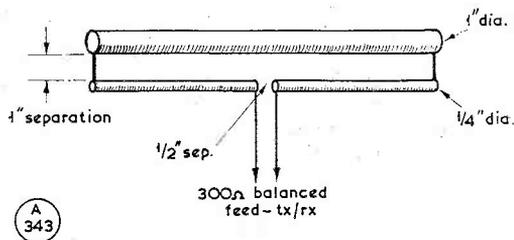


Fig. 2. Folded-section dimensions for balanced 300-ohm feed to the 4-metre beam. Though not shown here, there would need to be some insulating supports to hold the assembly to shape, as only the outside ends of the element sections are connected electrically, to form the folded dipole.

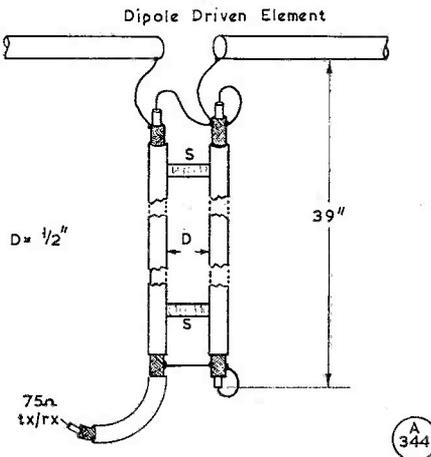


Fig. 3. For those wishing to use 75-ohm coax instead of 300-ohm ribbon feeder, the folded dipole can be made of the same size of rod or tubing all round (to the dimensions of Fig. 1) and balanced feed achieved with the matching section shown in this diagram.

The Feeder Line

Though 300-ohm ribbon looks like the easiest way of getting a balanced feed-line, there are two distinct disadvantages about it: To get the match, the folded-dipole section must be as in Fig. 2, with a 4:1 element-diameter ratio; this is simple enough, but may involve constructional difficulties in some cases. Apart from that, it has been found that 300-ohm ribbon tends to hold a lot of wind, and will whip about savagely in any sort of a blow; this can be minimised by slotting the feeder (cutting out 6-in. sections and leaving a rib of insulating material about 1/4-in. wide at these intervals) and providing cord support-lines to hold the feeder against the wind. This is all quite practicable, and works perfectly well—but feeding by coax is obviously much simpler, and even a long coax feeder will not be as troublesome in wind as the 300-ohm ribbon.

To use coax, a matching section is necessary ("balance-to-unbalance transformer"), the details for which are given in Fig. 3. Because this matching

section will be fully 3ft. long and should be kept at the $\frac{1}{2}$ -in. separation between the two arms, some sort of spacer (S in Fig. 3) must be used to keep the device neat, straight and in parallel. This is quite easily done by "melting" a few pieces of plastic insulant on to the outer covering of the coax; a hot iron is used to get the "melt," or fusion, and the

material can be the insulant stripped from odd pieces of discarded coax.

A 4-metre beam constructed to this general design should show a gain of about 9 dB and hence will give a good account of itself on the 70·2-70·4 mc band—for which, the band being only 200 kc wide, it will not be frequency conscious.

Miscellany

INCIDENTAL INFORMATION, AND ITEMS OF TOPICAL INTEREST

"Well, it's with us at last . . . the hideous spectre has raised its ugly head, and not a few amateurs in VS1-land press the 'transmit' switch in fear and trepidation, lest its operation bring down a swarm of irate viewers about their devoted ears with complaints of—TVI!" (Malayan Amateur Newsletter)

"One small thought.—Any fool can chatter into a microphone, but it is the amount of intelligence that emanates from the loudspeaker that matters."

(VQ4IN, in "QTC," East Africa)

"Ever notice how conventioners just love to twist knobs? They will stroll to a display of new equipment and even though it's not plugged in or connected, will just stand there and twist knobs. To accommodate them, Hammarlund have come up with the 'Dial Twisters' Delight,' a huge piece of gear equipped with large knobs positioned perfectly for twisting. We don't know what the knobs turn, but who cares? It brought in the crowds for the New York SSB Hamfest last month."

(DX Magazine," W4KVV)

To ensure that no four-metre CQ's go unanswered, Johnny McKenzie, GM3JJN, has fitted an auto-alarm to his four-metre receiver. This is a wide-band device which, by means of a sensitive relay, rings a bell if a signal appears *anywhere* on the band.

("GM Magazine")

"Confucius, he say: Self-appointed policeman running kilowatt often make more QRM than lid running 50 watts."

(W8IBX, "DX Magazine")

Weather control is a subject we hear about from time to time, and it is now in the news again with a report prepared by the National Academy of Sciences, an organisation which advises the United States Government. "It (the report) believes that continued development of space technology may provide techniques for local modifications of solar radiation, either by concentrating it or by interfering with its transmission to Earth. Such manipulation could be used not only to modify weather systems in the lower atmosphere but also to control characteristics of the

high atmosphere which influence telecommunications."
(The italics are ours.) (New Scientist")

Interesting technical articles in the May issue of CQ include one on The Design of Yagi Antennas which presents a design method for parasitic arrays producing maximum gain. This article gives an ingenious and lucid explanation of how they work. In the same issue is some useful information on Pentagrid Mixers for SSB Exciters, and also a design for a basically simple but effective Broad-Band Nuvistor Preamplifier.

Heard on the Air (1):—"This QSO brings you a handsome award, which you will get just for working my station. Send only your QSL, no money, no IRC's, and you will receive this award for the wall of your shack."
(EA7, on 14 mc SSB)

Scientists of the Aeronautical Systems Division of the U.S.A.F. are investigating a possible method of servicing radio gear by exploring heat loss and temperature distribution within units. Any abnormality in heat distribution could obviously be a guide towards a component failure, but the methods of "probing" or "scanning" equipment for this effect will obviously be out of the reach of the amateur. (Except, possibly, Old Fred, who knows that his 813 is running too hot when the paint on the outside of the cabinet starts to blister.)

"Marconi used it to cross the Atlantic sixty years ago; Old Timers have kept it going ever since; regular transmissions by GM3HBY are by it twice a week; some listeners and others take advantage of it; everyone must have it in order to get a licence; copy can be taken by it where modern modes fail. SSB and RTTY included; it overcomes language difficulties and ancient script like Arabic and Greek; don't think it's easy, but don't be put off. . . Ever tried it?"
(GM3HBY, in "GM Magazine")

Heard on the Air (2):—"Conditions that afternoon were so terrible that WWV was sending 'Help!'"
(G3 . . on 3.8 mc phone)

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.

DL2AI, Sgt. E. Bright (*G3OYS*), Raabestr. 40, Paderborn, Germany.

G3PST, P. J. Finch, 176 Kingston Road, Taunton, Somerset.

GM3RHK, C. Forret, 4 Hayfield Lane, Lerwick, Shetland.

G3RRM, J. Hughes, 41 Highfield Avenue, Great Sankey, Warrington, Lancs. (*Tel.: Penketh 2315*).

G3RRT, M. S. Dixon, Westover, Boundary Road, Farnborough, Hants.

G3RSV, R. H. Dowsett, (*ex-VS1HD*), 3 Park Street, Mansfield Woodhouse, Mansfield, Notts.

G3RTI, E. Hall, 47 Selmeston Road, Eastbourne, Sussex. (*Tel.: Eastbourne 51870*).

G3RUD, E. Workman, 121 Norton Road, Coleshill, nr. Birmingham.

G3RVB, N. G. Turner, 67 Pine Hill, Epsom, Surrey.

G3RVI, J. M. Walch, 55 Plumtre Way, Eastwood, Nottingham.

G3RWD, R. P. Dugher, 17 Stephens Walk, Brayton, nr. Selby, Yorkshire.

G3RWP, D. M. Bell, 12 Melbury Road, Woodthorpe, Nottingham.

G3RWQ, C. E. Bray, 98 Barbourne Road, Worcester, Worcs.

G3RWR, M. Cox, 3 Regina Drive, Walsall, Staffs.

G3RXC, E. E. Westmore, 10 Alvington Road, Carisbrooke, Isle of Wight.

G3RXI, E. C. Blundell, The Cottage, Knockbridge Farm, Icklesham, Sussex.

G3RXQ, S. J. Baker, 91 Gainsborough Road, New Malden, Surrey.

GM3RXT, 1138 (Ardrossan) Squadron, A.T.C., The Academy, Sorbie Road, Ardrossan, Ayrshire.

G3RXY, M. W. Meredith, 16 Gallwey Avenue, Birchington, Kent. (*Tel.: Thanet 41831*).

G3RYF, A. W. Rix, 17 Forest Drive East, Leytonstone, London, E.11.

G3RYL, A. Waugh, 15 North Grove, Blandford Camp, Blandford Forum, Dorset.

G3RYM, T. J. Money, 71 Aylesbury Road, Bierton, Aylesbury, Bucks. (*Tel.: Aylesbury 2620*).

G3RYN, M. S. Barratt, 13 The Broadway, Manor Road, Oadby, Leicester.

G3RYP, D. R. Craggs, 19 Dyers Close, West Buckland, Wellington, Somerset.

G3RYT, J. Knight, 45 Wearish Lane, Westhoughton, nr. Bolton, Lancs.

G3RYV, P. R. Cox, 9 Byrneside, Hildenborough, nr. Tonbridge, Kent. (*Tel.: Hildenborough 2553*).

G3RYZ, M. G. Byrne, 13 Bickham Road, St. Budeaux, Plymouth, Devon.

G3RZB, E. J. Matthews, 23 Oaklands Drive, Upperby, Carlisle, Cumberland. (*Tel.: Carlisle 22505*).

G3RZG, M. S. Box, 9 Connaught Road, Weymouth, Dorset.

G3RZH, K. J. Roberts, 3 Denbigh Street, Salford 6, Lancs.

G3RZK, E. A. Walling, 29 Windmill Hill, Ruislip, Middlesex.

GM3RZM, M. F. McDonald, 25 Doune Crescent, Newton Mearns, Glasgow.

G3RZP, P. Chadwick, 25 Raines Avenue, Worksop, Notts.

G3RZU, P. W. Kirby, 30 Begonia Avenue, Rainham, Gillingham, Kent.

G3RZV, A. A. Lawrance, 36 Redcliffe Gardens, Ilford, Essex.

G3SAB, J. H. R. Paddon, 67 Norfolk Road, Ponders End, Enfield, Middlesex (*Tel.: HOW 3931*).

G3SAR, R. M. Warner, Little Foxes, Bailey's Hill, nr. Sevenoaks, Kent.

G3SAT, M. A. Trickett, 15 Eger-ton Road, Bembridge, Isle of Wight.

CHANGE OF ADDRESS

G3HCL, D. E. C. Lockyer, c/o Officers' Mess, R.A.F. Station, Northwood, Middlesex.

GM3ITE, R. Costford, 22 Haldane Place, East Kilbride, Lanarkshire.

