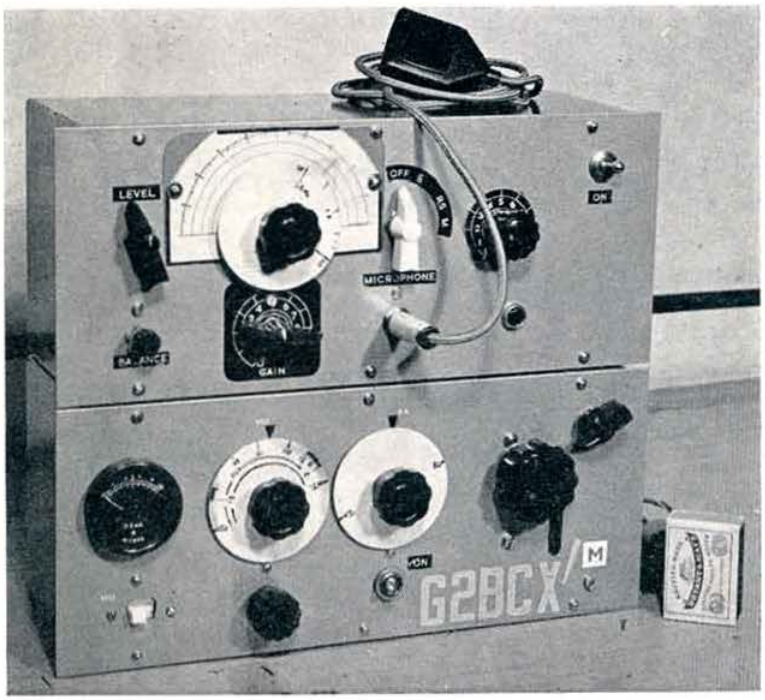
OCTOBER 1973

RADIO COMMUNICATION

After wartime silence—the RSGB's 5th decade



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RSGB Diamond Jubilee Year

1913 – 1973

Journal of the Radio Society of Great Britain

OCTOBER 1973

RADIO COMMUNICATION

Volume 49 No 10 Price 40p

CONTENTS

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A * *

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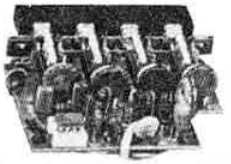

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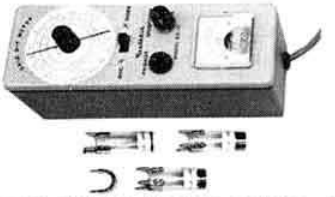

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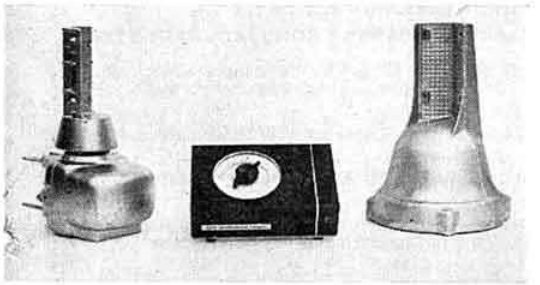

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Remember that all prices include VAT and postage, so you do not have to send extra.

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2m 'J' Beams 50 or 75 ohms, specify which.	
2/4Y 4 element folded dipole Yagi with 1" boom	£3.74
2/6Y 6 element folded dipole Yagi with 1" boom	£4.40
2/8Y 8 element folded dipole Yagi with 1" boom	£5.17
2/10Y 10 element folded dipole Yagi with 1¼" boom and 45 braces	£10.45
2/10XY Crossed 10 element Yagi with 1¼" boom	£13.86
2/14P 14 element Parabeam	£16.28
2/12 6 over 6 with 1" booms	£7.97
2/16 8 over 8 with 1" booms	£9.79
2m Mobile Whips	
Diamond DP-2S gutter mounting ⅝ vertical	£11.55
G-Whips	
Tribander (20, 15 and 10m)	£12.10
Multimobile 20, 15 and 10m	£14.30
160, 80 or 40m coils for above, each	£4.40
Top whip section for above	£1.10
Flexiwhip 10m with whip	£9.35
160, 80, 40, 20 or 15m coils, each	£4.67
Ranger 160m	£9.35
Duobander 160/80m	£10.45
Base section for all G-Whips	£1.60

The above are normally sent by British Rail—should you require 24 hour Securicor delivery, please add an extra £1.70.

ANTENNAS

Verticals

Diamond	DP-KB103, 80 and 40m	£27.50
	DP-KB104, 20, 15 and 10m	£20.90
	DP-KB105 80, 40, 20, 15 and 10m	£38.50
	Echo 8G 40, 20, 10 and 10m	£22.00

H.F. Beams

AS-203W Wide spaced 3 element 20m beam	£72.60
AS-154W Wide spaced 4 element 15m beam	£48.40
AS-153W Wide spaced 3 element 15m beam	£38.50
AS-104W Wide spaced 4 element 10m beam	£40.00
AS-103W Wide spaced 3 element 10m beam	£22.00
Polygon 2 element glass fibre kit	£38.50

PRICES INCLUDE SECURICOR CARRIAGE

Antenna Accessories			
Coax UR43 50 ohms			10p/m
Coax UR67 50 ohms			26p/m
Twin feeder 300 ohms			6p/m
Twin feeder 75 ohms			6p/m
Rotator cable 4 core (AR22)			18p/m
Rotator cable 12 core (TR44 and Ham-M)			35p/m
Rotators	AR22R		£27.50
	TR44		£49.50
	Ham-M		£77.00
SWR Meters	Hansen single meter		£5.50
	Asahi twin meter		£8.80
	Diamond SR435 (VHF/UHF)		£15.40
Dummy load/wattmeter (VHF/UHF)			£38.50
PL259 plugs	33p	Reducers	10p
Sockets	33p	Line Connectors	80p

Station Accessories

Plain brass morse keys	£1.35
Katsumi keyers EK-9X	£9.90
CW practice oscillators	£2.75
Headsets, low impedance, padded	£3.30
Microphones Yaesu YD844 table mike	£14.30
Yaesu YD846 hand mike	£5.50
DM501 hand mike	£3.75

Valves

6AH6, 6BZ6, 6CB6A, 6CL6, 6U8A, 6EW6, 6EH7, 6BM8, 12BY7A, each	66p
6GK6	£1.32
6JM6A	£1.65
6JS6C, 6KD6, each	£2.20
6146B	£3.30

NEW ITEMS

2m Ground Planes. The 'J' Beam ½ wave **£3.52** and the very elegant Diamond GH2 ground plane at **£11.00**. Carriage by B.R. 50p extra, by Securicor **£2.20.**

Baluns. We are importing a very good Japanese balun. Ratio 1 : 1 impedance BY-5 52ohms, BU-7 75ohms. Price **£4.40** post paid. This balun incorporates a centre strain insulator and is really excellent value.

CARRIAGE

Please note that carriage is paid on all new items—expensive gear goes by Securicor 24 hour service, lower priced antennas by Passenger Train and small items by post (usually first class) Hire Purchase available on items over £30

SECOND HAND Prices include VAT

All mint, checked, serviced and aligned unless specifically stated otherwise

RECEIVERS

Trio 9R59DE Choice of several	£38.50
Trio 9R59DS Choice of several	£45
Trio JR500S Choice of several	£44
Heath GR78	£66
Trio JR310	£65
GEC BRT400	£45
AR88D's CALLERS ONLY	£44
Trio JR310 Fitted optional filter	£72
Heathkit SB300	£80
Hammerlund HQ170A Fitted Hammarlund 2m conv.	£80
Collins 75S3C	£325
Marconi CH200 CALLERS ONLY	£10
Inoue IC700R	£65
Trio JR599	£130
Heathkit SB301	£105
Star ST200	£33
National NC190	£55
Eddystone 750	£55
Racal RA17	£175
Drake R4B	£185
Eddystone 730/4 A1	£65

CARRIAGE BY SECURICOR £2.00 EXTRA

LOWE ELECTRONICS

ALL PRICES INCLUDE VAT

AMATEUR RADIO BULK BUYING GROUP

ALL PRICES INCLUDE VAT

Now the construction season seems to be upon us, this month we are reproducing a large part of our current price list, which because of the enormous demand for our service is now becoming quite a lengthy affair.

From: P. L. A. BURTON, G3ZPB

COMPONENTS FOR G3TDZ 2M TX/RX

P.C. Boards—Rx, 90p; Tx, 60p; 3 gang × 17pF, £1.10; Drive drum, 20p; Cord drive spindle, 17p; FX1115 Ferrite beads, 1p ea. or 35p/50; 4 mm formers, 4p ea. or 30p/10; VHF cores 1½p ea. or 10p/10; 2½" loudspeaker, 90p; Siemens 47µF polycarb capacitor, 13p; TAD100, £1.55; 2N708 (equiv. to BF220), 12p; 2N3819, 28p; BA102, 29p; 40673 56p; BC109, 9p; BLY33/40290, £1.40; CFT455C IF filter, 50p; Ten Ni-Cad Batteries, £17 (U11 size). Kits of the above items, less batteries: Rx, £7.35; Tx, £2.60.

COMPONENTS FOR G2DAF S.S.B. TX

Variable capacitors: 5 gang × 40pF, £3.57; 3 gang × 75pF, £4.53; 3 gang × 350pF, £1.85; 400pF, £2.66; 50pF Trimmer with locking device, 72p; 4½" drive drum, 25p.

COMPONENTS FOR G3XGP D.F.M.

2 versions available: Mk. 1—as published in June Rad Com; Mk. 2—uses 1MHz Xtal + additional 7490 i.c. and provides calibration markers between 1MHz and 1Hz. P.C. Boards—Clock, £1; I/P amp, 80p; Display, £1; Set for £2.50 (state clock frequency required). Minitron 3015F indicator, £1.43; LED, 26p; Transformer, £1.43; MVR5 regulator, £1.80; IN4001, 20p/4; 1000µF, 10p; 2000µF, 13p; 2N3819, 28p; Time-base switch, 37p; Pointer knob, 12p; Round knob, 17p; I.Cs—7400, 22p; 7447, £1.13; 7473, 45p; 7490, 63p; µL 914, 42p; 30MHz versions—DM7490, £1.10; 74H00, 40p. Sockets—14DIL, 22p; 16DIL (also for Minitron), 24p; Metal cabinet, £3.80. Kit of the above items (includes 30MHz i.c.s but not sockets or cabinet)—Mk. 1, £24.50, Mk. 2, £25.

PLESSEY SL600 COMMUNICATION I.C.S.

SL610, 1, 2, £1.81; 620, 1, £2.71; 622, £6.80; 623, £5.37; 630, £1.71; 640, 1, £3.32; SL402 Audio O/P 2W on 12V, £1.35. Holders 8 pin and 10 pin, 40p.

SPECIAL OFFER TRANSISTORS & DIODES

2N3055 NPN Silicon power transistor, 50p ea. or £2/5. The following are brand new and tested but are unmarked and sold without our normal guarantee:

Medium power NPN switching transistor like BFY50 etc, 50p for 15; £1 for 35. Sub-min silicon general purpose diode, 10p for 15, 20p for 35. Special prices for larger quantities of any of these 3 items on request.

IGNITION SUPPRESSION COMPS

The most complete range of ignition suppression components available to the Radio Amateur is now in stock:

Screened Plug connectors (essential for VHF) straight or angled, 50p;

Plug-in distributor suppressor, 36p;

1µF capacitor, available with normal push fit lucar connector, large lucar, or fully insulated with wire connections, 20p;

2µF, normal or large lucar connector, 30p;

0·5µF Coax type, £1.08;

Solid copper stranded ignition cable, 4p/foot; connectors, 11p/6.

Other items to special order (SAE please).

P.C.B. MARKER PEN

Genuine Decon Dalo Printed Circuit Board Marker Pen is still available at 75p including data sheet—ideal for home use.

Orders for the above to G3ZPB—cheques etc, payable to A.R.B.B.G.

ambit kits

From: G8CYK

15w am/30 fm VHF power transistor set, with PCB and instructions for the final 3 PA stages, £11.99. (Kit includes Oxley air trimmers, caps choke beads etc.) SAE details.

NBFM detector module: mini 4 cm, built and tested, £3.50.
deluxe version on 8 × 4 cm board with compensated AFC output. (State IF in range 300-500kHz). Built and tested, £4.60.

IC tone burst generator. Featuring wide range adjustment, and two preset tones at the flick of a switch. (For GB and continental repeater access.) Kit, £4.20; Ready built with tone preset on counter, £5.20 (8 × 4 cm).

Scalar: 250MHz (typ 300MHz) scalar in diecast case with connectors (BNC or coax belling lee), £20. Requires 5v.

Audio: Bridged amp with 4W out at 12v—terrific frequency response and short circuit proof, £3.50.

Ambit Letterscan: metal detector for scanning letters and small packets up to 12 inches wide, £12.25.

From: W. S. POEL, G8CYK:

SEVEN SEGMENT LED DISPLAYS

FAIRCHILD FND 70: The biggest and brightest in 7 segment LED displays for the price. Used in conjunction with the 9368 decoder/driver AND LATCH the FND 70 represents the long awaited price breakthrough in MSI/LED displays. They are rugged, they can be strobed, they last a lifetime, they run off TTL supplies. The IC has its own filter, for direct panel mounting.

DISPLAY one off £2.20
four £7.90
six £11.00

MSI decoder driver and latch with direct connection to the display and high current output,
one off £2.17
four £7.80
six £10.50

BUY BOTH ITEMS AND TAKE 5% discount ON TOTAL purchase.

Boards for 7490/9368/FND70 to make up your own dfm, only 50p each.

TRANSISTORS AND I.C.S.

SIGNETICS PLL RANGE

NE 561B AM/FM amplifier and demodulator—No coils, £3.50 (inc data);
NE 565 FM/RTTY PLL—No coils, £2.80 (inc data);
NE 567 AM/FM/TONE decoder, £2.80 (inc data);
NE 566 VCO/tone generator, £2.80;
NE 555 TIMER IC from microseconds to hours, 86p.

Lithic Systems: samples from the available range:

LP1000: 'miser IC' gives visual indication of power on for only a few microwatts, in 3 lead can, £1.25 inc data;

LS/LM 370: AGC/Squelch amplifier IC, £2.50.

Semiconductors by National: sample of the available range:

LM380: 2 watts rms at 12v, 4w rms 20v. Current overload protected, short circuit proof, and requires only input/output capacitors, and decoupled supply line. One LM380 provides more than enough volume to fill a car with sound. However, the LM380 can also be used as a power supply splitter for differential circuits, since the output voltage automatically assumes half the supply voltage. A simple offset pot can be used to adjust balance. Again the current limit feature is useful to prevent damage. Yet another use is as a servo driver, since the IC has both inverting and non inverting inputs. £1.40 each, including data. Application note of 5 pages for 20p.

TRANSISTORS:

BLY33/40290, £1.40; 2 watts of am or fm at 12v, at 175MHz.

PT2125 D and PT2125 E together forming a 7 watt am pair for 2m. Replacements for Westminsters etc. In capsatan line, ONLY £5 per pair; fully guaranteed brand new, electrically perfect.

40673 mosfet, 56p; MJE340 (300v 20w), 40p; BF256 (1000MHz FET), 37p; BC109, 9p; BFY51, 17p; MD2369 (matched 2N2369 in one), 30p.

TOKO FILTERS

The most complete range of ceramic and mechanical filters. A full data and application leaflet now available at 5p. (Free on purchases over £1.) CFT455C 6kHz and CFT455B 8kHz, 50p; CFU455C 4·8kHz, 55p; 4·5 or 7kHz Mechanical filters, £1.50.

Orders for the above to G8CYK—cheques etc, payable to A.R.B.B.G.

From: D. G. PHILLIPS, G8AAE:

SURPLUS ELECTRONIC COMPONENTS

Transistors: BFY51 @ 10p. BC107 and 109 @ 6p. UCS2410 (BFW10 FET equivalent) @ 12p. PT4166A, TO39, 1W out at 175MHz @ 45p. Small anodised heatsinks for two TO5, TO39 transistors @ 10p. Ideal for QRP rig with above transistors. Various Varactor diodes, VHF, UHF, SHF, SAE for details.

Disc Ceramic Capacitors: 1nF @ 1p, 4·7nF @ 1½p, 20, 47 and 100nF @ 2p.

Polystyrene Capacitors: 2·7, 5·0, 6·8, 10, 15, 22, 27, 33, 47, 68, 100, 150, 220 and 470pF @ 1½p.

Tubular Ceramic Capacitors: 0·4, 0·5, 1·1, 1·5, 1·6, 1·8, 2·4, 3·0, 3·3, 3·6, 3·9, 4·7, 5·1, 6·2, 7·5, 8·2, 9·1, 11, 13, 16 and 33pF @ 1p.

Feedthrough Capacitors: 22pF, nut fixing @ 2½p. 1000pF, solder-in @ ½p. 1000pF, solder-in, smaller and better finish @ 1p. 1000 + 1000pF, solder-in, with built-in ferrite bead @ 2p.

Ferrite choke cores: wire-ended, 3 sizes @ 50 for 10p.

Coaxial Plugs: BNC Plugs, 50 and 75 ohms @ 8p. C type Plugs, 50 ohms @ 15p. Coax. leads, approx 1 yd, RG 9/U cable, 3 types, A; N type free plug each end. B; N type free plug to N type free socket. C; N type free plug to N type free angle plug. Also cable with two C type angle plugs, various lengths. All above 50 ohms @ 40p each.

Order surplus components from G8AAE—cheques etc, payable to D. G. Phillips

ALL PRICES INCLUDE VAT. Post and packing—5p for orders under £1—FREE for orders over £1. Full price lists on request (large SAE please)

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RADIO SOCIETY OF GREAT BRITAIN

35 DOUGHTY STREET, LONDON WC1N 2AE

FOUNDED 1913
INCORPORATED 1926

MEMBER SOCIETY
INTERNATIONAL AMATEUR RADIO UNION

PATRON: HRH THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

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QTC AMATEUR RADIO NEWS

Financial year

The detailed results of the Society's financial year to 30 June 1973 will be published in due course but it may be of interest to know that the present figures show a surplus of over £4,000. This figure is still subject to audit.

HF band plan

One of the claims made for the amateur service in the UK is that it possesses a high standard of self discipline. Whether this claim is now as valid as formerly is perhaps questionable. Suspicion of our present standards is increased by the number of complaints received concerning deliberate defiance of the band plan which has been endorsed by the societies of Region 1 IARU for a number of years.

The band plan is reviewed at three-yearly intervals and is considered by the national societies to be practical and worthwhile. However, this view is obviously not shared by a small minority who insist on exercising their right to use any mode in any portion of any band. Such practices cause extreme annoyance to the majority who operate in accordance with a voluntary plan designed to benefit all users.

There is no law that says that a gentleman shall offer his seat, or raise his hat, to a lady but the actions of an individual will soon produce the appropriate label. Probably the same applies to the band plan.

One solution to the problem is to make the sub-division of each band according to mode a part of the licence regulations. The non-conformists will then be liable to official action if the sub-bands are not observed. However, this is a drastic solution and one which, it is hoped, will never become necessary. Nevertheless, the RSGB MPT Liaison Committee has the position continually under review and will not hesitate to make whatever recommendations are considered to be best for the amateur service.

IARU REGION 1 HF BAND PLAN

Band		Type of emission
3·5–3·6MHz		cw [2]
3·6MHz	±20kHz	rtty [1]
3·6–3·8MHz		cw and phone [2, 3]
7–7·04MHz		cw
7·04MHz	±5kHz	rtty [1]
7·04–7·1MHz		cw and phone
14–14·1MHz		cw
14·09MHz	±10kHz	rtty [1]
14·1–14·35MHz		cw and phone
21–21·15MHz		cw
21·1MHz	±20kHz	rtty [1]
21·15–21·45MHz		cw and phone
28–28·2MHz		cw
28·1MHz	±50kHz	rtty [1]
28·2–29·7MHz		cw and phone

Notes
[1] For rtty, recommended section of operation shared with cw.
[2] 3,500 to 3,510 and 3,790 to 3,800kHz reserved for inter-continental working.
[3] 3,635 to 3,650kHz is used by USSR stations for inter-continental working.

GW3INW

An overseas certificate has been received for GW3INW—if he will notify RSGB headquarters of his current address the certificate will be forwarded to him.

RSGB at the Leicester Exhibition

The RSGB is to have a 60 by 12ft stand at the Midland National Amateur Radio and Electronics Exhibition organized by the Amateur Radio Retailers Association, which is to take place in the Granby Halls, Leicester, from 25 to 27 October.

A large part of the stand will be occupied by the RSGB bookstall, where all the Society's publications, and those of other publishers, will be on sale. Members purchasing their books here will, in addition to saving postage and packing charges, help to supplement the Society's income.

The stand will be manned by headquarters staff and members of the Mobile and Exhibition Committee who have organized it. Also present will be "Skip" Tenney of *Ham Radio Magazine*, who will fly over from the USA for the exhibition: *Ham Radio Magazine* will be featured on the RSGB stand.

The stand will be completed by a display of photographs and other information on amateur radio activities in general and the RSGB in particular.

Reciprocal licensing—Denmark

The Danish administration is now prepared to consider applications for temporary transmitting licences from UK amateurs, holding an Amateur (Sound) Licence A, who propose to visit Denmark for periods of up to three months.

Application forms for these temporary licences are obtainable from the General Directorate of Posts & Telegraphs, 1st Technical Office, 1st Floor, 17 Farvergade, DK-1007, Copenhagen. Also available is a leaflet giving full details of the conditions under which the licences are issued.

When completed, the forms should be sent to the Ministry of Posts & Telecommunications, Radio Regulatory Division, Waterloo Bridge House, Waterloo Road, London SE1 8UA, for onward transmission to the Danish authorities, not less than two months before the date on which the licence is required. The fee of D.kr 50 is payable on arrival in Denmark.

Reciprocal licensees must conform to Danish regulations. Mobile operation is permitted.

Oscar news

Oscar 6 switching is now being controlled for European orbits by a recently completed digital afsk automatic vhf system by DJ4AU, to ensure that scheduled transmissions are "on" and that Oscar remains off for periods of battery recharge.

Despite the Monday, Thursday and Saturday only activation to provide the NiCad calls with shorter and more frequent charging periods, the batteries are still deteriorating, and telemetry indicates that although 3B (half battery voltage) seems to be holding up, channel 3A (full battery voltage) indicates a critically low value. For this reason, the time available for Oscar operation is to be further cut by 50 per cent by activating the transponder for through repeater operation on ascending modes, eg evening orbits only.

Although the European switching system seems to be over 90 per cent effective it may happen that Oscar 6 will be

found "on" during descending (morning) orbits, and even possibly activated when it should be totally off on Sundays, Tuesdays, Wednesdays and Fridays. Please do not attempt to transmit to Oscar in the passband at these times.

Oscar 7 is rapidly approaching completion, and a general acceleration in building and testing is now in progress to meet an early launch window. Full information will be published in the November issue.

Users are urged to keep their output powers at this time down to the maximum of 200W erp to conserve the Oscar 6 batteries and permit continuity until the Oscar 7 launch.

Pirates caught

We have again been notified by the MPT of prosecutions for using wireless transmitting apparatus without the appropriate licence, contrary to the provisions of the Wireless Telegraphy Act 1949.

The latest list, covering reports of court hearings from 3 January to 3 July 1973, includes 32 cases of successful prosecutions. Penalties ranged from three months' imprisonment concurrent on each of five charges and forfeiture of equipment, and fines up to £150 and confiscation of equipment, to conditional discharge.

Members will be pleased to learn of the MPT's success in tracking down pirates, although we have no way of knowing if they were operating in the amateur bands.

Stolen equipment

The Bristol Amateur Radio Club has had its HW100 transceiver stolen from its premises. To assist recognition of the transceiver, which has an easily removed serial number, the following information will be of assistance: (i) home-built power supply; (ii) circular scratch marks on dial made by calibrator; (iii) additional valve (2E26) fitted for field-day operation; (iv) 6146/2E26 heater changeover switch fitted on rear panel; (v) SO239 aerial socket replaces Belling-Lee.

Any information which will lead to the recovery of the equipment will be welcome and treated in confidence. Contact G8BIR or G3TKF, tel 70271 ext 26 and 28 respectively, both QTHR, or Bristol Police, tel 22022 ext 759.

Back to basic principles?

Interference on 45MHz affecting television Channel 1 was traced to an emergency lighting unit. The Post Office investigating officer concerned with the case visited the manufacturers and suggested that a much simpler method of charging batteries might be employed. This was to use a resistor instead of a transistor regulator to limit the charging current and to substitute relays for the transistorized switching circuit for switching in the battery.

The suggestion was adopted by the firm, who built a new unit that did not cause interference.

Acknowledgement is made to the Ministry of Posts and Telecommunications for permission to quote this case from their records.

Licence figures

The Ministry of Posts and Telecommunications advises that the following numbers of amateur licences were in force at 31 July 1973:

Class A	14,756	Class B/M	1,029
Class B	3,936	Television	249
Class A/M	3,037		

RSGB Diamond Jubilee—GB3RS

Between 19 and 28 October, GB3RS will be operated from Tonbridge School, Kent, by members of Tonbridge School Radio Society, under the supervision of Tim Hughes, G3GVV, Immediate Past President of the RSGB (Director of Technology at Tonbridge). Operation will be on all bands from 3·5 to 28MHz, using A3J. A special QSL, sent via the bureau, will confirm all contacts.

RACAL 1973 Giant "Junk" Sale

Amateurs and radio enthusiasts are invited to attend the 1973 Giant "Junk" Sale which will be held at St Sebastian's Hall, Nine Mile Ride, Crowthorne, Nr Wokingham, Berkshire, on Saturday 27 October. Doors open at 2pm.

The "junk" to be sold consists mainly of electronic assemblies and materials, old test gear, instruments and electronic components that are surplus to Racal's requirements. Everything sold or on offer is "as seen" and subject to no guarantee as to condition or fitness for use whatsoever. However, this, as in past sales, will be reflected in the prices!

Refreshments will be provided and parking space is available in Wokingham Road or in the Hall Compound, but please do not park in Nine Mile Ride, Honey Hill or too close to the cross-roads by which St Sebastian's Hall is situated. Nine Mile Ride runs east and west just south of Wokingham, passing the Road Research Laboratory and connecting the A321 and A3099.

More RAE courses

Members who live in the Crawley, Ilkley, Morden and Pontefract areas should note the following RAE courses currently being offered. These courses have already started, so intending students should contact the course tutor or college for details of enrolment. (For a complete list of courses compiled from information supplied by the colleges, see pages 533, 602 and 603 of the August and September issues of *Radio Communication*).

Crawley, at the Ifield Evening Centre, every Monday, 7–9pm. Details from course tutor G3VKQ, 7 Briarwood Close, Pound Hill, Crawley, Sussex, tel Pound Hill 2036.

Ilkley, at the Middle School, Valley Drive (for the Airedale and Wharfedale College of Further Education), every Tuesday, 7.30–9.30pm. Details from course tutor G8FUW QTHR, tel Menston 3160.

Morden, at Merton Technical College, London Road, Morden, Surrey, on Wednesdays, 7–9.30pm. Contact C. E. Travers, tel 01-640 3001 ext 52, for further details.

Pontefract, at Knottingley High School (for the Pontefract and Castleford Institute of Further Education), every Wednesday, 7–9pm. Details from course tutor G3HCW QTHR.

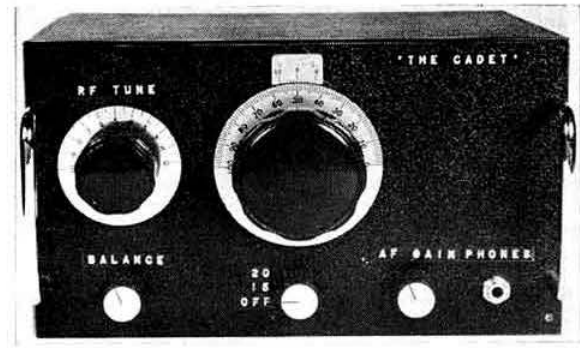
The Cornish Radio Amateur Club is organizing two courses this year. One is at **Camborne**, at the Technical College, on Mondays commencing 22 October, under the guidance of C. Bowden, G3OCB QTHR, tel Stithians 480. The other is at **St Ives**, at the County Secondary School, under the guidance of D. W. Blackford, G3NPB QTHR, tel St Ives 5438. This latter course began on 1 October. For further details contact either the course tutors, or G3NKE QTHR, tel Camborne 2419.

There is also a course in progress at **Chatteris**, Cambs, at the Cromwell Community Centre, every Wednesday, at 7.15 pm. First class was on 12 September.

The Cadet

A direct conversion receiver for the novice

by J. YOUNG, BRS33339*



Introduction

The receiver described is a direct conversion type intended for the reception of ssb and cw amateur stations. It is simple to construct, inexpensive to build, yet capable of performing as well as many of the more complex and more expensive superheterodyne receivers. Although intended as a project for the novice it should also prove an interesting project for the more experienced constructor, for use as a stand-by receiver for home station or portable use.

It is designed for the 14 and 21MHz bands but may be constructed as a single-band receiver by omitting the band-change switch and one oscillator coil. It may be further simplified by omitting the af filter and rf amplifier but at the cost of performance.

The operation of the direct conversion receiver is to convert the incoming signal directly to audio frequencies and to amplify them with a high gain, low noise audio amplifier—unlike the superheterodyne receiver where the incoming signal is converted to an intermediate frequency, amplified, and then demodulated to recover the original information. In the direct conversion receiver the incoming signal is fed together with the local oscillator to a balanced mixer, the local oscillator being tuned to the same frequency as the incoming signal. The output of the mixer, after filtering, is the sideband information of the incoming signal. This is then amplified by the audio amplifier.

Circuit description (Fig 1)

A field effect transistor was chosen for the rf amplifier as it was far less prone to cross modulation than the bipolar transistor, and a common gate configuration was used to provide a low input impedance for the aerial or atu as it does not require neutralizing. A bipolar transistor rf amplifier is also shown for those who wish to use it. No band switching is required for either amplifier, as the tuning covers both bands. The rf amplifier will increase the gain of the receiver and improve the signal-to-noise ratio but may be omitted if a lower performance is acceptable, in which case a two-turn link is wound on the cold end of L1 for the aerial, or the aerial may be connected via a 47pF capacitor connected to the hot end of L1.