G3JYB, C. Teale, Kiln Cottage, Talland Bay, Looe, Cornwall.

G3KCD, P. Bedwell, 135 Gainsborough Road, Crewe, Cheshire.

G3KOJ, R. J. Ezra (*ex-ZBIPP/VSIFF/ZC5FF*), 1 Eastney Street, Eastney, Southsea, Hants. (*Re-issue.*)

G3MZS, R. K. Flaherty, 45 Western Park Avenue, Shelton-Lock, Derby.

G3NFZ, A. M. Parks, 30 St. George's Drive, Prittwell, Essex.

GM3NHQ, T. Harrison, 6 Busby Place, Kilwinning, Ayrshire.

G3ODT, S. Kirkbride, 24 Old Skipton Road, Foulridge, nr. Colne, Lancs.

GM3OOI, D. S. L. Yeo, 9 Westhall Gardens, Edinburgh, 10.

G3ORB, S. S. Bosley, 67 Holly Avenue, New Haw, nr. Weybridge, Surrey.

G3PXX/T, J. J. M. Phillips, 52 Allans Meadow, Neston, Wirral, Cheshire.

G3PYP, G. F. Hibberd, 13 Forest Road, Melksham, Wilts.

GM3RIJ, Ariel Radio Group (Westerglen), 109 High Street, Falkirk, Stirlingshire.

G3RJB, B. R. Edwards, 5 Powys Walk, Newton Farm, Hereford.

G4MJ, H. K. Basterfield, 1 Manor Abbey Road, Halesowen, Birmingham.

G5KM, H. H. Eyre, 9-A Woodstock Road, Barnsley, Yorkshire.

AMENDMENT

G3RSR, The Midland Radio Contest Club, c/o R. H. Jennings, 12 Dark Lane, Hollywood, Worcs.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for July Issue: June 14)

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

IT seems from this month's letters that one or two clubs are not going at all well. The cause is the old trouble—apathy and the ensuing stagnation. The first sign of impending doom is always the same—poor attendance at meetings. And the lack of interest shown by one section of the membership seems to become infectious.

The chairman of one such Club addressed a few straight remarks to members on this subject, and the secretary followed them up in the newsletter as follows: "Your scribe feels that the above remarks should not have been necessary in an active club. Said scribe therefore concludes that this is *not* an active club. This is borne out by a marked lack of attendance at meetings, and an indifference to club activities . . . this is primarily caused by the work being carried out by the same persons every time. If you are not prepared to exert either mental or physical effort on behalf of the club, why did you join? Seriously, I want to know. Write and tell me (if the cap fits). One good reason—"For help in passing R.A.E." So what then? Will you leave? Remember—Stagnation causes Disintegration. This applies equally to clubs and pond-weed."

This is quoted in full, as a warning to others who feel themselves on the slippery downhill path. Most clubs have to be run by a hard core of willing types; once they lose their enthusiasm for shouldering everyone else's burdens, things begin to happen—or rather, stop happening. Think about *your* Club now, and answer this question: "If all the officers and the committee were to resign, next week, would there be anyone willing to take over their jobs and run the club? Or would it just stop being there?"

And with that thought we leave you and pass on to the Activity Reports.

No lack of support for **Cornish**, who report a well-attended meeting at Camborne on May 2. Various subjects were discussed, and the rules of the Cornish Award were amended to include SWL's and amateurs resident in Cornwall; a film show by G3EHT concluded the meeting. The next one will also be at Camborne (S.W.E.B. Club Room).

Constructional activity is one of the strong points these days at **Crawley**, and some of it will be on show at the Members' Evening this month. The "two-metre gang" expect to attend a number of Mobile Rallies, and a fresh crop of call-signs is awaited (hopefully) after the R.A.E.

An activity that is at present peculiar to **Dorking**

is the idea of meeting informally at various points during the summer. On June 11 the *venue* is The Wheatsheaf, Dorking (8 p.m.); on June 25 it will be The Barley Mow, West Horsley; July 9, back to The Wheatsheaf; and on July 23, The Black Horse, Gomshall. It may *look* like a pub crawl, but these are pleasant hosterries, and visitors will always be welcome. The Club call, G3CZU, has been re-issued, and will be heard later in the year from the Surrey Hills Model Railway and Engineering Exhibition, at Dorking Halls.

A newcomer to these columns is the **East Worcestershire** group, meeting on the second Thursday of the month at the Old People's Centre, Park Street, Redditch. On June 13 the subject will be "The Other Man's Station."

The June meeting of **Flintshire**, on the 24th at The Railway Hotel, Prestatyn, begins, as usual, with Slow Morse (7.30 p.m.). This is followed by "Simple Hints and Kinks" (GW3PCZ/T), and a discussion on arrangement for VHF field days.

Talking of Field Days, **Grafton** announce that their regular annual affair will be held on June 16, on Tumulus Field, Hampstead Heath. They hope to have GB3AFT in action on most of the bands. This event is always much enjoyed by all who take part.

One of the more successful Top Band operators in this country is G3IGW, and he will be describing his 160-metre Tx to **Halifax** at their June meeting; on July 2 their talk will be on "My first six months on the Air," by G3RMQ. These meetings will be at the Beehive and Crosskeys Inn, but negotiations are under way for a new headquarters. Laboratory facilities are already available at Halifax Technical College. In May, the Club had a particularly interesting and informative talk, by G3LHQ, on Mobile Working.

Luton College of Technology has recently obtained some SSB equipment, and it is hoped to form a small radio club as one of the College activities. Anyone who would be interested, or prepared to help, is asked to get in touch with Mr. J. E. Leader, Electrical Engineering Dept., College of Technology, Park Square, Luton.

Recent doings at **Northern Heights** have included a talk on Radio Astronomy (by Mr. L. Dougherty of the Halifax Technical College), a Junk Sale, an "Any Questions?" night, and a visit to Emley Moor TV station. On June 15 G3MDW/A will be operating from Halifax Charity Gala, and on June 12 the gear

of the late G2SU will be put up for sale at G3MDW's QTH. July 3 is booked for a visit to the C.E.G.B. Power Station at Elland.

K.W. Electronics equipment will be described and demonstrated by G8KW at Reading, on June 29 (at the Palmer Hall, West Street, 7.15 p.m.). On July 27 the club's chairman, G5TP, will be talking on Safety in the Shack, and it is hoped to arrange a demonstration of artificial respiration.

South Yorkshire have changed over from weekly formal meetings to an alternation of formal meetings with constructional or operational evenings. They will all be held at the Lord Nelson, Cleveland Street, Doncaster, at 8 p.m., and it is hoped to precede them with Morse practice. A 14 mc phone transmitter is being built, and six members who sat for R.A.E. in May are all hoping for good news.

Stourbridge will be taking part in an exhibition at the Town Hall on June 15, 2 p.m. to 9 p.m., and on the same Saturday a working station will be set up in Mary Steven's Park. It is also hoped to have a station in the playing fields of the junior school at Wollaston, near Stourbridge, on July 6, and this coincides with a two-metre field day—so the Club is pretty busy these days. No regular meeting in June, but on July 2 there will be a talk on Mobile Work by G3BMN.

News from the Newsletters

Reciprocal licensing difficulties were surmounted, as far as PA and ON were concerned, at the Mobile

Rally at Verviers . . . but some straight talk on the subject is still necessary, and some is to be found in the April issue of *Mobile News (A.R.M.S.)*.

The recent Clifton/Crystal Palace Quiz was won by Crystal Palace by a narrowish margin (279 to 258). This event is eagerly looked forward to every year by both Clubs (*Crystal Palace Newsletter*).

Two members have undertaken to produce a Club magazine, and the Committee have accepted and asked them to go ahead with the first issue (*Derby News Letter*).

For the coming Enfield Show (date not yet fixed), the Club are planning a Pedestrian Mobile 2-metre outfit (transistorised) and an experimental modulated light-beam set-up, together with some other novelties (*Lea Valley Reflector, Enfield*).

G3CED has been forced by business commitments to curtail his activities on behalf of the I.H.H.C., whose International Liaison Officer is now J. Coote, 56 Dinsdale Avenue, Kings Estate, Wallsend, Northumberland (*IHHC Newsletter*).

The I.R.T.S. will be taking part in the Royal Dublin Society Scientific Exhibition (October 22-25), which will be followed on the 26th by the Society's annual dinner. "Live" transmitting stations on each band will form the centrepiece of the exhibit (*IRTS News*).

The hon. sec. reported a very successful year (1962-63) with rather more emphasis on other-than-routine events such as the August Bank Holiday Show at Erith; average attendance at meetings was about



Torbay Amateur Radio Society have a number of trophies, awarded annually to members who distinguish themselves either on the air or in the construction of amateur-band apparatus. Here we see, front row, left and centre, G5ZT and Mrs. Jones (Plymouth) who came to present the prizes, with SWL R. Western, who is well known in these pages; and standing behind, SWL's Hunt and Symons, with G3LHJ and G3OUA.

thirty (**North Kent Newsletter**).

Licensed members of the **Radio Amateur Invalid and Bedfast Club** have been made honorary members of a new organisation called the International Handicappers' Net, recently formed in California. One of the activities of the American members is the guarding of emergency frequencies for urgent calls, and one of them, confined to an iron lung, handled Red Cross emergency traffic during Hurricane Carla by keying his transmitter with a kitchen spatula (*Radial*, **RAIBC**).

Although an average of 15 to 20 R.A.E. Certificates are won every year in the Glasgow area, only a small percentage of these seem to turn up on the air. In spite of the fact that Slow Morse is being radiated every week, it seems that some major snag exists, and it is suggested that some "helping-hand" activity is needed. This is being investigated (*GM Magazine*, **Radio Club of Scotland**).

A full description of a transistorised D/F receiver designed and built by C. N. Smart, president of **Slade Radio Society**, is described in full in the April issue of *Contact*, their monthly magazine. It occupies 32 of the magazine's 36 pages.

A "special activity station" was run by **Reigate** at the Exhibition of Leisure Activities, Merstham, on May 10-11, and a new gremlin was encountered in the

shape of a model aircraft which severed one of the aerials! A Junk Sale will be held on June 15, and the normal Club night on July 20 (*Feedback*, **Reigate**).

A Club Car Rally will be run on June 26 by **Surrey (Croydon)**, for which the "obstacles" (sometimes called clues!) are being worked out. On June 11 there will be a talk by a Mullard representative on Recent Developments in Transmitting Valves (*S.R.C.C. Monthly News*).

Club Publications have also been received from **Southgate** (*Newsletter*, May); **South Hants** (*QUA*, May); **W.A.M.R.A.C.** (*Circular Letter*, April and May); **Wolverhampton** (*Newsletter*, May); **Plymouth** (*QUA*, May); **Wirral** (*Newsletter*, Vol. 16, No. 5); **Hastings** (*Natter-Net Notes*, No. 38); and **M.A.R.S.** (*Newsletter*, May).