The mixer is a simple two-diode balanced type with the balance potentiometer brought out to the front panel. This is done so that when band conditions are good, and strong a.m. broadcast transmitters may break through, a small adjustment to the balance potentiometer will remove them. Both silicon and germanium diodes have been used in the mixer, and both work well. It was, however, easier to find two silicon diodes that were closely matched.

The audio filter is a three-section LC network. The inductors can be wound on ferrite pot cores or on ferrite rings. The cut-off frequency of the filter is 3kHz.

In the af amplifier three low-noise transistors are used. The gain control is between the first and second stages. By doing this the amplifier is not at full gain except when the gain control is at maximum. This keeps the noise level down.

The local oscillator employs a field effect transistor in the well known Vackar circuit. This type of oscillator is far more stable than any of the transistor circuits tried. An emitter follower is used as a buffer stage to prevent pulling of the oscillator during the tuning of the front end. No retuning has been found necessary during QSOs lasting 15min or more, and no form of stabilization has been used.

Construction

This receiver has been constructed, in single and dual band versions, in various cases from die-cast boxes to ex-surplus equipment cases. The choice is left to the constructor. Only one will be described here for the benefit of the novice, a simple front panel and chassis housed in a metal or wooden case. If the wooden case is used it should be lined with aluminium cooking foil. The front panel is a 9in by 5in sheet of aluminium or steel, and the chassis is 9in by 5in by 2in deep.

First mark out and drill the front panel, Fig 2, and chassis. then mount the rf tuning capacitor, balance potentiometer, af gain control and phones socket. The oscillator tuning capacitor is mounted on the top side of the chassis and a 3-to-1 reduction drive (or better still a 10-to-1) is mounted in line with it on the front panel. The remainder of the oscillator components, including the band switch if required, are mounted underneath the chassis. See the photographs for top and bottom layouts.

Start with the rf stage, keeping all wiring as short as possible. The leads from the two-turn link on L1 are passed through the chassis and connected to the balance potentiometer. Mount a tag strip or terminal posts to take the diodes and rf choke.

The next stage is the oscillator. All the components of this stage are mounted on a small tag strip behind the coils. Ensure that all the components and wiring in the oscillator

*97 Richmond Avenue, Hillingdon, Uxbridge, Middlesex.

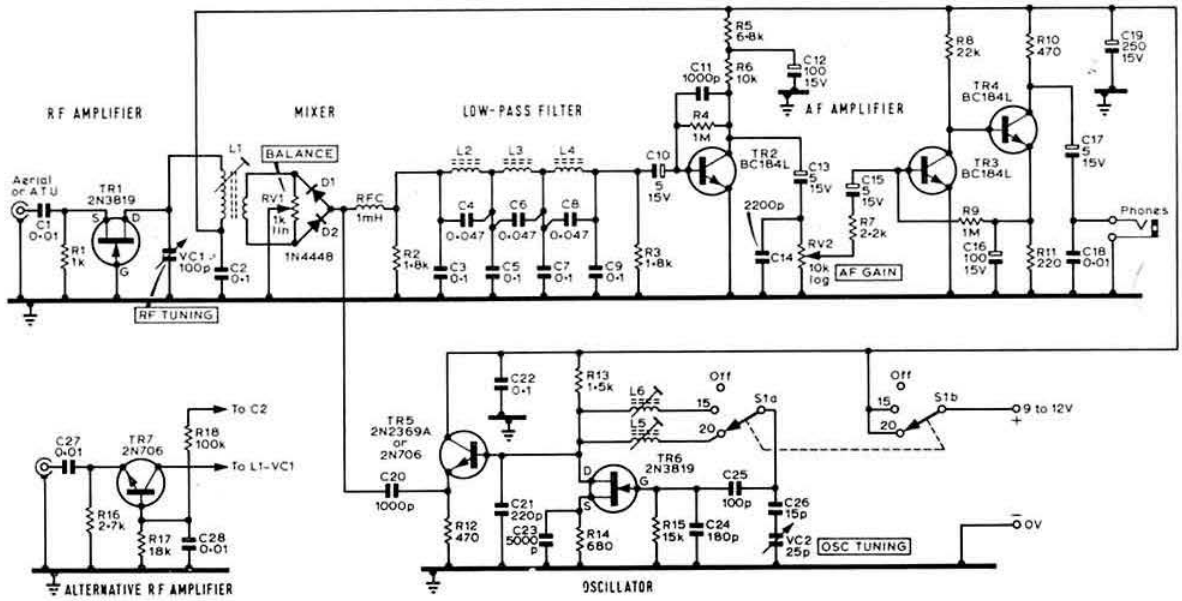


Fig 1. Circuit diagram

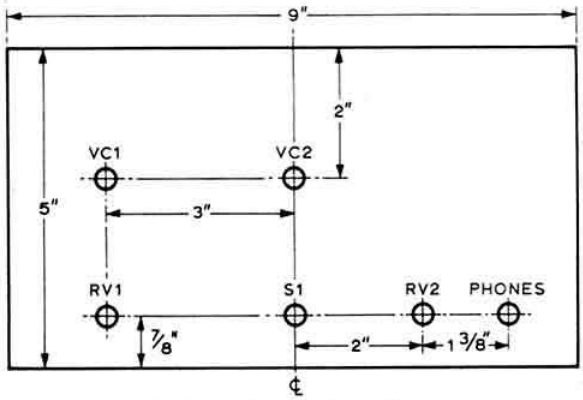


Fig 2. Front panel dimensions

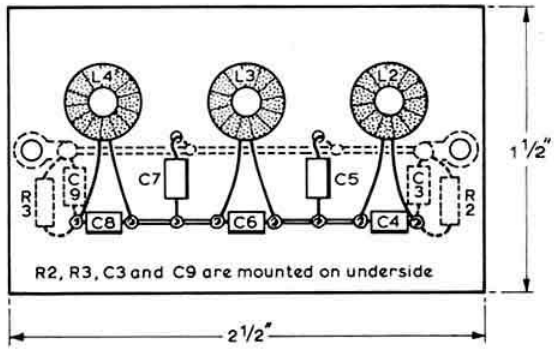


Fig 3. Filter layout

are ridged. The last to be wired in is, of course, the fet. A three-sided screen is then placed around the oscillator section and fixed to the front panel. A screened lead is brought out through the screen to the mixer tag strip.

The filter is the next item to be constructed and it is better to do this before putting it into the receiver, Fig 3. As pot cores were rather expensive it was decided to use ferrite rings, Mullard Type FX1593 wound with 300 turns of 38swg enamelled wire, for the inductors. A simple way of winding them is to make a shuttle, wind on 30 turns of wire, and pass it through the centre of the ring. Such a shuttle can be made from a 3½in length of ⅛in diameter knitting needle with a ¼in slot cut in each end. Before winding the rings rub them gently with fine emery cloth to remove any sharp edges. After winding, coat the completed coils with varnish and leave to dry.

The coils, capacitors and resistors R2 and R3 are mounted on a paxolin board 1½in by 2½in. The coils are held in place with cotton passed through small diameter holes drilled in the board. A 6BA solder tag is placed under both mounting holes on the board and a 16swg bus wire soldered between them to which the capacitors are connected. The board is mounted on two pillars, earthing both ends of the bus wire. A lead is taken from the filter to the mixer tag strip. The output of the filter is connected via a screened lead to the input of the af amplifier. The capacitors may be soldered to pins inserted in the board or their leads may be passed through small holes in the board and connected with tinned copper wire. If constructors wish to use ferrite pot cores for the inductors, Mullard LA2400 or LA1114 may be used and should be wound with 350 turns of 34swg enamelled wire. The inductance should be about 60mH.

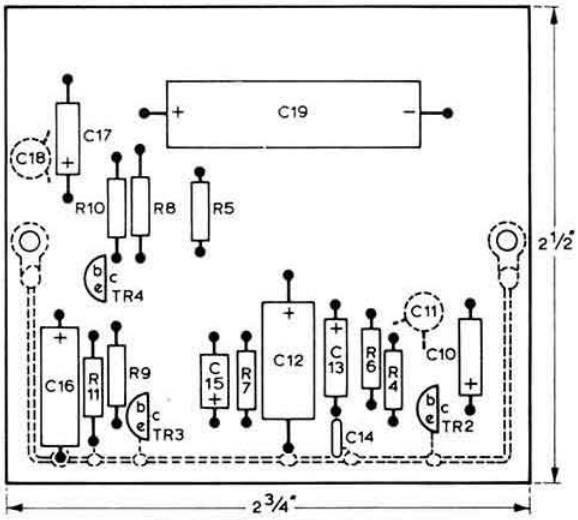


Fig 4. AF amplifier layout

The af amplifier is constructed on a 2¾in by 2½in paxolin board. Again, small holes are drilled in the board to take the component leads which are connected on the underside with tinned copper wire. Transistors type BC109 may be used but the plastic type are to be recommended as they are less likely to be affected by the rf from the oscillator. The BC184L was used in this design. The af amplifier board has a 16swg bus wire which is used for the common (negative) line. This is bent round at the ends and is soldered to the 6BA tags through which the fixing screws are passed and is earthed through the mounting pillars. The layout is shown in Fig 4.

The atu, although not essential, is a very worthwhile addition, particularly when the receiver is to be used with random lengths of aerial wire. The circuit is shown in Fig 6 and was constructed in a die-cast box, RS Components Type 994.

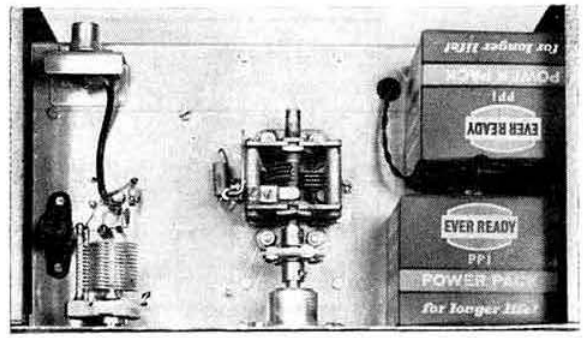
The knobs and dials used were Bulgin but here the constructor has a free choice. The reduction drive was a Jackson epicyclic ball type with a reduction of 10 to 1.

One section of the bandchange switch was used for the ON/OFF switch but whether one uses this or a separate switch is again a matter of choice.

Setting up

First check and then double check all wiring. Then connect two 6V batteries (Type PP1) in series to the receiver, negative to earth. Set the balance potentiometer RV1 to mid-way, and the oscillator tuning capacitor VC2 to full mesh. Switch to Band 1 and with the aid of a communications receiver (bfo on) adjust the tuning slug in L5 for zero beat at 14MHz. Switch to Band 2 and adjust the tuning slug in L6 for zero beat at 21MHz. Do not tune the coil slugs with a metal screwdriver, use a non-metal trimming tool, such as a large knitting needle filed to a blade.

The next step is to connect an aerial and tune the front end. Do this with the receiver switched to Band 1 and the oscillator at about 14MHz. Set VC1 to about 90 per cent of full mesh and adjust the tuning slug of L1 for the



Top view of chassis

maximum output in the headphones. Switch to Band 2 and rotate VC1 again for maximum output. Make a note of where the rf tuning is for each band. If a communications receiver or wavemeter is not available for tuning it is no problem to tune the oscillator until a station is heard.

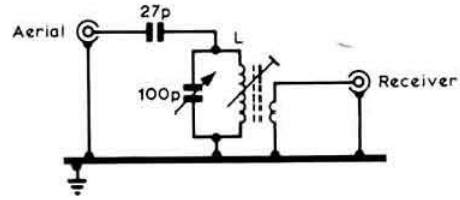


Fig 5. Aerial tuning unit. L — 12 turns of 28swg enamelled on ¼in diameter former with 2-turn link and tuning slug

Components list

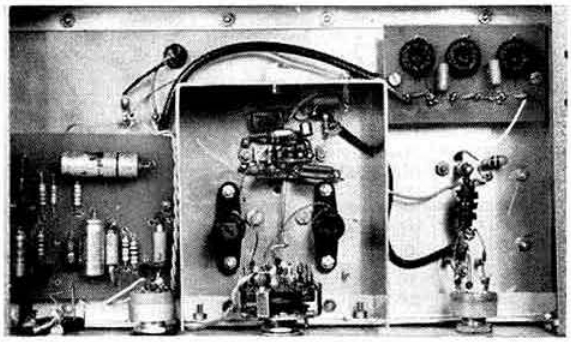
R1 1kΩ
R2 1·8kΩ
R3 1·8kΩ
R4 1MΩ
R5 6·8kΩ
R6 10kΩ
R7 2·2kΩ
R8 22kΩ
R9 1MΩ
R10 470Ω
R11 220Ω
R12 470Ω
R13 1·5kΩ
R14 680Ω
R15 15kΩ
R16 2·7kΩ
R17 18kΩ
R18 100kΩ
RV1 1kΩ lin
RV2 10kΩ log
All resistors 10% ¼W

C1 0·01μF
C2 0·1μF
C3 0·1μF
C4 0·047μF
C5 0·1μF
C6 0·047μF
C7 0·1μF
C8 0·047μF
C9 0·1μF
C10 5μF/15V
C11 1,000pF
C12 100μF/15V
C13 5μF/15V
C14 2,200pF
C15 5μF/15V
C16 100μF/15V
C17 5μF/15V
C18 0·01μF
C19 250μF/15V
C20 1,000pF
C21 220pF polyester
C22 0·1μF
C23 5,000pF sm

C24 180pF sm
C25 100pF sm
C26 15pF
C27 0·01μF
C28 0·01μF
VC1 100pF
VC2 25pF
TR1 2N3819 fet
TR2 BC184L
TR3 BC184L
TR4 BC184L
TR5 2N2369A/2N706
TR6 2N3819 fet
TR7 2N706
D1 and D2 1N4448 or other general purpose silicon diodes. Germanium diodes such as OA79, GEX-66 may be used
RFC1 1mH
SW1 2-pole 3-way wafer

Coil details

L1 12 turns of 28swg enamelled close-wound with 2-turn link wound on cold end
L5 12 turns of 28swg enamelled close-wound
L6 7 turns of 28swg enamelled close-wound
L1, L5 and L6 wound on ¼in diameter formers slug tuned
L2, L3 and L4 300 turns of 38swg enamelled wound on Mullard ferrite rings Type FX1593



Under-chassis view

Conclusion

Although simple, this receiver should not be regarded as a gimmick or as an inexpensive substitute for the superheterodyne. Since the first one using this circuit was built 4½ years ago it has aroused a lot of interest among people familiar with the superheterodyne receiver.

The station log book has entered many stations from the USA, Brazil, Japan and the Continent. It is not by any means claimed to be the ultimate in receivers but it does perform well and is an ideal project for the beginner interested in dx reception. This receiver has a better performance than the R1155A in use at the author's QTH, due to the better signal-to-noise ratio and selectivity.

The cost of the receiver based on advertisements for components in various radio magazines is approximately £5, excluding case and batteries. As most of the components are standard items it is assumed the constructor will be able to acquire these from the odds and ends box or from fellow radio constructors.

The use of ferrite rings for the low-pass filter considerably reduces the cost of the receiver, as the ferrite rings are priced at 5p each compared with £1 each for the ferrite pot cores—a total saving of £3.

The coil formers and variable capacitors may be purchased from Odeon Radio, 148 College Road, Harrow, and the ferrites and other components from Gurney's (Radio) Ltd, 91 The Broadway, Southall, Middlesex.

The author would like to thank the commanding officer, staff and cadets of 14F (Northolt) Squadron, Air Training Corps, for their help in constructing and testing this design.

Notes on a simple aerial arrangement for Oscar 6

by Dr A. GSCHWINDT, HA5WH

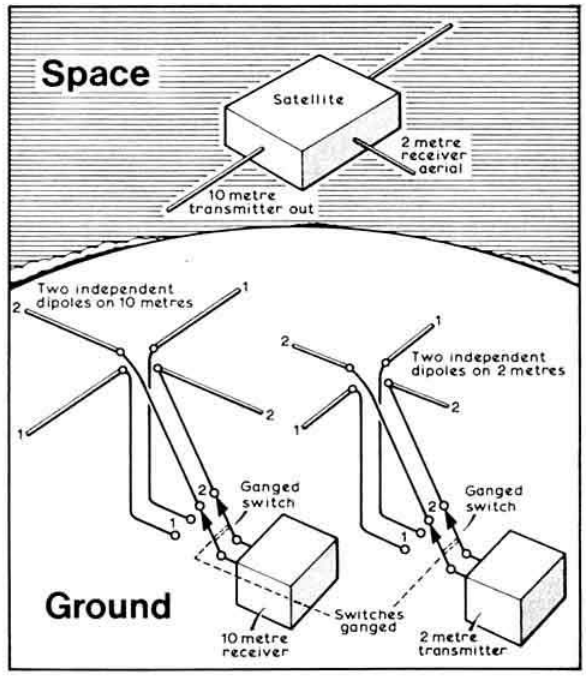
THE motion of the Oscar 6 satellite aerial in space gives deep signal fading when receiving with a dipole fixed in a given direction above the ground. To eliminate this difficulty it is best to use two dipoles fixed at right angles, so that polarization diversity can be achieved using a switch to choose the best aerial for reception.

To elaborate this configuration it would be an advantage to use polarization diversity for transmission as well. The on-board 2m receiver and 10m transmitter aerials are at right angles.

If the polarization distortion of the ionosphere on 10m signals is ignored, a matched ground aerial system can be constructed.

The receiver is fed from the aerial giving the higher signal level via a switch or relay controlled by hand. Within a short time it will be possible to quickly determine which is the best aerial for a given occasion. When the best receiving aerial is selected, the corresponding transmitting aerial will automatically come into use, and in this way the ground 2m transmitting aerial and the on-board 2m receiving aerial will be in the same polarization plane.

By this method 6dB gain over the crossed dipole system can be obtained, and considerable improvement over the two-dipole arrangement. The results will be best in the case of night overhead passes—the polarization distortion effect (Faraday rotation) will be low on the system gain for the overhead orbits.



Use of two pairs of dipoles, one for 2m and one for 10m, with switching as shown here, allows the best aerial to be quickly selected for a particular pass of the satellite.

160m ssb transceiver for portable operation

by K. S. BEDDOE, G3YOM*

Performance

Sensitivity Better than 1μV for 20dB signal-to-noise ratio
Selectivity 2·1kHz at 6dB
4·5kHz at 60dB down
Image rejection Better than 40dB on untuned aerial input (ie long-wire aerial)
Spurious signals One strong signal (4th harmonic of carrier osc) on 1,814kHz could be reduced by screening the cio
AGC action Slight audible change in volume for a signal change from 10μV to 1V, depending on threshold preset setting
Audio power output 100mW
Current drain on receive 110mA with no signal
Transmit output power At least 750mW rms in 30Ω
Sideband suppression Better than 40dB
Carrier supression 50dB down on peak audio
Spurious output Into untuned load 20dB down on main signal (untuned aerials are not recommended)
Standing pa current Set during alignment to 60mA
Peak pa current 300mA

DURING the last 18 months or so there have been many articles in *Radio Communication* describing the merits of the Plessey SL600 series of integrated circuits, when used in ssb equipment. This article describes the results of the author's experiments with these devices in a portable ssb transceiver for 160m.

As can be seen from Fig 1 all the major amplifying and mixing functions in the transceiver are performed by integrated circuits, the only exceptions being the microphone amplifier, vfo and cio where discrete components are used for simplicity. It will also be seen that the pa uses a CA3020A integrated circuit which the author has found very satisfactory for producing 1W p.e.p. output—adequate for walkie-talkie operation, as it does not result in excessive power consumption.

Receive

Signals received by the aerial are coupled via L1, L2 and L3 to the input of the SL610 rf amplifier, front-end selectivity being provided by VC1-L2 and VC2-L4. Amplified signals appear at pin 3 and are coupled into the first mixer (SL640) where they are mixed with the vfo (2·255-2·455kHz); the resultant 455kHz i.f. signal is passed through the mechanical filter and then amplified in the SL612 i.f. amplifier. The signal is then passed for demodulation in the second mixer (SL641) where it is mixed with the output from the 453·5kHz crystal injection oscillator (cio).

The resultant audio is developed across R2 and coupled via C10 to the input of the af pre-amplifier TR1. From here the signal is coupled in to the input of the audio power amplifier via RV2. A proportion of the audio signal from the pre-amplifier is coupled via RV1 and C26 to the input of the agc generator, an SL621, which generates the complex agc voltage to control the gain of the rf and i.f. amps. The audio output is about 100mW.

Transmit

Signals from the microphone are amplified by TR6 and TR7 and coupled into the first mixer via C29. Carrier is injected into the mixer (balanced modulator) via relay contact A3, and the resultant dsb signal passed through the filter to remove the upper sideband. The ssb signal is then amplified by the i.f. amplifier and coupled into the second mixer where it is mixed with the vfo signal. The resultant signal is selected by VC3/L6 and coupled via L7 to the rf power amplifier (CA3020A) where it is amplified to about 1W.

It can be seen that the power amplifier output is untuned, so if the transmitter is used on a long-wire aerial the use of an atu is recommended (the bandwidth of the CA3020A extends to 6MHz).

VFO

This uses the familiar Colpitts circuit incorporating a fet, followed by a second fet which acts as a buffer to prevent "pulling", and a BC108 to increase the vfo output. The vfo should cover 2·255 to 2·455MHz.

Muting and transmit receive switching

These are accomplished by relay A: contact RLA1 changes the aerial from transmit to receive; contact RLA2 mutes the receiver on transmit via D1, D2 and D3, and the transmitter when on receive via D4 and D5; contacts RLA3 and RLA4 reverse the inputs to the first and second mixers. A full diagram of the switching circuitry is given in Fig 3.

Alignment

Receiver

First check the vfo to ensure that it covers the band 2·255-2·455MHz—if not, adjust the slug in L8 until it does. With the equipment on receive temporarily earth the agc line (or set the agc potentiometer to zero) so that no agc voltage can be generated.

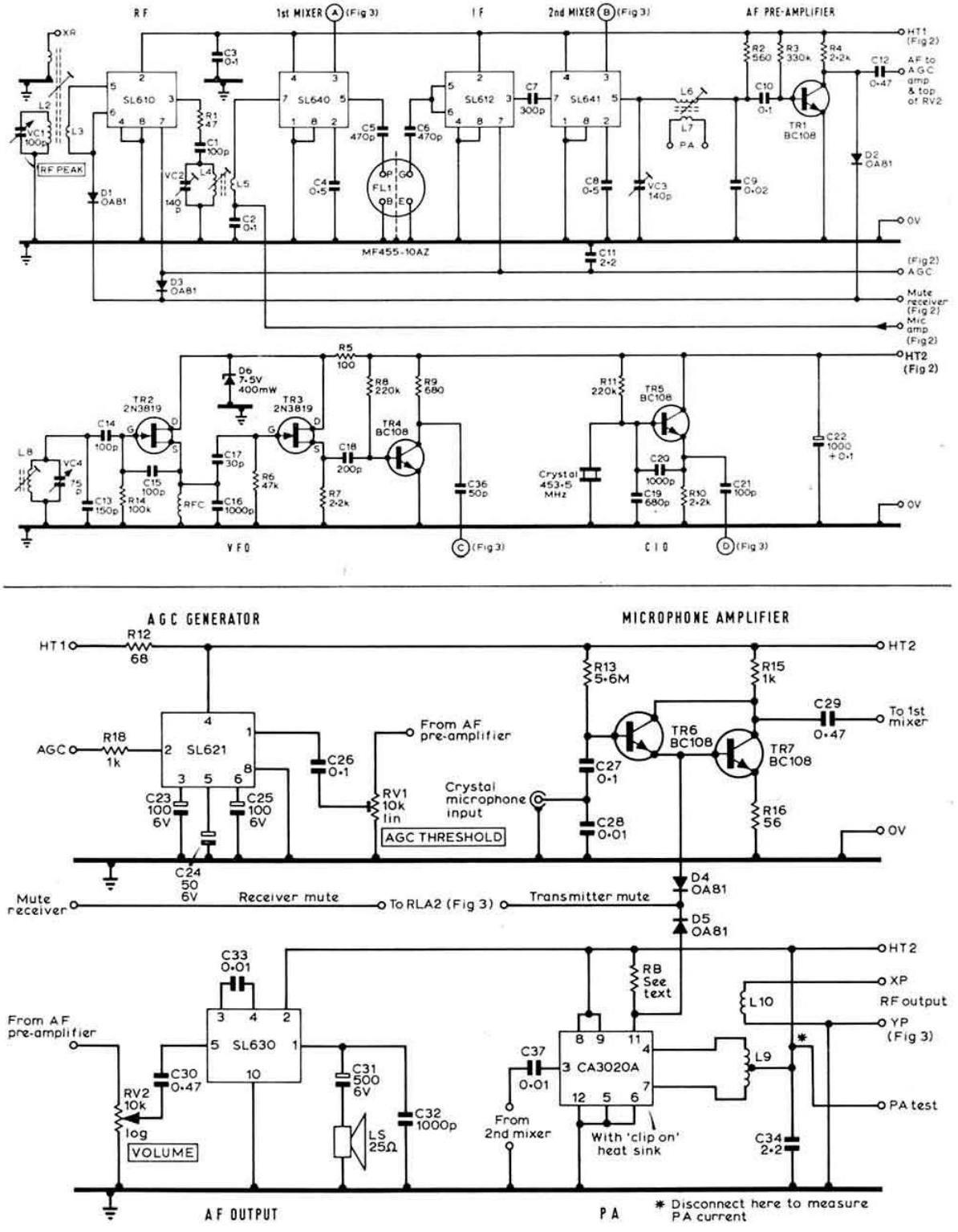
Loosely couple an aerial to pin 3 of the rf amplifier, tune to a strong signal such as a beacon, and tune VC2 for maximum loudspeaker volume. Then connect the aerial to the

On facing page

Fig 1. (top) The i.f. and oscillator stages of the transceiver

Fig 2. The af output stage, pa stage, agc generator and microphone amplifier

* 1 Garstons Road, Titchfield, Fareham, Hampshire.


RF
1st MIXER (A) (Fig 3)
IF
2nd MIXER (B) (Fig 3)
AF PRE-AMPLIFIER
SL610
SL640
SL612
SL641
MF455-10AZ
RF PEAK
HT1 (Fig 2)
AF to AGC amp & top of RV2
0V
(Fig 2) AGC
Mute receiver (Fig 2)
Mic amp (Fig 2)
HT2 (Fig 2)
TR1 BC108
TR2 2N3819
TR3 2N3819
TR4 BC108
TR5 BC108
Crystal 453·5 MHz
VFO
C10
(Fig 3)
CIO
(Fig 3)
AGC GENERATOR
MICROPHONE AMPLIFIER
SL621
From AF pre-amplifier
AGC THRESHOLD
Crystal microphone input
TR6 BC108
TR7 BC108
To 1st mixer
Mute receiver
Receiver mute
To RLA2 (Fig 3)
Transmitter mute
D4 OA81
D5 OA81
SL630
From AF pre-amplifier
VOLUME
CA3020A
From 2nd mixer
With 'clip on' heat sink
XP
RF output
YP (Fig 3)
PA test
AF OUTPUT
PA
* Disconnect here to measure PA current

equipment input and tune to a weak signal, ensuring that VC1 sharply peaks the signal.

The agc preset should now be adjusted so that a sensitive voltmeter connected between the agc line and earth registers about 2V on a moderate signal. The final adjustment of this is a matter of personal preference; in the author's case it is set to operate at 10μV. The agc starts to control the rf and i.f. amplifiers when the agc voltage is 2·1V.

Transmitter

(The receiver should be aligned before transmitter alignment is attempted).

Insert a milliammeter at the pa test point and operate relay A. Adjust resistor RB (about 680Ω) until standing pa current is about 60mA.

Replace the aerial with a 30Ω resistor and feed a tone into the microphone, tuning VC3 for maximum pa current. Make a check on another receiver to ensure that the output is on 160m and *not* 2·6-2·8MHz.

Construction

The author's transceiver is built in an aluminium box measuring 6 by 8 by 3in, and the vfo is enclosed in a small diecast box mounted inside the aluminium box. The drive mechanism used is a small vernier dial marketed by Eagle Electronics.

The main circuitry is mounted in a small t in box: however, the audio and rf power amplifiers are mounted on a separate piece of copper laminate board (both within the small chassis). The layout is shown in Fig 4.

The loudspeaker is mounted inside, and holes drilled in the top of the box.

The cable connecting the vfo and cio must be screened; use can be made of the miniature screened microphone cable which is readily available at electrical stores. Since all the inductors except the vfo coil are of pot core assembly, no screening between sections should be necessary.

Whatever the main circuit is constructed on, it is very important that no earth loops occur, in which context the author does *not* recommend the use of stripboard. A local amateur who copied this design, using copper laminate board, soldered all earth connections to the copper surface and experienced no instability problems whatever.

Operation

The equipment is used by the author for portable and mobile activity, and also as a main station. When portable using a 42in telescopic whip aerial, and with the equipment hand held, reliable contact can be made over eight miles. If a small neon is held in the hand and the glass touched on the side of the whip, it can be used as a tuning indicator to establish the correct adjustment of VC5, indicating whip resonance. The adjustment should be optimized if maximum range is to be achieved.

For a mobile aerial the author uses a G-whip mounted on the car. Switch S1 should be closed for this type of use, to short circuit the loading coil inside the transceiver and to give a low-impedance output. Contacts over 50 miles have been made running only 1W p.e.p. output into the mobile aerial.

When the equipment is used from the main station, S1 is again closed, and in the author's case a 50ft end-fed aerial is used with a series-tuned atu. The furthest dx worked by the author so far is G3LYW located in Bath, Somerset.