Other Club News

Harrow held their annual Constructional Contest on May 10, and adjudged G3RAN the winner, with a mobile 160-metre Transceiver. On May 24 they heard G6CJ's lecture on Aerials.

Plymouth, at their AGM, elected G5ZT president, G3LSD and G3BRJ vice-presidents, Mr. E. Fallon chairman and Mr. R. Hooper vice-chairman and secretary.

Eight members of **Torbay** sat for the R.A.E. in

Names and Addresses of Club Secretaries reporting in this issue :

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, W.3.
 A.R.M.S.: N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10.
 BARNET: F. Green, G3GMY, 48 Borough Way, Potters Bar.
 BRADFORD: E. G. Barker, G3OTO, 63 Woodcot Avenue, Baildon, Shipley, Yorks.
 BURNHAM-ON-SEA: D. Birt, G3GIW, 99 Stoddens Road, Burnham-on-Sea, Somerset.
 CAMBRIDGE: H. Lowe, G3PEI, 47 Hurst Park Avenue, Cambridge.
 CHILTERN: H. D. Coltman, G3PVJ, 301 Micklefield Road, High Wycombe.
 CLIFTON: E. Godsmark, G3IWL, 211 Manwood Road, London, S.E.4.
 CORNISH: W. J. Gilbert, 7 Poltair Road, Penryn.
 CRAWLEY: R. G. B. Vaughan, G3FRV, 9 Hawkins Road, Tilgate, Crawley.
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.
 DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
 DORKING: J. Greenwell, G3AEZ, Eastfield, Henfold Hill, Beare Green, Dorking.
 EAST CHEAM: D. C. Griffiths, G3RDQ, 7 Chatsworth Road, East Cheam, Surrey.
 EAST WORCESTERSHIRE: L. Hickingbotham, G3HZG, 95 Oakenshaw Road, Redditch.
 ENFIELD: R. Langston, 54 Poynter Road, Push Hill Park, Enfield.
 FLINTSHIRE: A. Anthley, Fairfield, Fairfield Avenue, Rhyl.
 GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.
 HALIFAX: J. Ingham, G3RMQ, Lambert House, Greetland, Halifax.
 HARROW: A. C. W. Biddell, G3GNM, 114 Kingshill Avenue, Kenton, Middx.
 HASTINGS: W. E. Thompson, G3MQT, 8 Coventry Road, St. Leonards-on-Sea.
 I.H.H.C.: M. Allenden, G3LTZ, 16 Grovefields Avenue, Frimley, Aldershot.
 I.R.T.S.: T. O'Connor, EI9U, 280 Collins Avenue, Whitehall, Dublin.
 LIVERPOOL: H. James, G3MCN, 448 East Prescott Road, Liverpool, 14.
 LOTHIANS: W. T. Sutherland, GM3JWS, 47 Great King Street, Edinburgh, 3.
 M.A.R.S.: C. J. Haycock, G3JDJ, 29A Wellington Road, Handsworth, Birmingham, 20.

MID-WARWICKSHIRE: T. Inkester, 13 Dormer Place, Leamington Spa, Warwickshire.
 MITCHAM: B. Blandford, 1 Biggin Avenue, Mitcham.
 NORFOLK: J. D. Simpson, G3NJQ, 50 Vicarage Road, Norwich.
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.
 NORTH KENT: B. J. Reynolds, G3ONR, 49 Station Road, Crayford.
 PETERBOROUGH: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.
 PLYMOUTH: R. Hooper, 2 Chestnut Road, Peverell, Plymouth.
 R.A.I.B.C.: Mrs. F. E. Woolley, G3LWY, 10 Sturton Road, Saxilby, Lincoln.
 READING: R. G. Nash, G3EJA, 9 Holybrook Road, Reading.
 REIGATE: F. D. Thom, G3NKT, 12 Willow Road, Redhill.
 SCOTLAND: A. Barnes, GM3LTB, 7 South Park Terrace, Glasgow.
 SHEFFIELD: D. A. Justice, G3PYL, 9 Leslie Road, Sheffield, 6.
 SLADE: D. D. S. Williams, 117 The Boulevard, Wylde Green, Sutton Coldfield.
 SOUTHGATE: K. Spicer, G3RPB, 22 Clifton Road, London, N.3.
 SOUTH HANTS: P. A. L. Shoosmith, G3MDH, 7 Fairfield Close, Hythe, Southampton.
 SOUTH YORKS: V. J. Ludlow, G3JLZ, 50 Wellington Road, Lindholme, Hatfield, Doncaster.
 SPEN VALLEY: L. A. Metcalfe, 1A Moorlands Road, Birkenshaw.
 STEVENAGE: V. Cundall, G3FAU, 23 Shackledell, Stevenage.
 STOKE-ON-TRENT: K. H. Parkes, G3EHM, 28 Grove Road, Heron Cross, Stoke-on-Trent.
 STOURBRIDGE: R. A. G. Macintosh, 50 Field Lane, Oldswinford, Stourbridge.
 SURREY (CROYDON): S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon.
 SUTTON & CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
 SUTTON COLDFIELD: K. H. Varney, G3DMV, 149 Whitehouse Common Road, Sutton Coldfield.
 TORBAY: Mrs. G. Western, G3NQD, 118 Salisbury Avenue, Barton, Torquay.
 VERULAM: B. Cockell, 119 Gurney Court Road, St. Albans.
 W.A.M.R.A.C.: Rev. A. Shepherd, G3NGF, 121 Main Street, Asfordby, Melton Mowbray.
 WESSEX: G. J. Fowle, 138 Surrey Road, Branksome, Poole.
 WEST KENT: H. F. Richards, 17 Reynolds Lane, Tunbridge Wells.
 WIRRAL: A. Seed, G3FOO, 31 Withert Avenue, Bebington.
 WOLVERHAMPTON: J. Rickwood, 738 Stafford Road, Fordhouses, Wolverhampton.

May. At their May meeting a tape recording from G3BBF/VS1LV was played to members. The June meeting is fixed for the third Saturday, not the second, as usual; June 15 is therefore the date.

Stoke-on-Trent, at their AGM, elected G3UD president, Mr. E. Fair chairman and G3EHM secretary. They now meet every Thursday and are getting down to improving their premises. Coming talks cover the subjects of Transmission Lines, GDO's, Power Supplies, Modulation Measurements, The Theremin, SSB and "Quiz Time."

Stevenage have changed their meeting-place to the "near-palatial" Senior Scouts' Hq. in Fry Road—Mondays at 8 p.m. They now own the call G3SAD and hope to give it an airing at least once a month from the Club premises.

Sutton & Cheam, at their AGM, elected G2AYC president, G8DF chairman, G2BOF secretary and G3BHR treasurer. They reported a satisfactory year and sound finances.

South Hants will meet on June 22 (7 p.m. in the Engineering Lecture Theatre, Southampton University). A series of slides will be shown, followed by a Junk Sale. This will be the only meeting during June and July, after which normal meetings on the second Saturday will be resumed.

Barnet describe their May 28 meeting as "one of the highlights of the year." On that occasion Angus and Doris Murray-Stone (5N2AMS and 5N2DMS) showed their collection of slides and sound colour films, covering their African travels. The summer programme, up to the AGM on September 24, has now been arranged—details from the secretary.

Clifton are shortly losing their secretary, G3JWL, and G3OGE is "acting" until the AGM in September. Field Days and two-metre events, as well as the popular D/F outings, have all been going strong.

The AGM at **Norfolk** was attended by over 50 members and friends. A film of the Club's indoor and outdoor activities was shown. (The new secretary is Mr. A. Nicholls, but as his address was not given, that of the assistant secretary, G3NJQ, will be found in the panel opposite.)

The Club group at **East Cheam** is unusual in that it was formed specifically to cover VHF activity—they operate G3OSC/P on every possible competitive occasion. Another of their interests is Scout co-operation, not only in the annual Jamboree-on-the-Air, but in connection with other local Scout activities as well. And in reporting, the hon. secretary remarks that though they have two P-E sets for their /P excursions, having no confidence in either of these devilish machines, they always have to take them both along!

From **Burnham-on-Sea** we get a note that they are still very active, with meetings every Tuesday evening and Sunday morning in the club room at The Hall, Berrow Road. The official monthly gathering is at the Crown Hotel, Burnham, on the 2nd Tuesday, that on June 11 being the AGM.

Now having 25 active members, the **Mid-Warwickshire** A.R.S. meets fortnightly (2nd and 4th Mondays) in the Leamington Boys' Club, 1 Avenue Road, Leamington. Visits and applications from

prospective members will always be welcome. An R.A.E. course, with a class of 15, is being run in collaboration with the College of Further Education, for the November sitting, and it is proposed to have a winter course for the May, 1964, R.A.E.

At their recent AGM, **Bradford** R.S. elected G3KEP president, G3ADQ vice-president, G3RAS treasurer, G3NNO p.r.o. and G3OTO to the office of hon. secretary. Meetings and outings are arranged for: June 11 (G3ADQ, Linear Amplifiers); June 25 (Visit to C.E.G.B. Power Station, Bradford); July 9 (G3OGV, Tape Recorder Amplifiers); and July 23 (Visit to Ferranti, Ltd., Oldham). Meetings are at 7.30 p.m. in Cambridge House, 66 Little Horton Lane, Bradford 5, preceded by Morse practice classes.

CLUB NEWS IN BRIEF

Liverpool: June 11—NFD Post-Mortem. June 18—G3NEM. Mobile in Cornwall. June 25—Junk Sale. July 2—Open Meeting.

Lothians: June 13—Constructional Competition. June 27—A.G.M. (YMCA, 14 South St. Andrew Street, Edinburgh 2).

Peterborough: First Friday—7.30 p.m. at Peterborough Technical College.

Spen Valley: June 15—Oscilloscope Patterns. June 27—Open and Final Meeting. July 11—A.G.M. (Grammar School, Heckmondwike).

Wessex: June 10—Quiz, Southampton v. Wessex, and talk on Radio Controlled Boats. July 1—Members' Constructional Contest (Cricketers Arms, Windham Road, Bournemouth).

Wirral: June 19—NFD Inquest. July 3—Lecture on Metals (G3IHH). July 17—Discussion on Aerials.

West Kent: June 14—Two-metre Converters (G2UJ). June 23—Outside Visit. June 28—Modulators (G4IB).

Acton, Brentford and Chiswick: June 23—NFD Inquest (66 High Road, Chiswick, W.4).

Derby: June 12—Visit (to be announced). June 19—Open Evening. June 26—D/F Practice Run No. 3. July 3—Junk Sale (Room 4, 119 Green Lane, Derby).

Chiltern: June 27—Choosing the Right Valve, by A. H. Morser, B.Sc. (British Legion, St. Mary Street, High Wycombe).