Components list

CAPACITORS

C1	100pF ceramic	**C2**	0·1μF poly
C3	0·1μF poly	**C4**	0·5μF poly
C5	470pF ceramic	**C6**	470pF ceramic
C7	300pF ceramic	**C8**	0·5μF poly
C9	0·02μF ceramic	**C10**	0·1μF poly
C11	2·2μF tantalum	**C12**	0·47μF poly
C13	150pF sm	**C14**	100pF sm
C15	100pF sm	**C16**	1,000pF sm
C17	30pF sm	**C18**	200pF ceramic
C19	680pF ceramic	**C20**	1,000pF ceramic
C21	100pF ceramic	**C22**	0·1μF poly + 1,000μF elect 6V
C23	100μF elect 6V	**C24**	50μF elect 6V
C25	100μF elect 6V	**C26**	0·1μF poly
C27	0·1μF poly	**C28**	0·01μF ceramic
C29	0·47μF poly	**C30**	0·47μF poly
C31	500μF elect 6V	**C32**	1,000pF ceramic
C33	0·01μF ceramic	**C34**	2·2μF tantalum
C35	1,000μF elect	**C36**	50pF ceramic
		C37	0·01μF ceramic
VC1	100pF tuning capacitor	**VC4**	75pF tuning capacitor (or 100pF with 2 plates removed)
VC2	140pF compression trimmer	**VC5**	30pF tuning capacitor
VC3	140pF compression trimmer		

RESISTORS

R1	47Ω	**R2**	560Ω
R3	330kΩ	**R4**	2·2kΩ
R5	100Ω	**R6**	47kΩ
R7	2·2kΩ	**R8**	220kΩ
R9	680Ω	**R10**	2·2kΩ
R11	220kΩ	**R12**	68Ω
R13	5·6MΩ	**R14**	100kΩ
R15	1kΩ	**R16**	56Ω
RB	680Ω (see text)	**R18**	1kΩ
RV1	10kΩ lin preset	**RV2**	10kΩ log volume control with switch

INDUCTORS Wound on 160/N22* pot core with adjusting slugs, unless specified†

L1	2t	20swg wound on L2
L2	25t	36swg
L3	3t	20swg wound on L2
L4	20t	36swg
L5	3t	20swg wound on L4
L6	30t	36swg
L7	3t	20swg wound on L6
L8	65t	36swg on ⅜in former with dust slug
L9	6t	20swg centre-tapped
L10	4t	20swg tightly wound on L9
L11	30t	36swg (loading coil) dependent on whip capacitance
RFC	2·5mH	
Switch S1		Single-pole miniature changeover, RS components Ltd.

TR1, 4, 5, 6, 7	BC108
TR2, 3	2N3819
D1, 2, 3, 4, 5	OA81
D6	7·5V 400mW zener diode
FL1	Kokusai MF455 10AZ
X1	453·5kHz to match above filter.

Integrated circuits available from SDS Components Ltd, Gunstone Road, Hilsea Industrial Estate, Portsmouth. The CA3020A is fitted with push-on heatsink.

* 160/N22 pot cores are available from Henry's Radio Ltd, 303 Edgware Road, London W2 1BW.

† An alternative former for L1, 2, 3, 4, 5, 6, 7 and 11 is the Neosid toroid 4326/1/F14 red, which is cheaper and smaller than the 160/N22 pot core, but requires the same windings.

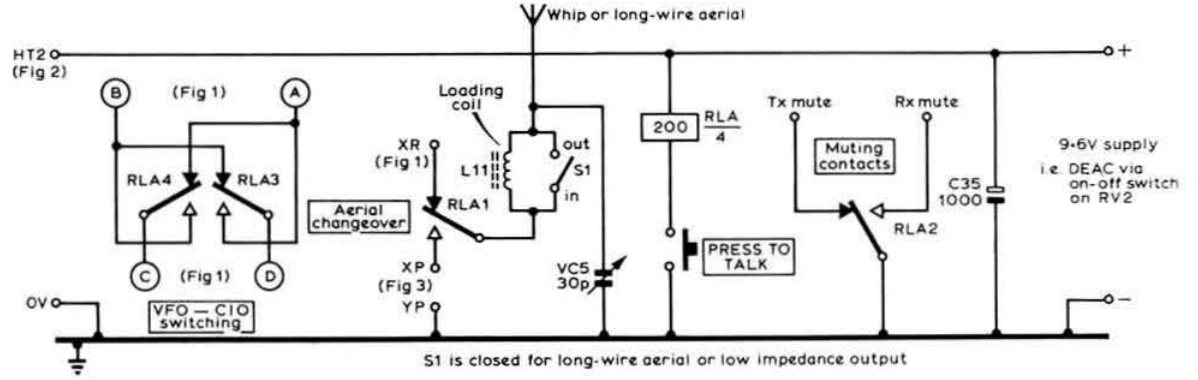


Fig 3. Switching circuitry

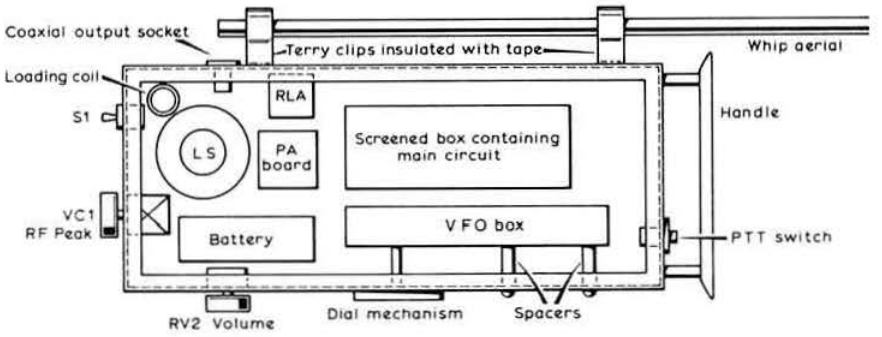


Fig 4. Layout of the prototype transceiver (not to scale). The telescopic whip is fed via a loading coil which can be switched out when a low-impedance aerial is used

If greater portable range is required, some improvement may be made by using an externally-loaded portable aerial. There is plenty of room for experimentation here—the author would be interested to hear from anyone working along these lines.

Power supply

When operating portable it is very desirable to keep the weight of the equipment as low as possible, and the deciding factor is usually the size of the power source. The total power input to the equipment on transmit is about 400mA peak, so small dry batteries are unsuitable. The author uses a nickel-cadmium secondary battery type 1000/DKZ, marketed by Deac, which has a nominal voltage of 9·6 and a capacity of 1Ah. This gives about five hours continuous operating time, and despite the initial cost of the battery (about £7) it is a very worthwhile investment if totally portable operation is contemplated. If operation from a car battery is required, a very simple series stabilizer such as the one shown in Fig 5 can be used.

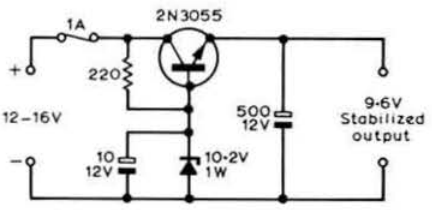


Fig 5. A suggested simple voltage stabilizing circuit enabling the transceiver to be powered from a 12V car supply

Conclusions

The overall performance appears to be very good, the agc action is superb and has to be heard to be believed. No overloading occurs, even within 6ft of a main station running the full legal limit.

Selectivity is very good due to the mechanical filter, and sensitivity is such that, in the evening, stations from all over the country can be heard.

INTERFERENCE PROBLEMS

Members accused of causing interference or who suffer interference from external sources are invited to seek the assistance of the Interference Committee in solving their problems.

Enquiries should be addressed to: The Chairman, Interference Committee, RSGB, 35 Doughty Street, London WC1N 2AE.

EQUIPMENT REVIEW

The Heathkit HA-202 144MHz fm amplifier

by R. F. STEVENS, G2BVN, and

G. M. C. STONE, G3FZL

ALTHOUGH primarily designed for use with the Heathkit HW-202 transceiver, the HA-202 can be used with any 144MHz transmitter having an output in the range 6 to 12W. It provides a power gain of 6dB across its working range, which in some circumstances can provide solid copy from a signal that would otherwise barely be readable.

Circuit description

The amplifier has input and output impedances of 50Ω, and a portion of the input signal is rectified and used to drive a 2N3641 into conduction, causing relay K1 to close. This connects the input socket to the amplifier input, and the output socket to the amplifier output; when not energized, the input and output sockets are connected together to provide a direct path for reception. It was found that the relay dropped out at 0·5W rf input and pulled in at 1W rf input. Matching circuits provide the necessary impedance transformation for the input and output of the two amplifier transistors.

The HA-202 does not contain any sensing circuitry to disable the amplifier in the event of appreciable vswr, but protection is provided by sensibly-rated transistors mounted on very adequate heat sinks.

Construction

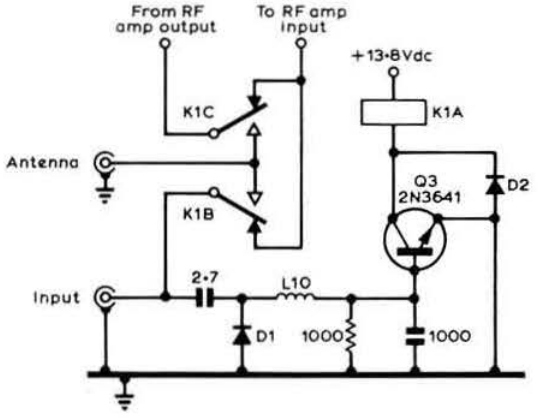
The assembly is straightforward and can be expected to occupy about four hours. There are one or two steps which require particular attention, and the usual helpful Heathkit manual provides guidance which should not be ignored.

Technical data

Frequency range	any 1·5MHz segment between 143 and 149MHz
Power input and output	see text and graph
Input and output impedance	50Ω
Power requirements	12 to 16V dc at 7A, negative earth
Input vswr	1·5 : 1 maximum
Output vswr	3 : 1 maximum
Size	3in by 4¼in by 5⅝in deep excluding mounting flanges which add 1¼in to width
Weight	2lb

Heathkit 144MHz fm amplifier HA-202, in kit form, £38.50 (including VAT); carriage 44p extra. Obtainable from Heath (Gloucester) Ltd, Bristol Road, Gloucester GL2 6EE

A generous supply of heavy-duty connecting wire is supplied with the kit, together with about 15ft of RG-58A/U coaxial cable, although, due doubtless to the USA origin of the kit, the rf connectors are phono plugs and sockets. Although often reassured that this type causes no noticeable deterioration in performance at 144MHz, and with the modest power levels involved, the reviewers would prefer to see a better rf connector.



Circuit of the aerial switching arrangement. Notations are those used in the Heathkit diagram. Operation is explained in the text

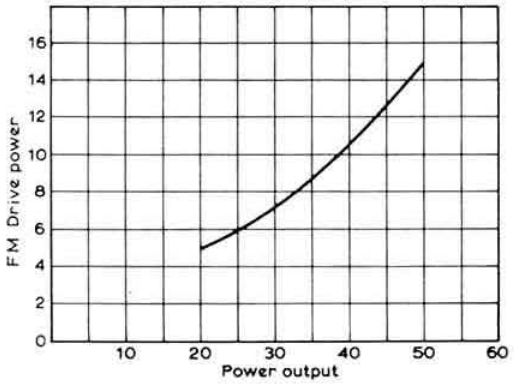
Alignment presents no difficulty and the manual gives two alternative methods. Initial tests indicated that the amplifier was not delivering its rated output, but it did not take long to discover that it was necessary to make the final adjustment

with the amplifier cover in place. In the future, kits will have pre-drilled covers which will permit this adjustment without difficulty.

Performance

It was found during testing that the power input/output characteristic stated by Heathkit related to a dc supply of 13·8V. Figures obtained at this and other voltages were:

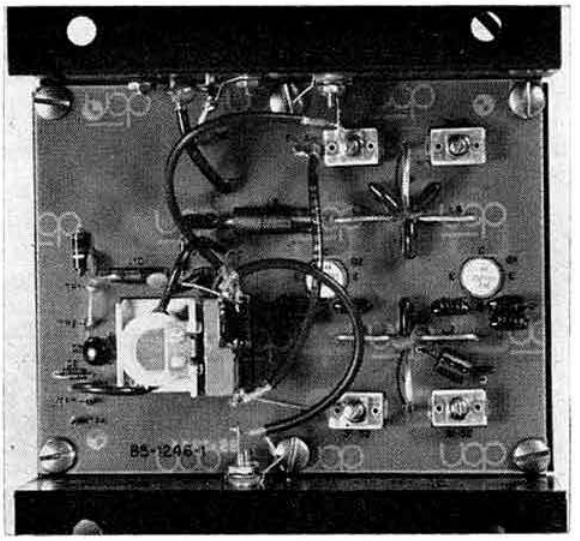
Power in (W)	Power out (W)		
	12V	13·8V	16V
5	20	23·5	25
10	32	38	43
15	36	44	54



RF output power vs drive for the HA-202. This characteristic is accurate when using a 13·8V dc power supply which is the accepted nominal for mobile radiotelephone equipment

Spurious outputs. Measured with 10W of power in, giving 35W of power out.

Second harmonic	−46dB
Third harmonic	−57dB
Fourth and above	better than −60dB

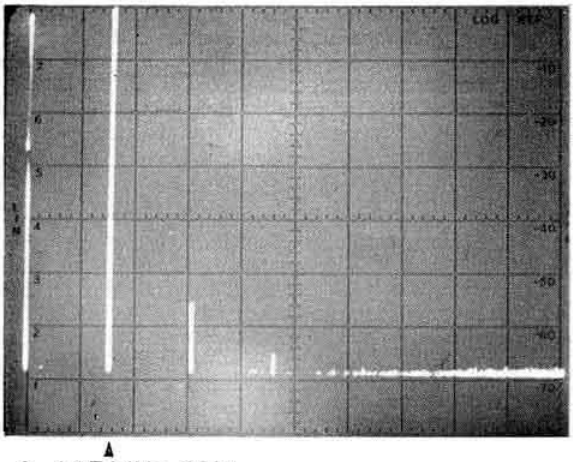


Interior view of the HA-202

The amplifier performs according to the specification and its spurious output performance is considered to be good. It is essentially a practical unit shorn of unnecessary frills and as such offers a good return in watts per £.

Conclusion

The HA-202 is the first of a line of Heathkit equipment designed for the growing number of vhf fm operators, and is primarily intended for use with the HW-202 transceiver which is at present being evaluated for a review in a forthcoming issue of *Radio Communication*. Accessories designed for use with the HA-202 and HW-202 are a new vhf wattmeter (HM-2102) and a regulated ac power supply (HWA-202-1). These will also be reviewed in the near future.



The input spectrum, (left) and the output spectrum. The X scale is 100MHz/div and the Y scale 10dB/div

MICROWAVES—1,000MHz and up....

by DAIN EVANS, G3RPE*

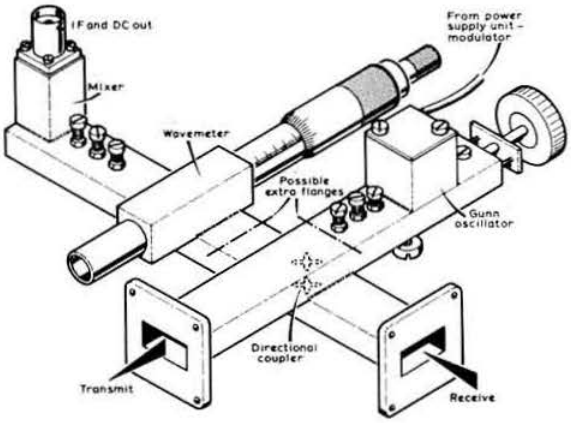
Putting together waveguide equipment

The following outlines a popular way of putting together four basic waveguide components to form a practical transmitter/receiver. The italic references are to *Radio Communication* unless otherwise stated. As shown in the figure, the heart of the unit is a directional coupler, to one port of which is connected an rf source, for example a Gunn oscillator or klystron, and to the coupled output of which is connected a mixer. The mixer current provides a continuous indication of the relative output power of the rf source, which is essential in setting the working voltages of klystrons, and also enables an absorption wavemeter to be used to measure frequency. Alternatively, a transmission wavemeter, which produces a dc output only when it is tuned to the frequency of the rf source, may be used to advantage.