Sheffield: June 14—RTTY, by G3LLV. June 28—Ordinary monthly meeting (8 Sandbeck Place, Sheffield 11).

Sutton Coldfield: June 13—Transformers, by G3CNV. June 22—Demonstration at Sutton Carnival. June 27—D/F Night in Sutton Park.

Verulam: June 19—Film Show by G3NCK. July 1-6—Exhibition Station, GB3VER, in operation.

Wolverhampton: June 15—Hobsons' Sports Gala. June 17—Bring-and-Buy Sale.

Wirral: June 19, July 3 and 17—Regular meetings, with Junior Symposium preceding at 6.30 p.m.

NUCLEAR-EXPLOSION EFFECTS ON PROPAGATION

An interesting article by VK7LE in the April issue of the Australian *Amateur Radio* discusses the effects on HF propagation, as observed at Hobart in Tasmania, of the American high-level nuclear explosion over the Pacific last July. With receivers and pen-recorders running on WWVH and several high-power commercial stations in the U.S., Japan, China and Europe, and a number of plots made for comparison purposes for periods of six weeks before the actual explosion, VK7LE is able to show that 5/10 mc signals disappeared completely a few seconds after the explosion, remaining affected for many hours; the 5 mc signal from WWVH reappeared weakly about 70 mins. after the event. His conclusion is that these big high-level explosions do have a marked effect on long-distance HF circuits.

SMALL ADVERTISEMENTS

("SITUATIONS" AND "TRADE")

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TRADE

WANTED: Communications equipment, in good condition, send details. Cash offer by return.—Bernard's Radio, 620 Holderness Road, Hull. (Tel. 71949.)

CASES, chassis, panels. ANYTHING in metal; send your drawings for quote. Stove enamelled, hammertone, or plain, in any colour.—Moss Watson, 40 Mount Pleasant Street, Oldham, Lancs. (Main 9400.)

QSL CARDS AND LOG BOOKS, G.P.O. APPROVED. CHEAPEST, BEST, PROMPT DELIVERY. SAMPLES.—ATKINSON BROS. PRINTERS, LOOE, CORNWALL.

WEBB'S LOG BOOK for recording signals heard and worked; 112 pages 9½ in. x 8 in., approved format, semi-stiff covers. Excellent value; 6s. 0d. post free, or callers, 5s. 4d.—Webb's Radio, 14 Soho Street, London, W.1.

QSL CARDS: Buff, blue, pink, green, 100, 14s. 6d.; 250, 23s.; 500, 40s.; 1,000, 75s.—Samples (s.a.e.): Reilly, Panxworth, Norwich, 56.Z.

CATALOGUE NO. 15. Government Surplus Electrical and Radio equipment. Hundreds of items at bargain prices for the experimenter and research engineer, 2s. 6d. post free; catalogue cost refunded on purchase of 50s.—Arthur Sallis Radio Control Ltd., 93 North Road, Brighton.

READERS' ADVERTISEMENTS

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

FOR SALE: Abbey Tape Recorder, has Collaro transcription deck, piano-type controls, 3 speeds; bass, treble controls, digital counter, in excellent condition, £30 o.n.o.?—P. Perretta, 121 Conway Road, Southgate, London, N.14.

SX-71 HALLICRAFTERS double conversion superhet, MW to 56 mc, general coverage and bandspread, £39. Sonolor French 7-transistor portable superhet, LW-MW- 3 Short-wave bands, 1.7 to 22 mc, £11. BC-221 frequency meter, built-in AC supply, £9. Plessey super power unit, most comprehensive ever made, approximate outputs 1400v. 300 mA twice, 250v. 150 mA, numerous 6.3v. and other LT at amps, -175v. bias, -50v. bias, all circuits separately fused and HT metered; overload trip resets, coloured indicator lamps, thermal delay with operate relays having individual over-ride switches. Attractive cases, cost £150. Gift, first £12 10s. Buyer collects.—BM/CVWK, London, W.C.1.

G2CDN going SSB/M offers his well-known equipment consisting of Elmac Tx and Rx, all bands 10 to 160 metres, also the matching Transistor Power supply for both; cost £195, accept £75 the lot.—Toby, 13 Wood Lane, Isleworth, Middlesex.

MINIMITTER MOBILE WHIP, base section complete with top sections for 160 and 80m. Very good condition, £4.—Apply, G3OGZ, 13 North Park Avenue, Leeds, 8.

SALE: R.107, unmodified and in very good condition, with manual, £10.—White, 11 Rington Avenue, Grt. Carleton, Blackpool, Lancs.

FOR SALE: RCA AR88D Receiver in excellent condition, £50 or offer? R.208 Receiver, also good, with manual, £10 or offer?—Kemp, 1 Trafalgar Road, Clacton, Essex. (Phone: Clacton 53.)

WANTED URGENT: HRO Senior manual, buy or loan.—Price to Harvey, Rocklea, Dunrossness, Shetland.

SALE: HEATHKIT portable transistor Rx RSW-1, works aligned, cost £22, short wave. Also 100-watt No. 1625 Tx, complete with PSU, microphone, key, spare set valves; both can be seen working; bargain, £30 the two.—G4PJ, 8B Fore Street, Salcombe, Devon. (2809.)

EXCHANGE Latest Yashica Lynx, 35 mm., 1:8 lens, cpld. R. Finder, cpld. exp. meter, speeds 1000 sec. Eric, hood, mint value, £45; for AR88D, SX-28, Eddystone 750, 840, or two older bandspread Rx. W.H.Y.?—Steel, 13 Pine Avenue, Blackpool, Lancs.

EDDYSTONE S.640, excellent condition, unmodified, just re-aligned, with Eddystone S-meter, £21 o.n.o.? Carriage extra.—GW4OQ, 10 Clinton Road, Penarth, Glamorgan. (Phone: 57395.)

SALE: G2DAF Rx, built, going FB, Philpott's chassis and cabinet, Electroniques coils, IFs, condensers and switches, Cathodeon crystals, £45.—Box No. 2806, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: LM-14, HRO Senior, 1 mA meter, Minimitter X20 array, Telescopic mast, rotator gear.—Box No. 2807, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

R. 4660, good cond., built-in PSU, 11-103m, M/W. and L/W, pre-selector, magic eye, etc., offers? Improved 38 Tx/Rx, complete range accessories and spares, £4 10s. o.n.o.? Immaculate Grundig Stenorette T.Rec., dust cover, tape, spare spool. Best offer over £35, or will exchange for perfect AR88D. All letters received ans.—H. Brown, 4 Midcroft Ave., Glasgow, S.4.

FOR SALE: Hallicrafters SX-111, as new, £80. RME 69 + DB20 pre-selector, £20. Heathkit V7A valve volt-meter, £9.—A. Parkes, 24 Ardgowan Road, Catford, S.E.6. (Phone HIT 6594 after 7 p.m.)

SALE: K.W. Vanguard Tx, 10-160 metres, with xtal mic, good condition, £30. R.206 Mk. II Rx, with LF adaptor, covers overall 50 kc to 30 mc, power pack, cables, manual, good condition, £25. Heathkit Mohican Rx, manual, factory checked/aligned, new condition, £27. R.107 Rx, up to Army specification, £13. R.1155A modified, working condition, £6; s.a.e. for details, deliver London area or carriage extra. **WANTED:** FL8 type AF Filter.—K. Turffrey, G3DNK, Hazelcroft, Scatterdell Lane, Chipperfield, Kings Langley, Herts.

SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: AR88 Rx in first-class condition, £30, recently checked over. Homebrew Tx 50 watts, Geloso VFO into 807, modulated by 6L6's, containing three separate PSU's with VR150 stab. osc., built in Philpott's cabinet as per Hallicrafters SX-28 cabinet, also complete with Labgear aerial relay and TVI filter by K.W., TVI filter not required here, £25, or £50 the lot. Also 400-volt vibrator PSU, new, with 12-volt input, 15s.—Hurst, 93 Merley Ways, Wimborne, Dorset. (Tel. Wimborne 2920 evening.)

60 WATT 160 to 10 metre Tx and Modulator, fully stabilized separate power supplies, fitted in two cabinets, £30. Prefer buyer collects.—Markland, 29 Runworth Street, Bolton, Lancs.

WHO WANTS a Novice Band? Please write and give your support.—Box No. 2808, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SPRING-CLEANING: Transmitters RCA.4336-H with Geloso VFO, 1·8 to 30 mc, £30. T.1131L complete, £15; buyers collect. 100-watt 1·8 to 30 mc, CW only, £10. Receivers: HRO Senior, 8 coils, 6 BS, power supply, speaker, £22. CR-100, £10. MN-26C AC pack, £4. MW Command Rx, AC pack and 12v. generator, £5. Class-D Wavemeter, £4. RCA Speech Amplifier M1-1120, £5. New valves: 813's, 30s.; 807's, 4s. All plus carriage, s.a.e. for list of other items.—Benson, 10 Westcliffe Terrace, Harrogate, Yorks.

SHORT WAVE MAGAZINES Vol. XVII, Nos. 7, 8, 9. XVIII, No. 7. XIX, Nos. 1, 3, 4, 5, 6, 7, 8, 9, 10, 11. XX, Nos. 1, 2, 3, 4, 6, 7, 8, 9. *RSGB Bulletin* Vol. 36, Nos. 10, 11. Vol. 37, Nos. 1, 2, 3, 4, 6, 7, 8, 9, 10, 12. Vol. 38, Nos. 1-10. Command Rx, 1·5-3 mc, inc. spkr. and 12-volt xformer, £5, inc. p/p.—R. Livermore, Upper Yeomans, Hall Street, Long Melford, Suffolk.

COMMERCIAL 160m. mobile Tx/Rx, 12 in. x 7 in. x 5 in., with PSU and mike, £15. Command Mobile Rig, 160m. Tx, Rx and mod., £14. Transistor PSU, 12v. input, 300v. at 140 mA, £6. Command Rx, 160m. bandspread, £6. Command Tx, Top Band model, brand new, £4. Command Rx, medium-wave, £3. Dynamotor for Command Rx's, 12v. input, £1. Minimitter 160m. whip, £3. All-Wave Signal Generator 110 kc to 75 mc, £2. AVO DC Minor (working but 300 volt range u/s), £1. Receiver Vibrator pack, small, 12v. input, 10s. Rotary Transformer, 12v. to 365v. at 125 mA, 15s.—G3KNB, 8 Oak Avenue, Walton Heights, Stafford.

SALE: K.W. Valiant Tx, mint condition, 160 to 10 metres, nearest £40.—Box No. 2809, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: FSR.1.IX (AP.66862) RTTY Converter, must be in FB condition; also power unit for converter.—Details to Box No. 2810, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

2-METRE R.1392D Receiver, modified to VFO power pack, £10. 5-element beam, £2. 30-ft. sectional mast, £4. Complete, £15. Callers preferred.—Longmire, Overlea, Stanah Road, Thornton, Nr. Blackpool. (Tel. Thornton 2363.)

MUST SELL BY JUNE: Minimitter Rx MR44/11, used only month, first offer, £30-35.—P. Mitchell, 167 Nightingale Lane, Hornsey, N.8.

MINIMITTER TRANSMITTER, £35. Delivery and/or H.P. possible; 50 miles.—K. F. Moss, 9 Fairview Road, Timperley, Althrincham.

MINIMITTER MOBILE CONVERTER, Hallicrafters SX-24, Heathkit Mohican, Bendix RA1B and R.1155A receivers all going very cheap at youngsters' prices.—Drop a line to "Bill," Crazierhurst, Kemble, Cirencester, Glos.

SALE: Radiovision Command Rx, double superhet, general coverage and separate coils for 80-10 metres, £20.—Box No. 2811, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Complete 2m. mobile rig. Mohican Receiver, £27 10s. Tiger Transistor 2m. converter, £6. Falcon 2m. mobile Tx, 12v. PSU, £30 o.n.o.? Can be seen in London.—G3OYW, The Vicarage, Lostwithiel, Cornwall.

HRO-5T, 540 kc-30 mc, metal valves, new 1962, no mods., in crate with handbook, PSU, going abroad; quick sale, £18, prefer buyer collects.—Pearson, 34 Landguard Road, Southampton, Hants.

AR88D FOR SALE, mint condition with manual, no mods., £35 o.n.o.? Buyer collects.—Farrell, 65 Harrowside, Blackpool, Lancs. (Phone 41840.)

BEGINNER seeks BC-221 frequency meter with charts, working order, looks not important.—Hakess, 2 Afton Avenue, Prestwick, Ayrshire.

WANTED: Good-class Communications Receiver, also commercial Transmitter, 160-10, or/and 160 metres. **SALE:** Class-D Mark II Wavemeter, mains and 12v. DC, as new, £5. Signal generator, 120 kc-84 mc, RF/AF output meter, £3 10s. Delivered London. (Speedwell (London) 8831.)

FOR SALE: LM-14 Frequency Meter, mint condition, correct calibration charts, £10 o.n.o.?—G3FYR, Top Flat, 31 Sandford Road, Bromley, Kent.

SALE: CR-100, good condition; 358X modified 6AM6 RF, 6V6 AF, S-meter, 9 coils, good condition, each £9 10s. 58 Mk.I, no Rx valves, 45s. All carriage extra.—Box No. 2812, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

MINIMITTER 44/II, unused, in maker's sealed carton. Full guarantee, real bargain, £58.—G3HSC, 45 Green Lane, Purley, Surrey. (UPLands 2896.)

WANTED: S.750 Rx, rough AR88D. Also a QRO Phone/CW Tx, prefer enclosed rack rig. **WANTED:** G2DAF Tx, Rx; would consider part built.—Box No. 2813, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TIGER 2-METRE Tx, almost new, 100 watts input, QQV06-40 PA, Cathodeon crystal, £65 or nearest secures.—G3GHZ, 52 Queens Road, Accrington, Lancs.

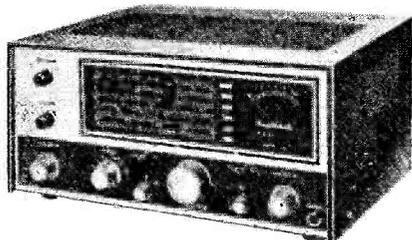
G3RKH, going VHF, offers Panda Cub, £26 plus carriage. **WANTED:** Bug-Key. Letters only, please.—John Marshall, Worcester College, Oxford.

MINIMITTER Amateur Band converter, IF 1·5 mc, 6 months' old, as new, £13 o.n.o.? Carriage paid.—R. Rylatt, Harringworth, Elm Grove, St. Peter Port, Guernsey, Channel Islands.

WANTED: Airmec Receiver C.864, good condition.—G. L. Eastell, 136 Arkwrights, Harlow, Essex. (Tel. Daytime Harlow 24212; Evening Harlow 24811.)

RTTY Sale: Creed Type 3X teleprinter with FSR.1.IX frequency shift converter (see April *Short Wave Magazine*) with PSU, £20, offers?—Box No. 2814, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HOME RADIO OF MITCHAM FOR THE NEW HEATHKIT RA-1 AMATEUR BAND RECEIVER



- ★ 8 VALVES AND 2 DIODES
- ★ HALF LATTICE CRYSTAL FILTER
- ★ 5" BANDSPREAD ON ALL BANDS
- ★ BUILT-IN 'S' METER
- ★ VOLTAGE STABILISED OSCILLATOR
- ★ B.F.O. SWITCHED FOR UPPER OR LOWER S.B.

Available as a kit at £39.6.6, or ready assembled and tested, £52.10.0. Send s.a.e. for full specification and circuit diagram.

Dept. S., 187 London Road, Mitcham, Surrey. MIT 3282
Shop hours 9-6 p.m. (Weds. 1 p.m.)

G4GZ's BARGAINS

VALVES: EA50, EF50, 1/6 each, 9/- doz. 6H6M, 6AC7M, 6K7G, 12SJ7M, 12SC7M, 2X2, 6BB9, EF50(S), 6C4, 2/- each, 18/- doz. 6AL5, 6AM6, 6J6GT, 6J6, 12A6, ARP12, AR8, EB91, EP91, EL32, TTT1, VP23, Z77, 3/- each, 24/- doz. 6SN7GT, 1626, DC70, DF73, DL70, 3/6 each, 36/- doz. 6AK5, 6J7G, 6J5M, 6ST7, 12K7G, 12Q7G, 35Z4G, 3Q4, 12AT6, 959, 4/6 each, 48/- doz. 6SL7GT, 6SJ7M, 6X4, 6F6M, 80, 12CBM, 12AU6, 42, PCF82, PCC85, PY83, VR150/30, 2A3, 5/- each, 54/- doz. 12AU7, 12AT7, 12SQ7M, 446A, EC80, 836, PL82, EZ80, EZ40, 6BJ6, 6AU6, EZ81, UY41, 6BH6, 6BF80, EAF42, 6/- each, 66/- doz. 6L6G, 6L7M, 50L6GT, EZ81, 7/- each, 78/- doz. ECC85, ECC84, EM80, 3A5, 6K8M, 6L6M, 8/- each, 90/- doz. 7B7, 757, 7C5, 5R4GY, UCH81, VLS631, 9/- each, 102/- doz. EL84, 5763, ECH42, 9/6 each, 108/- doz. 805, 3E29, 25/- each. 4E27 (HK257B), 40/- each. P/P 6d. per valve 2/6 doz. lots if under £5.

AR88 tub. trimmers ceramic, 4 for 6/-, AR88 smoothing chokes (10H 100m/a), 3 for 21/-, 65/- doz. ET4336 transformers. 190-250v. input, 10v. CT 10A 2 1/2v. 10A. CT, twice, 35/- each, £16 per doz. Potted USA xfmr. 230v. input, 32, 34, 36v. 2A. output, 17/6.

MC METERS. 3 1/2" rd. fl. (2 1/2" dial) 0-500 m/a, 12/6, £6 per doz. 0-15v. AC (MI cal at 50 cps.), 12/6 each £6 per doz. 2 1/2" rd. fl. (2" dial) 0-1 m/a, 22/6, 2" rd. fl. 0-500µa amps, 17/6, 0-30 m/a, 10/6, 2 1/2" rd. plug-in electrostatic 0-1500v. 16/6 each, £8 per doz.

B9A moulded valveholders and cans, 11/6 doz., 75/- gross. Micalex ditto, 13/6 doz., 90/- gross.

GEC PYRANOL. 10mf. 2Kv condensers, oil filled, 27/6 each. 25pfd. ceramic air spaced trimmers, 4 for 5/-, 14/- doz.

GUNFIRE TIME SWITCHES. 200-250v. 50 cps. 20 amp. contacts, 1 make 1 break every 24 hours, 55/- each (P/P 2/6), £26 per doz.

EDDYSTONE RECEIVERS. FERROGRAPH TAPE RECORDERS — LEAK — QUAD — GOODMAN'S — WHARFEDALE, Etc. HI-FI EQUIPMENT.

JOHN ANGLIN

385, CLEETHORPE ROAD, GRIMSBY, LINCS. Tel. 56315

SMALL ADVERTISEMENTS, READERS—continued

A CHANCE TO ACQUIRE an excellent American Rcvr. Gonset G43, 540 kc to 30 mc, 6 switched bands, bandspread tuning, S-meter, built-in speaker, printed cct. construction, provision for plug-in xtal calibrator, cabinet slightly scratched, otherwise perfect, £35. Heath DX-35 Tx, 80 to 6m., Phone/CW, 6146 PA, just overhauled, new xformer and valves fitted, £20 o.n.o.? Heath VF1 VFO, needs attention, £5 o.n.o.? 813 PA chassis, not complete, 10s. Lionel J36 bug key, £3. Valves: QQV06-40 (AX-9903), 50s. each; 813's, 30s.; 815, 20s.; 811, 15s.; 807's, 4s.; JAN 35TH, 10s.; 250TH 30s. Thyratrons 394A, 5s.; TZ40, 15s.; 6L6's, 6V6's, 4s.; 6SJ7's, 3s.; 6AK5's, 3s.; 100 others, various types, all cheap. Meters: 3 in. Simpson 0.5 amp RF, 15s.; Milliammeters 0 to 1, 5, 30, 100, 500, all at 15s.; various others, volts, micro-amp. etc. Send your requirements and prices, for meters or valves, or offers for any of above items.—B. Watkins, New Jersey, Breach Lane, Enmore Green, Shaftesbury, Dorset.

FOR SALE: 160m. Command Receiver, £4. 6-9 mc Command Receiver, rough condition, 10s. B2 Rx, £2 10s. Panda Rx, £5. RF-27 4m. converter, 15s. Collaro Mk. III tape deck with manual, £5 10s. 160m. CW/Phone Tx, in two TU5B cases (prefer buyer collects), £2. Two GEC 100 kc bars on B7G bases, £1 each. 3 in. round 100 µA meter, £1. Absorption wave meter with 200 mA meter, switched 160m/20m, 10s. Transformers: 350-0-350v. + heaters, 300-0-300v. + heaters; 2 at 250-0-250v. + heaters, all 15s. each. Co-ax relay, 2 c/o, 12v., 7s. 6d. Homebrew OZ7BO El-Bug with PSU, 25s. 100/10kc freq. meter with PSU, 30s. 12v. 2A charger, 15s. Carriage extra, money back guarantee, s.a.e. details, offers considered.—Taylor, G3NNW, 55 Manchester Street, Heywood, Lancs.