To use the unit as a receiver, an aerial is connected to the receive port, so that the rf source acts as a local oscillator, and the i.f. output is taken from the mixer to a suitable amplifier. To use it as a transmitter, the aerial is connected to the transmit port so that the mixer then simply acts as a power indicator. The most common ways in which these units are used are:

1. As a transmitter/receiver, by connecting an aerial to the appropriate port as described above;
2. As a transceiver, when a single unit feeds separate receive and transmit aerials aligned along the same axis;
3. As a transceiver, with a single unit in which the receive port and the transmit port are connected to a single aerial via a circulator, or magic-tee etc;
4. Two units, one acting as a transmitter and the other as a receiver, connected in turn to a single aerial. This approach has obvious advantages, one of which is that as a transmitter may easily be converted to a receiver, and vice versa, a spare is always available.

For the efficient operation of mixer diodes, they must receive the correct level of local oscillator injection. For diodes of the 1N23 series, this level is approximately 0·25 to 0·5mW; for the SIM2, SIM5, CV2154 and CV2155 series, 0·5 to 1mW, and for Schottky diodes about 2mW. These levels correspond to mixer currents of approximately 0·25 to 0·5mA, 0·5 to 1mA, and 1·5mA respectively (*Vol 49, p618*). The coupling coefficient of the directional coupler required to produce these levels is simply the ratio of the power of the rf source to that appropriate to the mixer diode in use. For a 50mW klystron and an SIM2 diode, this ratio is 50:1, ie 17dB. For a low-power Gunn oscillator of output 5mW to a 1N23 diode, this ratio is equivalent to 10dB. A type of coupler with which coupling up to 9dB can be obtained is described in *Vol 47, p609*. If a lower coupling is possible,



Configuration of a common type of 10GHz transmitter/receiver

then other designs of directional coupler, which are somewhat simpler to make, may be used, for example the round-hole cross-coupler described in *Microwave Handbook, 1972*.

In a typical system employing a 10mW source, a 10dB coupler could be used: of this power, 1mW would be dissipated in the mixer diode, and 9mW would appear at the transmit port (a few microwatts only should appear at the receive port). Note that the input signal power is attenuated in the same proportion, and 10 per cent of the signal is coupled from the receive port to the transmit port and is lost, although the loss is insignificant. When the unit is used as a receiver, the transmit port should preferably be terminated in a matched load as this improves the frequency stability of the rf source. If the rf power even approaches 20mW, then the transmit port should at all times be terminated in a load or an aerial as the radiation level at the open end of the waveguide can exceed the maximum safe level of 10mW/cm².

Some general points on various components will be useful:

Gunn oscillators. The design of a Gunn oscillator is given in *Vol 47, p271*, and other designs, claimed to be more reliable in operation, are being prepared for publication. For a suitable psu/modulator unit see *Vol 48, pp158* and *302*. An associated discriminator/afc amplifier unit is described in an article in *Vol 49, p193*, which also gives some advice on setting up Gunn oscillators. Note that it is worthwhile being able to tone modulate the local oscillator of a receiver as this enables cw signals to be detected. Check any psu carefully for hf and vhf parasitic oscillations.

Klystrons. Information on modifying 723A/B type klystrons is given in *Vol 47, p467*, and *Vol 46, p752*: for the K308

* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts.

klystron see *Vol 47, p759*. For brief details of a psu see *Vol 46 p752*, or, alternatively, *VHF-UHF Manual*, 2nd edn, p5.33, for a mains-powered stabilized psu which could be made suitable for this application.

For duplex working a 30MHz i.f. is standard, and a well-proven amplifier design is given in *Vol 48, p430*: see also the 30MHz discriminator unit described in *Vol 49, p193*. An advantage of using a separate receiver is that any i.f. within reason may be used, and a number of people use a first local oscillator fixed in frequency followed by a tunable i.f. based in standard fm tuners at about 100MHz.

Components. A mixer design is given in *Vol 47, p335*: a 1N23WE diode may be substituted for the 1N415E diode specified. A self-calibrating wavemeter and a high-Q wavemeter are described in *Vol 49, pp106* and *261* respectively. The construction of dummy loads is given in *Vol 48, p741*, and a method of adjusting circulators in *Vol 49, p398*.

Aerials. The design of horn aerials is explained in *Vol 48, p81*. Suitable materials for their construction are brass and copper, with tin-plate an acceptable alternative. Make a small one first, as their geometry can surprise, and horns having a gain greater than 25dB tend to be too bulky anyway. For aerials of higher gain, parabolic dishes are preferred, the design of horn feeds for which is covered in *Vol 48, p229*. Their mounting must be well engineered. The potential range of equipment over line-of-sight paths can be estimated from the data given in *Vol 48, p442*.

BOOK REVIEW

Propagation of radio waves at frequencies above 10GHz, IEE Conference publication 98. Obtainable from: The Institution of Electrical Engineers, PO Box 8, Southgate House, Stevenage, Herts SG1 1HQ. Price £8.70 (members of sponsoring societies £5.70).

With congestion growing on the microwave bands below 10GHz, there is much interest in exploiting frequencies in the millimetric range to carry the vast amounts of information that seems to be an essential part of present day existence. Unlike amateurs, who are happy to take advantage of favourable propagation conditions however brief, communication engineers are preoccupied by reliability of communication—reliability in terms of both maintaining a link and the accuracy with which it carries information. The standards demanded are high: failure rates exceeding minutes per year are unacceptable.

One of the major factors affecting overall reliability above 10GHz is propagation, and the 42 papers contained in this publication deal with the many aspects involved at frequencies up to 118GHz. Much attention is paid to the effect of rain in attenuating signals, a very significant effect at millimetric frequencies. Even the nature of the rain is distinguished, between drizzle, widespread rain and thunderstorms. Other atmospheric absorption effects, on both ground-to-ground and ground-to-satellite links, even the effects due to winds, and noise pictures from tall buildings are covered and two papers deal with the phenomenon of superdiffraction.

Most of the papers are highly readable by amateurs, even the more theoretical ones, and give a good picture of the professional's attitude to communication as well as much experimental data. Some of the installations described are a little unusual: for example, the Post Office experimental link using repeaters mounted on the lanterns of 24 motorway masts—what happens when the bulbs need changing? An ominous note for amateurs was sounded by several papers—that communication bands below 10GHz are likely to become overloaded before the end of the decade. D.E.

Historic "first" from Rathlin Island

The first tv picture received from Rathlin Island at GB3MKB Ballycastle on 6 July. *Photo: GI3GTR.*

The undoubted highlight of the Marconi/Kemp 75th Anniversary celebrations at Ballycastle (reported last month) was the successful transmission of amateur television from Rathlin Island to GB3MKB at Ballycastle. This formed part of the ceremony to dedicate the memorial to the two wireless pioneers Marconi and Kemp and was achieved on 6 July, exactly 75 years to the day since the first wireless signals (the letter V) were received from Rathlin.

The three-man team from the Ballymena Amateur Radio Club was led by Ian Kyle, GI8AYZ, with valuable support from Trevor Huddleston, GI8HUD, and SWL Paul McTaggart. They landed on the island on 5 July and established radio contact with GB3MKB on 144MHz. Setting up of the tv equipment was delayed next morning by heavy rain but by 11am all was in readiness for the attempt after the memorial had been dedicated and the visitors assembled at GB3MKB.

Success was theirs and the quality of the result can be judged from the picture taken from the tv receiver.

Technical details. Vision was on 437·79MHz with audio on 145·8MHz. The transmitter was home-built by GI8AYZ, the basis of which was his 70cm a.m. transmitter. Controlled carrier modulation was used, 625 lines and negative modulation. The power was 2W peak white into the aerial. 18-element parabeams were used at both ends, and at the receive end the signal passed from an Eddystone 990 to the i.f. strip of a standard tv receiver. The camera was a Pye Lynx using a lens modified by Trevor Huddleston. On 144MHz a Pye Cambridge was used on the island and a Murphy MR960 at the receive end.

Souvenir postcards

As part of their Marconi/Kemp commemorative celebrations, Ballycastle Urban District Council issued specially designed souvenir postcards bearing portraits of Marconi and Kemp and hand-stamps of unique design for use on 6 July only. Also carried on the cards are extracts from Kemp's diary which he kept at the time.

For late applications and extra copies the council have had a limited quantity serviced and stamped and these are now on sale. The Corrymeela Community Project, Ballycastle, will benefit from the proceeds of total sales.

Cost: One set of two cards with Ballycastle and Rathlin Island postmarks

and Marconi 9p stamps	35p
or using regional 3p stamps	25p
Single postcard and Marconi 9p stamp	20p
" " and regional 3p stamp	15p

Fuller details were given in May *Radio Communication* pp 308-9. Applications should be sent to: Urban District Council Office, 61 Castle Street, Ballycastle, Co Antrim, Northern Ireland.

TECHNICAL TOPICS

by PAT HAWKER, G3VA

IN *TT* one tries to achieve a rough balance between the simple and useful "gimmick" or aerial that can immediately benefit many of us, and the somewhat more esoteric ideas and projects that reflect new or little known techniques with potential application to amateur radio. This I admit is partly because of an ingrained belief that good ideas do not suddenly spring fully clothed out of nowhere but often develop from the work of many minds over quite long periods of time. Some of the most interesting ideas are those which are not suddenly and universally taken up and exploited but which lie around half-born in old journals or in people's minds or in patents. The industrial research and development organizations often cannot pursue ideas that do not seem to have an immediate commercial application; this has to be left for those in pure research, such as the universities, or the amateur who is often prepared to tackle a problem, like Everest, simply because he recognizes that it is there, or because some past experience has convinced him that conventional practice or theories do not fully explain the phenomenon that he has encountered.

Of course, not every amateur is a born experimenter or is necessarily endowed with special insight—but fortunately some are. So no apologies if, this month, the balance is weighted rather more than usual towards the experimenter. To the casual reader looking for a slick bright idea—your turn will come!

Subjective selectivity—or more cocktail parties

In the August *TT* we put forward a number of views and suggestions on making use of the so-called "cocktail party" effect, including PA0CX's 1958 "frequency-scissors" binaural demodulator for double-sideband a.m. and some proposals from G3OTK on af signal processing to provide stereo type facilities on cw.

What we did not know about at the time was the pioneering and extensive work in the field of cw subjective selectivity by F. J. H. "Dud" Charman, G6CJ, and the clear priority established by him in British Patent No 916,843 "Improvements relating to radio telegraph receivers". This patent, now expired, was taken out by EMI (formal application date 24 January 1958) naming G6CJ as the inventor. For anyone at all interested in this fascinating subject it remains essential reading, describing the arrangements necessary to assist a radio operator to separate wanted cw signals from unwanted transmissions around the same frequency by means of "psychological or subjective" effects. In practice, these arrangements—which have been used by G6CJ over many years—provide exactly the facilities sought by G3OTK, although, as we shall see, they differ in the sense that G6CJ is convinced that the stereo effect is achieved by minute time delays rather than phase differences.

How has it come about that this most interesting and valuable work has remained little known over the years? Well, Dud hinted at the possibilities in his lecture "The human machine as a radio operator" first given on 24 January 1958—though he frankly admits that quite deliberately he has never described his work in any detail except in the patent application. He says: "Well it's nice to have a private secret, especially in competitive amateur radio operating—but really I was aware of the placebo pitfall of psychology and wanted first to get a proper statistical test done, using operators who did not know what was going on, and once it was widely known this would be impossible". The patent was taken out not for financial gain, but rather to establish priority of the work.

One of the problems of making use of the operator's own brain is that we still do not know much about how hearing really works and what goes on between our two ears; not even precisely how we achieve directional effects—this makes it extremely difficult to design the black box of the brain into the radio system.

However, G6CJ believes that it is now evident that we are extremely good at detecting incredibly small differences of *time* of arrival of sounds at our two ears: times so short that it must be done virtually at molecular level. The cocktail party effect thus depends partly on time delays, but also makes use of all other features of the signal including amplitude, waveforms, room echo and the like.

Recent work on stereo has brought to light a good deal of fresh information. It is already possible to take a pair of loudspeakers, provide them with identical inputs and then insert effects that make the sound "walk around" in imitation stereo, successfully fooling the hearing mechanism (if this experiment is repeated with continuous tones, varying only the phase, nothing unusual will be observed). It seems that essentially the ears work on starts and stops (the musician's *attack*) so that morse code is an almost ideal medium for achieving pseudo stereo selectivity.

G6CJ recalls how as long ago as 1925 he was working with phones on a bridge system with two nearly identical 1,000Hz inputs, when all of a sudden the beat note between them began wobbling about inside his head. The effect was so startling that the memory persisted although it was many years before a reference in the classic book by Fletcher began to set him wondering whether this effect could possibly be used to turn the output of a receiver into a stereo presentation.

This was in the mid-thirties when, at EMI, G6CJ was working with such people as Blumlein, the father of modern stereo recording. Unfortunately he never put his ideas to Blumlein, who was later tragically killed during the war while working on airborne radar. Fletcher had shown that the relative time delay for a "side" signal was about 0·6ms and that there would be an amplitude difference of about 1dB when a signal goes round the outside of the head. It seemed feasible to establish such conditions artificially, but this needed networks of a type then little understood even by the experts in this field.

By 1945, "Dud" had made a model using filters with $m > 1{\cdot}0$ to get delay differentials, but it was not very satisfactory in spite of being frightfully difficult to realize. However,

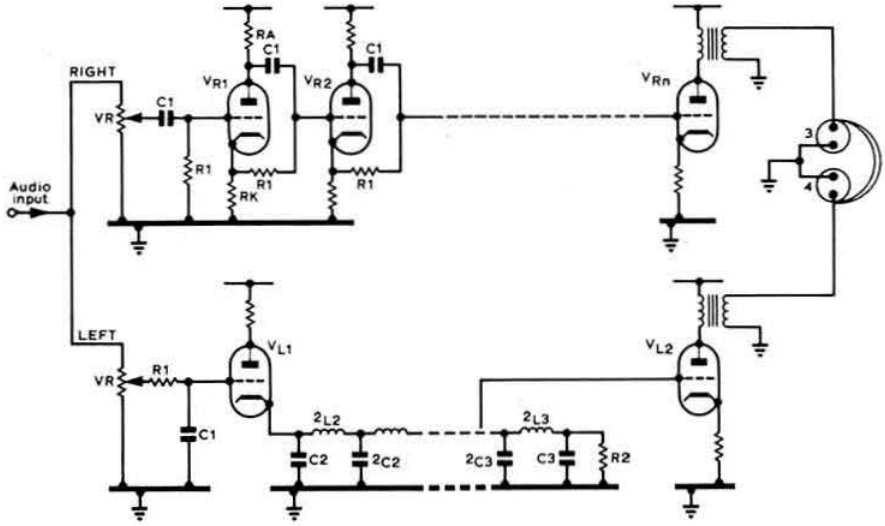


Fig 1. Basic outline of G6CJ's system for achieving a "stereo" effect on cw signals to provide subjective selectivity. This diagram is reproduced from British Patent 916,843 which provides much background information on the advantages offered by such systems compared with narrow-band filters

he then discovered the "all-pass" network and by 1951 had a two-channel amplifier with a delay cross-over at 700Hz. "As soon as I put it on the air I knew I was home—though aware that a psychologist would jump in and say—'Ah, but you wanted it to work that way, so you haven't proved anything'. But I discovered that not only could I concentrate on the signal tuned to the centre (ie the crossover frequency) but also if, for example, a rare callsign turned up on the 'edge' so to speak, I could immediately switch my attention to it."