RF UNIT No. 2, 100-156 mc, and RF Unit No. 3, 190-240 mc, identical with RF Unit No. 1 described September 1959 issue of Short Wave Magazine, offered in new condition, £3 10s. each, p/p 5s. SCR-522, 100-156 mc, complete with mains PU RA62C, mounted on rack with cables and instruction books, nearest £12 10s. Also brand new Collins Tx/Rx 2-9 mc, MO eight pretuned channels on any frequency, 60-watt output, input 24v. DC.—R. Jay, 69 Church Road, Moseley, Birmingham, 13. (Local callers appointment only Tel: South 2285.)

FOR SALE: Labgear Topbander, £20 o.n.o.? BC-348, int. PU, £12. Minimitter MC6, 6 mc IF, £15. TW Mains PSU, £12. TW2 2-metre Tx, £20. 4-ele w.s. 4-metre Yagi, £4. 6-over-6 2-metre Yagi, £4. Add postage.—Marriott, R.A.F. Weyhill, Andover, Hants.

SALE: R.1155B, £5. Balmoral tape recorder, Motek tape deck, 7 1/2, 3 1/2, 1 1/2 i.p.s., £30.—Coffey, 105 Walton Avenue, South Harrow, Middx.

SALE: Minimitter Top 2-7 Tx, adapted mobile or mains use, £20. Heathkit GC-1U Rx (factory built), £17 10s. 19 Set with ATU conversion, phones, crystal mike and special junction box, £5. Or the lot for £37. Carriage by arrangement. All really good condition.—Berry, 12 Warwick Crescent, Harrogate, Yorks. (Tel: 3807.)

WANTED: Up to six FT-243 crystals, Channel 332, please state price.—Cooper, 71 Ringstead Crescent, Sheffield, 10.

SMALL ADVERTISEMENTS, READERS—continued

WANTED: 4D32 valve and Heathkit Balun, price and particulars to—D. McLean, 38 Netherthird Road, Cumnock, Ayrshire.

DX-100U, LG.300, Tiger, Vanguard, LG.50 or similar Tx required; Top Band and AM not essential; fullest details please.—Box No. 2815, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Several small Marine Radio Telephones (Dolphin, etc.). **FOR SALE** or **EXCHANGE:** Radiovision Commander, £30. Good TCS-12, AC pack/speaker, £8 10s. Marconi B.29 4-band VLF, offers?—Cain, 18 Oaky Balks, Alnwick, Northumberland.

VICEROY Mk. III, as new, *de luxe* version by K.W. Electronics, includes additional $\frac{1}{2}$ -lattice filter, together with low-level low-impedance output on all bands for converter mixing, first £125, including Top Band converter. RSGB 35-watt 144 mc Tx with comprehensive power-supply for Tx/Rx, 40-watt modulator with separate power-supply, complete, £9 10s. G2DAF Tx, set of specified filter and sideband xtals, £3. 1131 modulator power supply (new), complete, 50s., s.a.e. enquiries.—G2HCV, 34. Grasmere Avenue, London, W.3.

A R88LF, completely rebuilt PVC wiring, no mods, no case, front panel cellulosed and relettered. Must sell for QTH deposit, £40 o.n.o.?—Last, 4 Hillside, Marham, Kings Lynn, Norfolk.

SALE: EDDYSTONE 750 Rx, Apache Tx with matching SB10, Drake 2B Rx. Minimitter MR-37 Rx. Deliver within 50 miles.—G3OFV, Colchester. (QTHR.)

A R88D WANTED, one in excellent condition, state lowest price and details, will personally collect. Midlands area.—Box No. 2816, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: PANDA 150 bandswitched ATU; also Labgear low-pass filter.—G3RYL, North Grove, Blandford Camp, Blandford Forum, Dorset.

EXCHANGE Transmitter DX-40U; VFO VF-1U, BC-348L, all mint, for FB all-bands receiver or all-bands converter, mobile rig considered, cash adjustment.—Watson, 2 Newlands Drive, Sheffield, 12. (G3BMT, Phone 396660.)

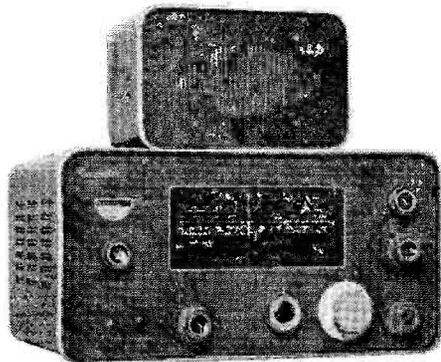
T.W. TOP BAND Mobile Rx, as new, £14 o.n.o.?—E. J. Gane (G3LWX), Sergeants Mess, R.A.F. Hullavington, Chippenham, Wilts.

SALE: CR-150 Rx, companion RB-150 Auto Bridge and Marconi manuals, £35. 7B Teleprinter, £20. Teleprinter 110w. motor PSU, £2. Tiger Z-Match, £4. R.1132 (75-100 mc), £4 10s. Buckley T/R Switch, £1 5s.—G3IGG, 26 Hooton Way, Hooton, Wirral, Cheshire.

FOR SALE: LG.300, almost new, with home-built power unit, £37 o.n.o.? K.W. Valiant 10-160m. (CW only model), with K.W. power unit, £25 o.n.o.? R.107, £5. Vibroplex El-Paddle, £3. Carriage extra.—G3OPP, 7 Standard Road, Downe, Orpington, Kent.

SALE: Heathkit RSW-1 Transistor Portable Receiver, good condition, four wave band, £12. MCR1 receiver, complete with power pack and three coils, working, £4. CR-100 service manual, £1.—Ladd, 4 Wellington Close, Melbourne Park, Chelmsford.

MINIMITTER



MR44/2 COMMUNICATIONS RECEIVER

The latest 1963 version of this superb instrument is now in production. New "Front End"—New Tuning Mechanism New Styled Cabinet—Price unchanged. £65.0.0 C/plate

" Top 2-7 " 24 Watt, 3 Band Transmitter	... £30. 0. 0
MC8. 8 Band Converter	... £21. 15. 0
MC6. 6 Band Converter	... £19. 10. 0
A.B.C. 5 Band Converter	... £18. 10. 0
Mobile Transmitter 20 Watt	... £17. 15. 0
TR7 Transistor Mobile Receiver	... £11. 0. 0
Transistor Power Supply	... £11. 11. 0
Mobile Whip Aerials 1.8-3.5-7.0 Mc/s.	... £6. 15. 0
G4ZU "X20" 20 Metre Beam	... £11. 0. 0
G4ZU "Minibeam 10/15"	... £17. 10. 0
Telescopic Mast 34 foot	... £10. 10. 0
Minimitter "Multi-Q" Unit 465 Kc/s.	... £5. 10. 0

For full details of any of the Minimitter Range, Please send S.A.E. to—**THE MINIMITTER Co. Ltd. 37 DOLLIS HILL AVENUE, LONDON, N.W.2** Tel. MALda Vale 5588

GOING MOBILE??

Then you will want the best Receiver available—one of the TW all transistor units

For 160m - The TOPMOBILE 19 gns.

Specification : ● Fully bandspread 1.8-2.0 Mc/s. ● V.H.F. transistors up to the 2nd Det. ● Really efficient noise limiter. ● Printed circuit I.F. and A.F. strips. ● Early injection B.F.O. ● 4" slide rule scale—silky tuning. Performance : Sensitivity better than 1 μ V. 1 watt of audio 60 c/s-16 kc/s. Selectivity : 5 kc/s. Size : 6" wide, 6" deep and 2 $\frac{3}{4}$ " high.

For 2m - The TWOMOBILE £28

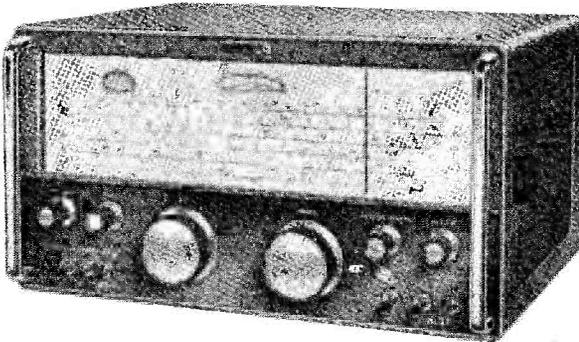
Basic Specification as above. 2m Section—R.F. Philco 2N1742. ● Mixer 2N1743. ● OSC : OC170 using 70 Mc/s. Cathodeon crystal. ● Complete lack of beats and spurious signals. ● Excellent A.V.C. and overload characteristic. TWOMOBILE less converter ... 19 gns. 80m Model ... 19 gns. 2m Converter, 1" x 1" x 3" (All transistor, 70mc. crystal) ... 9 gns.

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SMALL ADVERTISEMENTS, READERS—continued

EDDYSTONE 659/670 Receiver, good condition, £12, including carriage. **WANTED:** Vanguard, DX-40U or similar Tx, up to £25. G3RAD, 1 Approach Road, Broadstairs, Kent.

LATE G2SG. AR88D with speaker, £30. Minimitter LTx (807's), £45. Taylor Meter Model 127A, £7 10s. Electronic Keyer, £2 10s. Rapid band-checker, 10s. Geloso xtal mike, £1 5s. All above in first-class condition. G4ZU Beam, requires dismantling; 2-metre 5-ele Yagi. Numerous transformers, chokes, valves, etc., carriage extra. Also June 1962, A.40, as new, £490. Please write or call—Mrs. C. M. Dunk, Applegarth, Medstead Road, Beech, Nr. Alton, Hants.

FOR SALE: R.107, perfect working order, handbook, power plugs, £12, carriage paid.—Campbell, Dunkeld Road, Bankfoot, Perthshire.

MOSLEY VERTICAL AERIAL V3-Jr with radials and feeder, £5. Aveley 60-watt transistor pack, as new, 12v. DC to 300v. 200 mA, tapped 200/250v., £10. AC pack, 600v. and 300v., 200w. silicon rectifiers, also 12.6v. 3A, £5. Valves, components, etc., s.a.e. list.—G5RP, Old Gaol House, Abingdon, Berks.

SALE: Compact rugged mobile Rx, R.209 1-20 mc, 6v. input, ten 1.4v. valves, £16. Full-size 40m. "ZL Special," 300-ohm ribbon, correctly terminated mica capacitors, built-in insulators, weather-proofed, 72-ohm feeder, 50s. Manual BC-312/342. 21s. All carriage paid U.K.—K. Jones, 3/50 Shelley Road, Worthing. (Tel.: 9852.)

FOR SALE: SX-110, mint condition, £45, or will exchange for similar condition K.W. Valiant. Also DX-40U with VF1U, £25 the pair, or will exchange for transistor mobile PSU or Top Band Command RX, or both, with cash adjustments if necessary. Owner in Merchant Navy so above gear scarcely used. Details to—G3OSR, 1 Cromwell Road, Blackpool, Lancs.

FOR SALE: SB-10U (American model) with manual, £27. UM1 Modulation Transformer, £1 10s.—G3NFV, QTHR. (Tel.: Ashted 2546 after 6 p.m.)