This seems to be in accordance with Prof Colin Cherry's belief that in the hearing centres of the brain a set of filters enables one to reject extraneous signals and accept a wanted one, but simultaneously the other filters are regularly "sampled" by momentary detachment, a sort of guard-dog operation. He also found that if he went back to single channel, it all sounded dull and empty whereas the binaural presentation was "live".

But, although using this system, it was difficult for many reasons to carry out the sort of development work that would convince others. G6CJ wondered whether a similar effect could be achieved on 'phone but did not think of the use of separate sidebands and quadrature modulation as developed by PA0CX—though, he adds, "Blumlein would have—but then he was dead".

The cw arrangement used by G6CJ had two half-lattice sections with negative differential slope at ω_0 CR = 1 for 350Hz, and four more higher up to extend the linear delay curve, all with valves in between: this was in the "right" channel, so that lower frequency signals were spread to the left, for the same reason suggested by G3OTK—"my dial went that way". The other side was balanced in delay at 700Hz by an eight-section low-pass filter with a cut-off at 2kHz; with also two-section ladder CR high-pass and low-pass sections at the inputs to give amplitude cross-over, all having equal delays. An outline, as given in Patent 916,843, is shown in Fig 1.

It will be evident from this short description that it represented quite a box of tricks, with some 10 valves (six in cascade, thus giving severe stability problems), an expensive collection of LA3 cores, and problems with decoupling which produced its own brand of delay distortion. However, in the end it did what it should—providing about a millisecond/octave delay. This unit was in use at G6CJ up to the time of his last move of QTH about two years ago; its use at the moment is inhibited partly by a loss of sensitivity in the left ear, so that an amplitude cross-over would hardly be necessary.

At one stage he began developing a portable solid-state version, with a view to encouraging a significant number of amateurs to participate in tests—but this work is already obsolete and he feels the whole thing could be done better and more easily with integrated circuits—he feels that it might all be done today with about three 709s and a handful of capacitors and resistors . . . and time to do it.

G6CJ adds that another question still open is whether it could all be done by loudspeakers having just an amplitude cross-over with the head providing the necessary differential time delay. As a result of showing VK5NO his box of tricks, the Australian brought out a loudspeaker version which G6CJ has heard in action but not under conditions in which he could really assess its operation.

So there we are—a great deal of practical work; a great deal of evidence that it does work and does provide additional subjective selectivity; though still not the massive statistical evidence that would be needed to show the true extent of its operational advantage, but nevertheless a truly fascinating research project in the making.

Our thanks to Dud Charman for revealing this work carried out over so many years.

Valve (yes, valve) voltmeter

A *valve* voltmeter with nary a fet or bipolar in sight—and if you think that is strange or old hat, consider a note by Les Yelland in *Australian EEB*: "After all the trouble I had in designing a transistorized millivoltmeter, I dug out my old valve voltmeter, made 10 years ago with no gimmicks . . . linearity was as perfect as I could expect within the limitations of the meter movement itself . . . conclusion: the old

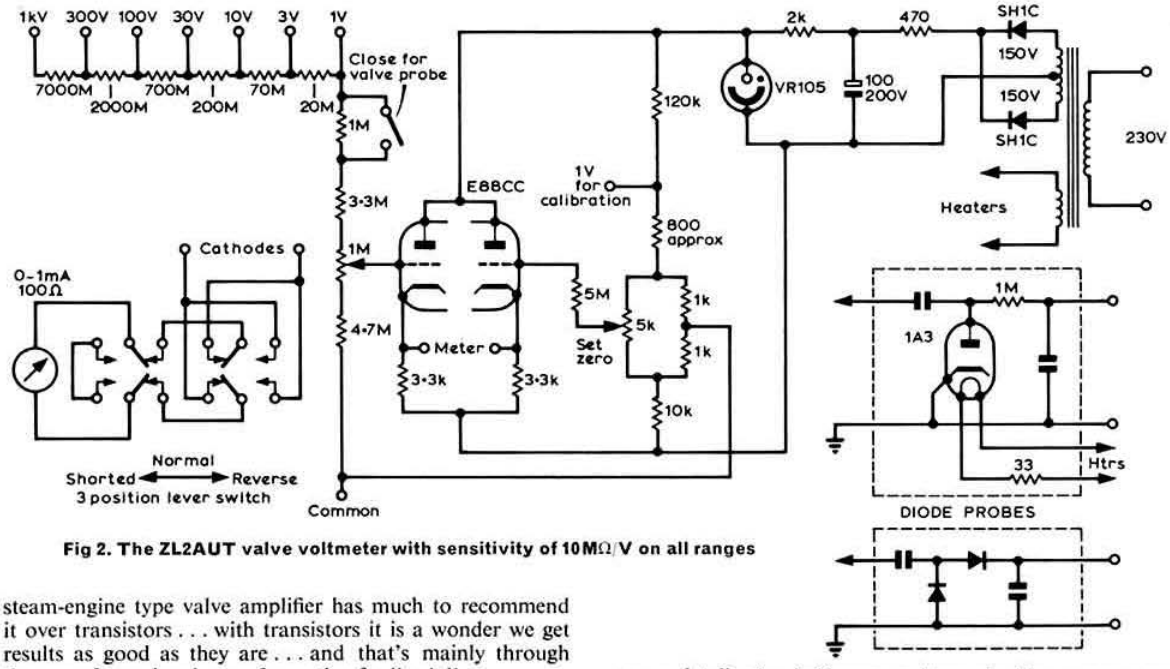


Fig 2. The ZL2AUT valve voltmeter with sensitivity of 10MΩ/V on all ranges

steam-engine type valve amplifier has much to recommend it over transistors . . . with transistors it is a wonder we get results as good as they are . . . and that's mainly through the use of massive doses of negative feedback."

So, as we have suggested before, let us not be hesitant in admitting that the valve is still well suited to some applications (the grid dip meter is another example).

The valve voltmeter design in Fig 2 comes from Lawrie Morton, ZL2AUT, (*Break-In* May 1973); it is by no means the simplest possible arrangement but is intended to provide a high-grade general-purpose instrument with a sensitivity of 10MΩ/V *regardless of range* using a 1mA fsd meter. Most valve voltmeters tap down the input to change range, resulting in there being different sensitivities on different ranges. The ZL2AUT meter gets away from this approach, although it does require some extremely high input resistances on the higher voltage ranges.

The E88CC valve was found to suffer much less from space charge problems than either the 12AU7 (ECC82) or 12AT7 (ECC81) often used in the past for amateur valve voltmeters. One problem which resulted in an early version giving widely erroneous readings was explained by finding that some insulation in the lug strips represented only 100MΩ between adjoining lugs: this may seem a lot until it is realized that the total input resistance on the 1,000V range is 10,000MΩ.!

Great care was taken over the first 10MΩ potential divider since this determines the accuracy of all ranges. A 1V reference point was made for the SET ZERO control and checked as follows: calculate the resistor values to get as close to 1V as possible, and put these in circuit; connect 1V range of meter to 1V point and adjust CALIBRATION control to read full scale; connect multimeter (20kΩ/V) between 1V point and ground, noting where the valve voltmeter drops; finally trim resistor values until this slightly lower voltage is indicated on the multimeter. Then without the multimeter in circuit this point is now 1V above ground and can be used to set the basic sensitivity of the valve voltmeter. ZL2AUT discusses the choice of diode probes in some detail, the half-wave voltage doubler arrangement being used to obtain peak-to-peak figures; silicon power diodes worked to about 10MHz; germanium diodes typically to 30MHz; while the valve probe is preferred for vhf work.

The huff and puff vfo

In presenting recently an outline of the novel technique developed by Klaus Spaargaren, PA0KSB, for stabilizing a vfo over a continuous series of small evenly-spaced incremental steps (*TT* July 1973), we included a plea that anyone who tried the idea should pass on their experience to others. I am glad to say that this has produced a most informative note from that indefatigable trier-out of new ideas—Joe Cropper, G3BY.

What is more, he fully confirms the value of this system (at least to the extent possible from his preliminary work). "So far it looks as though PA0KSB has come up with the answer to the vfo problem," he writes, "when tuning the vfo the frequency varies normally with virtually no sign of 'steps' (the steps can *just* be heard if tuning is fairly fast but at normal careful search speed cannot be heard at all), and then when left stays there. It is *not* a cure for a bad vfo, but the system makes a good one very good."

A mixer-vfo with the vfo in the 5 to 7MHz range was found to have a drift of 500Hz in half an hour without the controller; with it the output stayed within a few hertz for 45min.

That is the good news; now the bad news. G3BY clearly found that the July notes represented only the barest of outlines when it came to implementing the system, and some of the problems might well daunt a less experienced constructor. So we are very glad to be able to profit by G3BY's work, and to add some further explanatory notes on this most promising technique.

He writes: "I decided to give the system a whirl on the grounds that I could see no reason why it should not work.

It does! Of course the circuit you gave was only the very bare bones, and being no authority on digital integrated circuits I had to do considerable digging. I made up the controller on a home-made printed-circuit board, and being no artist this was a bit of a toil. Still, like the masterpieces, it looks good from a distance! It measures 10 by 10cm —and proved ok circuit-wise.

"I used a 100kHz crystal and fortunately found I was getting 2Hz at the end of the divider chain instead of the expected 1Hz (probably because I had not squared off the 100kHz signal and this may have been peaky). This saved me from poking around the final divider to find a 2Hz pin. It proved my only lucky break (old Murphy must have nodded off temporarily).

"For the 100kHz oscillator I tried the SL201 Butler arrangement by G8BUQ (*TT* June 1971) which takes off with every crystal tried; unfortunately my 100kHz one took a fancy to its 1·4MHz mode and I was forced to use an inductive circuit.

"But now I had a gating signal. The main other need proved to be the addition of resistors to the 74121s, as indicated in Fig 3, and the need to put the reset pulse from the final 74121 through one of the unused 7400 gates used as an inverter, since the 74191 sets high. The control voltage output circuit suggested by PA0KSB seems ok but it may prove an advantage to use a 500kΩ resistor and 1MΩ pot, though this does not seem essential.

"The vfo here is about 6,950kHz (mixed with 5,000kHz when output is required on 1,950kHz). I found the input to the controller from the vfo needs adequate buffering as otherwise the gate tends to modulate the vfo and the ripple on the gate supply also appears on the vfo. It is quite feasible to pick up rf from the carrier in the case of A3 and then there is no trouble, but this cannot be done with ssb or cw; however, in my case a tap on the vfo tank coil and fet source-follower was the answer, but this may not apply in all cases.

"There seems to be a sort of warming-up period and I think this is due to the very long time constant of the 1000μF/1MΩ combination for the tuning diode; presumably the control pulses take an appreciable period (say 10min) to charge it to somewhere about midway."

G3BY is a little puzzled that many circuits using the 74121 do not show any resistors, yet he is convinced they form an essential part of their correct operation—certainly in this application. This is the sort of thing which, as he says, can prove very befogging for a beginner.

Watching the control voltage pulses on a scope reminded G3BY very much of the old "hit and miss" gas engine governor where this lifts one of the valves to reduce speed, resulting in a series of "thump, thump, gasp, thump, thump, gasp, gasp" sounds in varying rhythms. He feels the PA0-KSB system needs a name reflecting this governor type action; it would be wrong to think of it as a crystal controlled vfo since the frequency is not derived from the crystal (the tag we used in July was crystal-stabilized vfo which is still a bit out) and could, for example, be controlled from 50Hz mains.

But whatever it is called this seems to be a technique of considerable promise.

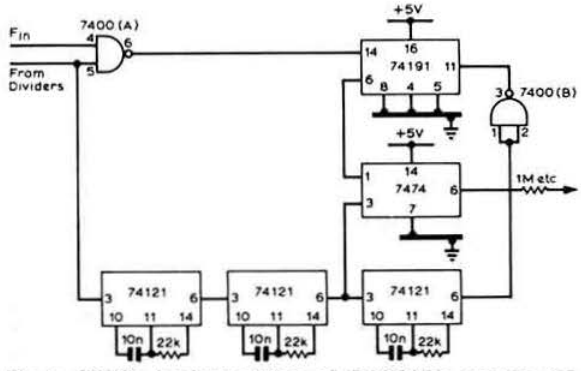


Fig 3. G3BY's implementation of PA0KSB's system for governor-type stabilization of a vfo by means of crystal derived timing periods. Note the additional components found necessary

Fig 4. A convenient means of extracting the vfo signal and applying dc control to varicap stabilizing diode over single coaxial line (G3BY also uses this technique for receiver muting over the same coaxial cable that carries the signals, in this case with the 50kΩ resistors replaced by rf chokes)

Capacitively-loaded vee aerials

Another technique associated with Dud Charman, G6CJ, is the capacitively-loaded aerial, described by him in the *RSGB Bulletin* as long ago as July 1961 (a summary is included in *ART4*) when he introduced a cheap method of making stretched dipoles by using overlapping lengths of 80Ω twin-feeder to form the capacitors. In recent years capacitively-loaded aerials have been the subject of a number of papers in the professional journals as the basis for broadband vhf and microwave aerials.

In his original article, G6CJ wrote: "The capacitively-loaded wire can also be used as an end-fire terminated aerial, but as such is very different from a long plain wire which has a multi-lobe pattern. With the loaded wire there is one main lobe of radiation (conical about the wire) at an angle depending on the load factor n (degree of stretching). The gain is proportional to length but the beam angle is constant. The far end of the aerial is terminated by suitable resistance (Fig 5) connected between the end of the aerial and a quarter-wave artificial earth wire. The single-wire version is the basis of the old EMI tilted-wire television aerial, but needs an impedance transformer and a coaxial line. The vee aerial can be fed with a balanced line of impedance 2R as given with Fig 7. The gain figures shown are basic, but much higher effective gains are obtained over long distances because of the low angle projection of the main beam."

A rather different approach to short vee aerials is reported in *Electronics Letters* 8 February 1973, pp45-46, based on experimental work at the University of Belgrade. This used a stretched microwave element made of a series of brass cylinders with the capacitors (0·9pF) formed by leaving small gaps between the rods; the first gap was 32mm from the feed point and the length of each subsequent cylinder was 2mm less than that of the preceding one. One such aerial had 16 cylinders (ie 15 gaps) of total length of 275·2mm; another had eight cylinders. The aerials were tested over

1,200 to 2,400MHz, although the system proved more effective over 1,800 to 2,400MHz (thus incidentally confirming a point made by G6CJ that these aerials are broadband in the higher frequency direction but not effective at lower than the design frequency).