SALE: Mobile Minimitter antennas 160, 80, 40m. complete, £6 10s. 1-130-A Signal Generator 100-150 mc and field strength meter, battery box, £5 10s. plus p/p. **WANTED:** RF-26 or 27 unit.—G8DT, 18 Newcourt Park, Charlton Kings, Cheltenham.

WANTED: Mohican Receiver, mint condition, kindly state factory made or otherwise.—Freck, 90 Vancouver Drive, Winhill, Burton-on-Trent.

MOSLEY TA32J beam, £10. CDR Rotator, complete, £10. Kemsley, 1 St. Marys Road, Faversham, Kent. (Tel.: 2608.)

EXCHANGE: Minimitter Amateur Band Receiver, Model MR44/II, as now advertised; top condition, little used. Exchange for Amateur Receiver having full coverage 550 kc to 30 mc. Full details please to—L. L. Neaverson, G5NX, Deer Park, Honiton, Devon.

R. 107 Rx for sale, reasonable condition, £6 10s.—Doughty. (Phone: BOW 6967 evenings.)

WANTED: Transmitter, by Plymouth Radio Club: Vanguard, LG.300, PR-120, Valiant, or similar, reasonable price.—R. Hooper, 2 Chestnut Road, Peverell, Plymouth.

SMALL ADVERTISEMENTS, READERS—*continued*

HRO SENIOR 8 coils (bandspread 14 and 21), matching spkr, PSU, manual. An exceptionally good specimen, £19 10s. Delivery within reasonable distance Harrow.—Box No. 2817, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

HRO-60, matching LS, Coil packs A, AC, B, C and D, highest offer over £80. Elmac A-54 Tx, 80m-10m. highest offer over £30. BC-221, case and calibration book, £12 10s. Radio Transmitter GWY-2A, cct. details available, ideal for conversion to mobile Tx on 10m. or 15m., £10. Ampro tape recorder, 3½ in./sec., £15 or near offer. Transtat voltage regulator (pair) input 100-130v. AC output 115v., £3. Mains filter unit, 10s. Parmeko step-down transformer 200/250 to 100/120 volts, £2. Magazines, meters, valves, transformers, etc., for disposal; state requirements, all letters answered.—Box No. 2818, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: 3x Tape Printer, 110v., printer motor power supply, 320 AN Telegraph Relay. Prop pitch motor. B2 Tx/Rx PSU. Johnson TR Switch. Best offers take.—G3NM. (*B'ham. SEL 2504.*)

FOR SALE: AR88D, mint condition, professionally re-aligned after storage, manual and trimming tools, £45 o.n.o.? Own transport.—(*Phone: Bywood 2654 after 8 p.m.*)

MOHICAN GC-1U Communications Rx, factory aligned, tested, immaculate condition with batteries and manual, £25.—Box No. 2819, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: AR88D, Eddystone 680X/750, Hallcrafters 36A, will collect. **FOR SALE:** R.1155L, 6V6 output, p/pack, headphones, speaker, £14 10s.—Bell, 27 Churchill Avenue, Horsham, Sussex.

EXCHANGE: Leica 3 F/2 Summar, good condition, ER case. **WANTED:** 750 or similar receiver.—G3CZ, 78 Yarborough Crescent, Lincoln.

SALE: Hallicrafters S40A Receiver, 550 kc to 45 mc, electrical bandspread, noise limiter, BFO, etc., excellent condition, £22 10s.—(*Speedwell 8831 (London.)*)

SALE: 90w. CW Tx, commercially built, excellent condx., TVI/BCI proof, 80-10m. bandswitched, TT21 PA, very easy to operate, £32 o.n.o.?—Milne, 24 Darwin Street, Northwich, Cheshire.

WANTED: Manuals on any Aircraft Radio Equipment, especially MN26P, SCR-269/BC 433, NAI/MN62/R5/ARN7, RA-10, AVR 20/AVT 112, and SCS-51. Also AVT-112 Transmitter and power supply. **SALE:** TTx 10RH UHF sweep generator with 723A/B (modified), £15. BC-348, £10. Multiplier Unit 252 (variable inductance with turns counter, 807, etc.), £5. BC-453 with controller, £5. Geloso VFO with pi-tank and valves, new, £6. New 12-volt aircraft batteries, £5. All plus carriage.—Coggins, c/o Executive Air Engineering, Coventry Airport, Warks. (*Phone: Toll Bar 2439.*)

BUYING DRAKE 2B. For Sale: CR-100, re-aligned, fitted noise limiter, S-meter, with manual, £15 o.n.o.? (Plus 10s. carriage).—Box No. 2820, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

G. W. M. RADIO LTD.

V.H.F. RECEIVERS approx. 80 mc/s. 230v. A.C. power pack, 6" speaker. Valves: 4 KTW63, 3 Z90 (EF50), D63, DH63, KT63, 5U4G. Suitable for modification for 4 metres, etc. In good used condition, £3, carriage paid. Matching part stripped Transmitter chassis complete with 230v. A.C. Power pack, £2, carriage paid. Both units are 19" x 8½" rack mounting. Less Crystals. **NO DETAILS AVAILABLE.** 19" rack, 21" panel space, 15/-, carriage paid. Rx, Tx and rack together £5, carriage paid.

CANADIAN MARCONI 52 RECEIVERS available as per previous adverts. Receiver alone tested and in good working order, £5/10/-, carriage £1, or complete set in case with installation kit ready to operate from 230 volts A.C. or 12 volts D.C., £9/10/-, carriage £1. Send S.A.E. for detailed leaflet.

METERS. 500 Microamp calibrated 0-15, 0-600 volts, ex 19 and 22 set, 8/6, post 1/6; 0-4 amps, hot wire type 2½", 7/-, post 1/6. All meters tested before despatch.

TRANSMITTER components, ex 52 set. 813 valve bases, 3/6, post 9d. Tuning condenser, 200 + 200 pf., rated at 1200 volts D.C. for 100 watts input, 7/6, post 2/6. Cooling fans, 12 volts D.C. 1 amp., will operate on A.C., 5/-, post 2/6.

TELEPHONE WIRE. 500 yard drums twin plastic covered, 6 steel, 1 copper strands, 25/-, carriage 10/-.

WHIP AERIALS. Superior flexible base, eight 4ft. sections will make any length up to 24ft. These will handle 100 watts, 35/-, carriage 10/-.

SPEAKERS. 5", 3 ohm in neat black crackle case, used, good order, 10/-, post 3/-.

AMERICAN CARBON MICROPHONES, type T17. Ideal for mobile use, with side button switch, lead and jack, 7/6, post 2/6.

19" RACK MOUNTING POWER UNIT, type 3. 230v. A.C. Outputs, 250 volts D.C., 100 ma. 6.3v. at 3 amps. A.C., 39/6, carriage 10/-.

MOTORS. Drayton 37 r.p.m. 230v. A.C., ideal for aerial rotating, 20/-, post 2/6.

CLOCKS. Admiralty, brass cased 8-day quality movement, overhauled and guaranteed 12 months, £5/10/-, post paid.

HANDBOOKS, 52 receiver and ZE12 power unit. Re-printed from the official handbook; includes circuit and all information, 5/- post free.

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TRANSISTOR 30 WATT POWER SUPPLY

12 volts DC Input. 300 volts, 110 mA. Output.
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£9.19.6 pp. 2/6.

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- HRO 4 Gang with Gearbox, 12-225pf. £1. 0.0 pp. 2/6
- AR77 3 Gang 2 Section 100 + 200pf. each 12/6 pp. 2/6
- 8 Element 2 Metre Yagi with Clamp £3.17.6 pp. 3/6
- 20yd. Offer, Super/Axial Coax £1. 0.0 pp. 2/6
- CRT Indicator, 3DP1 Tube 3/6AG5, 1/2X2 £1. 5.0 pp. 3/6

We welcome all enquiries, however small.

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MANCHESTER 4.

CENtral 6276

NATIONAL H.R.O. RECEIVERS

Senior model. Supplied with full set of 9 coils, covering 50 kc/s.—30 mc/s.
Available as follows—
Table model, as new condition, £25
Table model, good used condition, 19 gns.
Rack model, good used condition, 18 gns.
Carriage 20/- extra.

Power packs to operate any of above from 110-230 volts A.C. (also sold separately), 59/6 extra, carriage 5/-.

P.C.R. COMMUNICATION RECEIVERS

Type PCR. Has self-contained speaker. Covers 800-2,000, 190-550 metres and 6-18 mc/s. As new condition, £6/19/6.

Type PCR.2. Requires external speaker. Covers 800-2,000, 190-550 metres and 6-22 mc/s. As new condition, £5/19/6.

Type PCR.3. Requires external speaker. Covers 190-550 metres, 2-7 and 7-22 mc/s. As new condition, £8/8/-.

All models carr. 7/6 extra. External plug-in power packs, 35/- extra, or internal power units, 39/6 extra. Circuits supplied.

MARCONI CR100/8 RECEIVERS

Available brand new in original transit cases complete with manual, 60 kc/s.—30 mc/s. Operation 200/250 volts A.C., £35, carriage £2.

HALLICRAFTERS S-36 V.H.F. RECEIVERS

F.M./A.M. 27-143 mc/s. Improved version of S-27. Operation 110 volt A.C. (transformer supplied for 230 volt). Available brand new in original transit cases with manual, £40 each. Carriage £2.

AVO METERS

Guaranteed perfect condition with leads and batteries. Model "D" 34 ranges, £8/19/6. Model "7" 50 ranges, £11. Registered post 5/- extra.

R.C.A. PLATE TRANSFORMERS

Primary 200/250 volts. Secondary 2,000/1,500/0/1,500/2,000 volts 500 ma. New, boxed, £6/10/-, carriage £1.

AVO WIDE RANGE SIGNAL GENERATORS

Frequency coverage 50 kc/s. to 80 mc/s. in six turret operated ranges. For use on standard A.C. mains. Packed in original transit cases with accessories. Supplies in as new condition, fully checked before despatch, £15 each. Carriage 10/-.

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Famous American brand tapes. Brand new, guaranteed. 5"—600', 10/6; 5"—900', 13/6; 5"—1,200', 17/-; 7"—1,200', 13/6; 7"—1,800', 18/6; 7"—2,400', 30/-, P/P extra, S.A.E. for full lists.

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SMALL ADVERTISEMENTS, READERS—continued

EXCHANGE: Complete TW2 station consisting of Tx, three crystals, PSU, converter, 4-6 mc IF, only 6 months old, for mint factory-built Mobican of similar age. CDR Rotator and 6/6 Beam also available at £17.—Write G2CNN, Mount Pleasant Inn, Dawlish Warren, South Devon.

SALE: Minimitter 120 Tx, £35. Oscilloscope, £5. 19 Set PSU, £1. BC-221, £6. *Bulletins* 1958-63, £1; *Short Wave Magazine* 1958-63, £1.—Flaherty, 45 Weston Park Avenue, Shelton-Lock, Derby.

FOR SALE: Original G3BDQ receiver (see *Short Wave Magazine* June 1962), £40. Original "Natterbox" Tx with Baby Linear (see *Short Wave Magazine* June 1961) with nine channel crystals, £15. prefer purchasers collect and inspect.—G3BDQ, 201 London Road, St. Leonards-on-Sea, Sussex.

COMMAND Rx MW, brand new and unmodified, £6. Cowl gill motor, new, unused, 45s. Complete beam indicator equipment, 250v. AC, two Selsyns, 6 inch compass dial, etc., all new, £3. ARB Rx, brand new, £8. **WANTED:** Any model Command Rx for spares.—Box No. 2821, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE, owing to bereavement: Hallicrafters SX-100 receiver, only used a few hours, £100 o.n.o.? Hallicrafters S36-A, 27 to 143 mc, AM-FM, new condition, complete with manual, £32 o.n.o.? Variac transformer, 230v, input 0 to 260v, output at 5 amps, brand new, £5. RCA plate transformer 2000-1500-0-1500-2000v, at 500 mA, unused, £4. Plate transformer 1150-0-1150v, 0-48 kVA, unused, £3. American 22 range V-O-A test meter in wooden carrying case, 20,000 o.p.v., £5 o.n.o.? Exchange, for good 35 mm. camera, latest model Pye International 9 valve, 11 waveband, semi-communications receiver, bandspread on all amateur bands 160 to 15 metres. Buyer must collect all items.—K. Heap, G3NCZ, The Gables, East Park Road, Blackburn, Lancs.

FOR SALE: 150w. modulator, 6J5, 2/KT88's, 2/KT66's, UM3, £7. PSU 750v. 250-300 mA, 4/GU50's bridge circuit, £5. PSU 1000v. 300-400 mA, £5. Saja Tape Recorder, £10. Labgear DSL-28 10-metre coil, with base, £1. *RSGB Bulletins*, April 48 to date (missing Feb. '49, June '55, April '58) with indexes, £4. *Radio Constructor*, Aug. '56-Dec. '62 with indexes (two vols. bound), £4 10s. 2/813's with transformer, £3 10s. G3HSC Morse record, £1. Postage extra or delivery reasonable distance.—Butland, 43 Dollis Park, Finchley, N.3. (*Finchley 7262 evenings*.)

SILICON DIODES 500 mA 1000 p.i.v., 9s. each. OC44, 45, 81D, 81, 170, 171, all 4s. each. R209 Rx, 12v., 1-21 mc, £15. 888A, excellent, £60. All plus p/p.—G3MAD, 70 Arnold Road, Binstead, I.O.W.

EXCHANGE: Zeiss Signal Mettarr camera, as new, BASS[®] for HRO-5T or similar.—Stacey, 1 Cresswell Road, Swinton, Mexboro', Yorks.

WANTED: The following handbooks, 30s. each offered: Miniature Rx Type 53/1, Tx/Rx Type AR11, Canadian 58 Set (not the provisional working instructions). Also required, Handbooks on miniature and suitcase type radio equipment as were used by the Marquis, Polski-Podziemnes, and Dutch and French sections of the S.O.E. (1941-'45).—M. Gee, 11 Whitehorse Lane, Stepney, London, E.1.

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	£	s.	d.
AR88 LF. 75 to 550 kc/s. and 1.5 to 32 mc/s. from	32	0	0
EDDYSTONE 640. 1.7 to 30 mc/s.—bandsread	22	0	0
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EDDYSTONE 870. 550 kc/s. to 18 mc/s. ...	19	0	0
NATIONAL NC 188. 550 kc/s. to 30 mc/s. plus Amateur bandsread ...	59	0	0
NATIONAL NC 109. 550 kc/s. to 40 mc/s. plus Amateur bandsread ...	79	0	0
NATIONAL HRO 60. 1.7 to 30 mc/s. General coverage and bandsread on Amateur bands, from	110	0	0
EDDYSTONE 730. Similar to 680X but has built- in Calibrator, etc. ...	70	0	0
MR 44. Amateur Bands ...	32	0	0
HALLICRAFTERS SX-110. 530 kc/s. to 30 mc/s. plus Amateur bandsread...	48	0	0
PANDA PRI20 TX's ...	50	0	0

NEW RECEIVERS

NATIONAL NC 155 ...	106	17	6
NATIONAL NC 190X ...	113	4	0
NATIONAL NC 105 ...	63	6	0
HALLICRAFTERS SX-111 ...	120	0	0
HALLICRAFTERS SX-140. Kit ...	37	10	0
HALLICRAFTERS SX-140. Wired ...	44	0	0
EDDYSTONE 960. Transistorised ...	135	0	0
EDDYSTONE 940 ...	125	0	0
EDDYSTONE 840C ...	58	0	0
MOSLEY CH ...	86	0	0
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Carriage extra on all above items

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SMALL ADVERTISEMENTS, READERS—continued

FOR SALE: K.W. Hamobile Mk. II 25-watt 2-metre Tx/Rx, with mobile and mains power supplies, mike, key, speaker, xtals, cost over £100, accept £50 o.n.o.?—G3OHC, 24 Wood Green Road, Winsop Green, Birmingham, 18.

WANTED: Beam Rotator, mast head mounting. Details please to—G3IOE, 10 Western Avenue, West Denton, Newcastle-upon-Tyne, 5.

SALE: New 829B's (Brit.), 37s. 6d.; 832, 10s. 9001's at 1s.; screened wire 40/0076, 6d. per yard, 50 yards, £1. Postage and packing please.—G3OWQ, 12 Robin Hill, Bedford.

840C, 50 hours' use, £30 (buyer collects Essex). **WANTED:** 870A (not 870).—Box No. 2822, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EDDYSTONE power supply, 240v. in, 300v. 200 mA 12v. AC, grey crackle case, heavy, £5 carriage paid.—A. Tompkins, 43 Malvern Road, Luton, Bedfordshire.

ELECTRONIC GEAR, surplus to requirements, valves, meters, transformers, magazines, etc. s.a.f.e.—Hulmes, 1 Caravan Site, Lymans Road, Arlesley, Beds.

WANTED: Mosley 3-Band Beam (TA-Jr.), state condition and price.—Robinson, 5 Channel View, Penarth, Glam.

MINIMITTER TRANSMITTER AM/FM/CW, needs slight attention, G4ZU Beam Antenna. £55 both items.—Fisher, 458 Alum Rock Road, Birmingham, 8. (East 0398.)

EXCHANGE: Pye 12v. VHF Reporter Radio Telephone, for 20, 40, 80 metre Mobile Receiver.—Denham, 28 Medley Road, Greet, Birmingham, 11.

FULL-SIZE 4-element beam, on 26 ft. boom, easily converted back to 3-element, Powermaster, complete with 45 ft. steel mast, guy wires and hinged base, also two 38 Sets and xtal calibrator. Offers? **WANTED:** 20-metre SSB Transceiver.—(Phone BAR 4144.)

MR44/II Receiver, £45. G4ZU Beam, £7 10s. Marconi Laboratory sig. generator, TF39OG, 16-150 mc, with manual, £8. Clapp VFO, £2; PSU for same, 30s. Class-C Wavemeter, with PSU and 500 kc xtal, 30s. RF-27 Unit, 15s. 21 mc Converter, £1. Crystal Calibrator, No. 7, 10s. Transformers: 500-0-500v. 250 mA, plus LT's, die-cast shrouded, 30s.; 670-0-670v. at 200 mA, LT's, 30s. PSU's 450v. 250 mA, requires FW-4/500 rectifier, £2; 500v. at 300 mA. £3. Gyroscope and inverter, 30s. pair. (6) 4mF 600v.w. oil-filled capacitors; mod. transformer about 30w.; audio p/p trans. about 15w.; HTR trans.; 3 smoothing chokes; the lot, 30s. All items must be collected.—Steckel, 10 Maple Grove, Guildford, Surrey.

WANTED: Secondhand Zenith Trans-Oceanic Radio, either 1000, 1000D or 3000 model; dealers, or private sale.—Coldwell, 154 Bradway Road, Bradway, Sheffield.

KW 76 Rx 10/160 metres, £30. "Valiant" Tx 10/160 metres, built-in ant. relay, £25. Both mint; special offer £50 the pair, incl. cct. diags.—Fitch, 79 Murchison Road, London, E.10. (Leytonstone 6700.)

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Precision made in our own works from commercial quality half-hard Aluminium. Two, three or four sided **SAME DAY SERVICE** of over 20 different forms made up to YOUR SIZE

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48 sq. in. 4/-	176 sq. in. 8/-	304 sq. in. 12/-
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112 sq. in. 6/-	240 sq. in. 10/-	368 sq. in. 14/-
144 sq. in. 7/-	272 sq. in. 11/-	and pro rata

P. & P. 2/6 P. & P. 2/9 P. & P. 3/-

FLANGES (1 1/2" or 1 3/4" 6d. per band. STRENGTHENED CORNERS 1/- each corner. PANELS. The same material can be supplied for panels, screens, etc., at 4/6 sq. ft. (16 s.w.g. 5/3) plus postage and packing

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287-289 EDGWARE ROAD, LONDON, W.2. PAD 5891/7595

OLYMPIC all-band loaded Z-match

Don't give up the substance for the shadow
Keep that outside wire — It's the loading that matters!

ANY odd piece of outside wire, on ANY band, will couple to your Tx, ANYWHERE if you use the:—

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The only Six Band (160-10M) Coupler on the market

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RESISTORS

30 watt 33/50/100/150/200/300/500/820/1K/1.5K, 4/6 each.
10 watt 15/21/25/33/50/70/100/150/200/250/330/500/750/1K/1.45K/1.5K/1.6K/2K/2.2K/2.5K/3K/3.5K/3.9K/4.7K/5K/6K/6.8K/10K/15K/20K/25K, 4/2 each.

5 watt 15/21/25/30/39/50/60/68/75/82/100/125/133/150/180/200/220/250/270/300/350/400/470/500/600/680/700/750/820/1K/1.2K/1.5K/1.6K/1.8K/2K/2.2K/2.5K/2.7K/3K/3.3K/3.9K/4.3K/4.7K/5K/5.6K/6K/6.8K/7.5K/8.2K, 1/6 each.

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500 volt Paper Tubular. .0001/.0005/.001/.002/.003/.004/.005, 11d. each.
.01/.015/.02/.025/.03/.04, 1/- each.
.047/.05/.1, 1/2 each. .2/.25, 1/6 each. .5/1uF, 3/- ea.

CERAMIC CAPACITORS

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470pF/800pF/.001/.002/.003/.005/.01, 9d. each.

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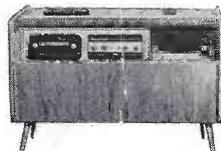
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