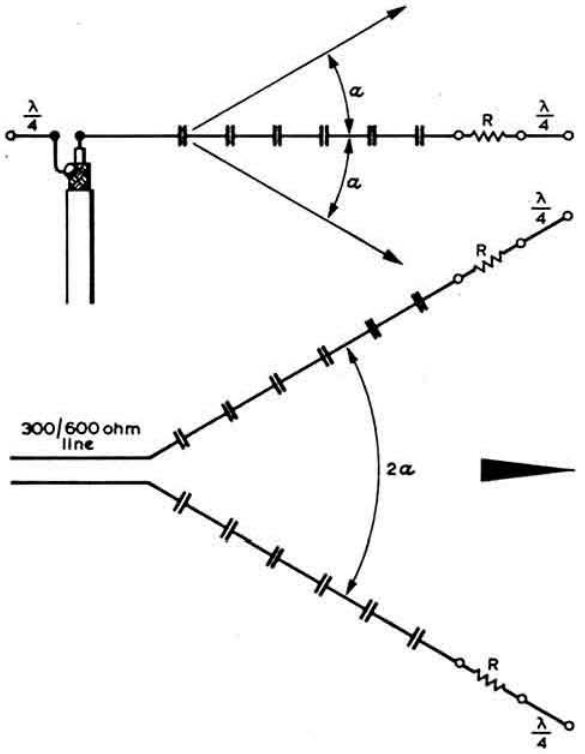


Fig 5. Terminated end-fire aerials using "stretched" (capacitively-loaded wires). The angle α depends only on the loading factor n; gain is proportional to length, with the following figures being typical (from G6CJ's 1961 article):

			Length	Gain
$n = 2$	$\alpha = 30°$	$R = 300\Omega$	$1\frac{1}{2}\lambda$	5dB
$n = 3$	$\alpha = 20°$	$R = 200\Omega$	2λ	6dB
$n = 4$	$\alpha = 15°$	$R = 150\Omega$	3λ	10dB

But the point that seems worth stressing is the following quotation from this item:

"It is well known that an unloaded V antenna has a more directive radiation pattern than a straight dipole of the same dimensions. The properties of such antennas are, however, highly frequency dependent. This deficiency can be radically remedied by eliminating the reflected current wave from the antenna ends. As far as the authors are informed, previous attempts to eliminate this effect were made only using V antennas with resistive loading. Inherently, however, a resistively loaded antenna is a lossy structure, and a substantial part of the power delivered to the antenna is dissipated in the antenna itself.

"It has been shown that, for a straight cylindrical antenna, elimination of the reflected current wave can also be obtained by reactive loading along the antenna. If folded (ie bent round) to form a V antenna, this structure could be expected to continue to sustain travelling waves. In this manner a loss-less broadband V antenna might be obtained . . . this letter presents some experimental results for capacitively-loaded V antennas."

The published results show that a main lobe is maintained well over the range 1,800 to 2,400MHz. It should be appreciated that the form of aerial investigated in Yugoslavia was virtually a stretched dipole bent into a V (or, more strictly speaking, one leg of this against a ground plane) and not the long-wire type of vee. But these results support the view that capacitively loaded elements offer unique properties that deserve further investigation at hf and vhf.

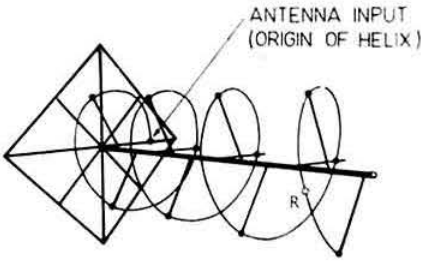


Fig 6. The 136MHz space telemetry helical aerial with optimized parameters as described in the Czech journal of *Tesla Electronics* (English language). Length (boom) 280cm; diameter 90cm; pitch angle 12°; reflector 116 by 116cm; input impedance 150Ω. Gain 12·7dB; beam width (—3dB) 43°, front-to-back ratio 15dB; maximum side-lobe level 11dB. This can also be used to form an array of four helical aerials

Another aspect of resistive loading in conjunction with a quarter-wave artificial ground wire was noted recently in *Tesla electronics* (No 2/72) in an article describing the optimization of parameters for a 136MHz helical aerial for the reception of space telemetry signals. This shows that in a helical aerial of moderate length improved overall results and reduced side lobes can be achieved by the insertion of a resistor a quarter-wave from the helix end. This is because a helical aerial of only a few turns does not radiate the entire energy propagating along the structure. The energy not radiated is reflected from the end and results in side-lobes and impairment of matching; it also impairs the polarization circularity. The article shows the improvement obtained with a 155Ω resistor in a four helix array having a gain of 16dB: Fig 6 shows the basic helical element with terminating resistor.

Polyphase system for ssb generation

All amateur transmitters employ one of three systems for generating ssb: (1) the filter method; (2) phasing ("out-phasing" or quadrature) method: and (3) "third method" (Weaver or Barber system). At present the vast majority of commercially manufactured rigs use the filter method despite the relatively high-cost of good ssb crystal or mechanical filters. The disadvantage of the phasing method is the precise component values needed in the phase-shift networks which in practice usually limit sideband suppression to about 30–40dB. The disadvantages of the third method are the extra modulators and the appearance of an af tone unless the second modulators are truly balanced.

It would be exciting to report that some entirely new method of ssb generation has been developed which combines all the virtues and none of the vices of all three systems:

providing say 60dB of sideband suppression at low cost and without unduly critical component values. It would be even more sensational to publish a circuit diagram showing exactly how to assemble such a system.

I cannot do the second—but it is possible to draw attention to an article which explains the principles of a system which seems to fill most of the requirements: "Single-sideband modulation using sequence asymmetric polyphase networks", by M. J. Gingell, of STL, in *Electrical Communication* Vol 48, No 1-2 (combined issue), 1973 pp 21-25.

My difficulty is that even after reading it through several times and phoning the author, I find it difficult to attempt to translate a pretty involved and complex paper into terms which I (and, I suspect, many readers) would understand. Still less do I feel capable of presenting design details, although I am assured that the article provides all the information required to set about doing this—especially when taken together with an earlier description of a FET modulator (*Electrical Communication*, Vol 44 Nr 2 1969).

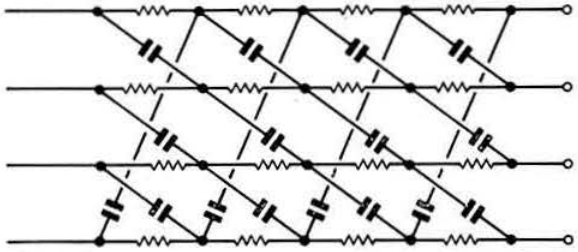


Fig 7. Four section, four-phase RC polyphase network

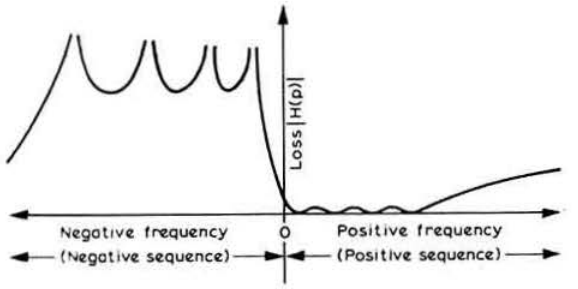


Fig 8. Insertion loss characteristics exhibited by a sequence asymmetric filter for positive and negative sequence inputs

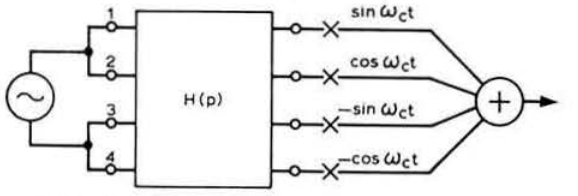


Fig 9. Sequence asymmetric filter in ssb modulator

It is claimed that a sideband suppression of 60dB can be achieved consistently in a polyphase network of capacitors and resistors whose tolerances can be as much as ± 2·5 per cent at the input section to about ± 0·2 per cent at the output. In fact, by adding or taking away extra sections one can design for varying degrees of performance and component tolerance. Up to 70dB of suppression has been achieved. The work was carried out in connection with line telecommunications at around 100kHz, but Michael Gingell believes that the system would be quite feasible at hf and can see no reason why it should not be used by amateurs.

I hope that by drawing attention to this novel technique I may stimulate somebody who understands or can grasp how a sequence asymmetrical polyphase filter really works and how it could be designed into an ssb generator suitable for amateurs to build. It would be possible to make a bit of communications history by doing so, since I gather that no commercial applications have yet appeared. So how about it somebody?

Modified third-method ssb generation

On a number of occasions in *TT* in 1971 (and in *ART4*) we reported ideas for using digital logic techniques to obtain signals in quadrature for use in ssb generators. These included reports by GI3VOB (January 1971), GD3XNU (June 1971) and an account from G3UEZ (September 1971) of his work on third-method ssb generation using fet balanced modulators and with the 90° phase shifts provided very simply by j-k flip-flop devices. Now a detailed account of such use of ttl logic in conjunction with third-method ssb generation appears in *Wireless World* (September 1973) by A. J. Turner, G3UFP, and once again confirms the validity of this approach, describing a generator capable of operation up to a few megahertz using two SN7473s to obtain quadrature square waves (the clock input is at four times output frequency) for his two balanced modulators: Fig 10. He also indicates that he is currently developing an exciter based on these principles but using very high speed Schottky logic devices capable of accepting a 100MHz clock input and producing ssb directly on 25MHz. He points out that integrated circuits can usefully be used in the balanced modulator stages: the SN56/76514 being a balanced modulator offering conversion gain. He believes that a complete exciter can be built using six integrated circuits and two transistors as oscillators.

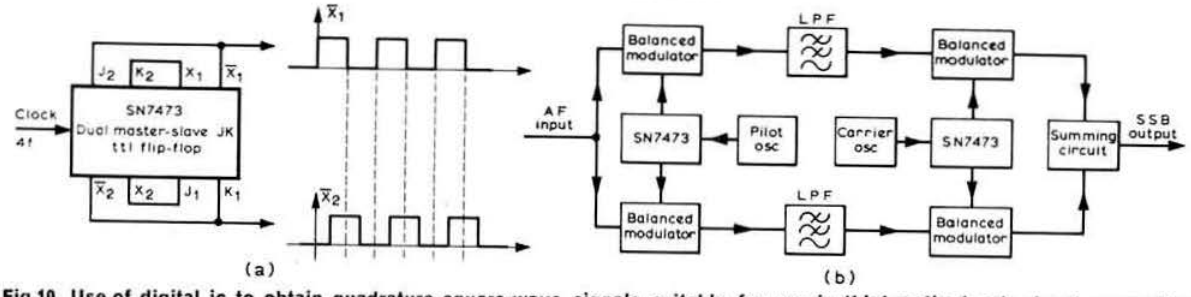


Fig 10. Use of digital ic to obtain quadrature square-wave signals suitable for use in third-method ssb signal generation

FOUR METRES AND DOWN

by JACK HUM, G5UM*

Doing what comes naturally (via m-s)

Contacts to count for the *FMD* Awards must be made by natural means. Those via Oscar or repeaters do not, for they are assisted on their way by intermediate man-made agencies (please, no QSLs for that Rutland contact via GB3PI!).

Contacts via meteor shower are as "natural" as any by tropo or sporadic-E or by direct signal to the chap in the next town. They can produce superlative dx and a clutch of rare and distant countries to operators blessed with the gift of patience (the final "R" may not come pinging through for quite some time) plus good morse ears and wrists, not forgetting the right rf equipment.

The major meteor showers process into radio range at predictable intervals. This month the Orionids are due, next month the Leonids. In between times QSOs may be had via random meteors: many times has the Trelleborg team of SM7AED-DBI-FJE (all same family) been near to a contact with GW3ZTH. "The number of random meteors is remarkably high," they report. Their equipment gives 200W into a 12dB gain aerial, and although they quote 20w/min as an optimum keying speed to catch random m-s, they emphasize the possibilities of A3J and keep a schedule with G8DNK on 145·475MHz.

On this point G3WZT of Horsham, Sussex, remarks: "I should imagine meteor scatter QSOs are quite in order on ssb providing the voice can stand the strain of a two-hour sked continuously!" On one occasion the signal from EI5BH at the kind of path distance where m-s could be expected to exert an effect was rising by several S-points for periods of a couple of seconds or so.

Both G3WZT and G3WSN of Chelmsford comment on the huge m-s signal from I4BER of Bologna on 144·05MHz, during the Perseids meteor shower of August. Each worked him, 'WSN on two successive days. "One burst from him of about 20sec peaked at S9 and overloaded the monitor tape recorder," says 'WZT. "Some of his signals were 40dB above noise," reports 'WSN. Between them they quote almost a couple of dozen stations in 10 European countries as active in the first few kilohertz of 2m seeking contacts via meteor scatter. More would be welcome ("Does anyone know any 2m operators in Portugal interested in m-s propagation?" asks G3WZT).

And if anybody wishes to arrange m-s exchanges with the Trelleborg team, a note to Arne Nilsson, SM7AED, Trumslagaregat.3, S-231 00, Trelleborg, will evoke an enthusiastic response.

"No super powers or aerials were used," says GW3NJW of Cardiff in reporting success during the Perseids. He has only 35W output and a 5-el at barely 30ft at a sea level site. This brought an m-s contact with DJ5DT on 11 August on 144·070MHz, signals peaking 30dB over the noise in a 500Hz bandwidth. Over in Germany the 'NJW signal produced bursts up to 11s long. The contact took about 1·5h to complete. Next day a QSO with DJ6CA produced much shorter bursts, and the contact took correspondingly longer to finish (3h).

Keying at GW3NJW and DJ6CA was by hand (EL-keyer) at about 50w/min, and at DJ5DT 60w/min auto sending was used. And if any intending m-s operator feels that these speeds are a bit off-putting, remember the text matter is repetitive.

Farther along the South Wales coast, GW3ZTH nabbed HG5AIR on the Perseids to hoist his 2m country total to 15.

Swelling the ranks

Callsigns in the late G8H - - series were appearing on the air in such profusion during the last week in August as to suggest a high pass rate in the RAE of the previous May. "The MPT must be issuing them at about 20 a day," commented one observer, a "guesstimate" which seemed to be fairly near the truth: when G8HUN of Northants was comparing notes with G8HVA of Staffs on the 70cm air each discovered that the other had received the vital parchment on the same day, 23 August. And for neighbours G8HVL and G8HWG the magic dates were 24 and 25 August respectively.

Father of G8HVL is G2BVW, one of the pioneers of vhf in the east Midlands: so 'HVL was well versed in vhf lore and operating procedure when he pressed the transmit button for the first time. But there was not much wrong with the generality of G8H - - men who flooded on to the air in the week before VHF NFD: most, so far as we could hear, had done their pre-licence listening well, knew the form for an effective QSO, and by and large steered clear of the fatuities of "the handle" and ". . . any possible call".

In respect of new callsigns an identification problem arises, for large numbers of them inevitably will miss the deadline for the 1974 *RSGB Amateur Radio Callbook*, due out this month. For a year, then, until the 1975 *Callbook* comes out, it will be advisable for them to be identified constantly over the air by their users. It helps people listening to them, if only as a guide to the best beam position. From Norman Fitch, G3FPK, of Purley, a timely comment: "Many of the more recently licensed G8s and G4s credit we older types with considerable clairvoyant powers. When calling CQ they never give their locations, so I never know if my beam is in the right direction or not."

Not unrelated to the foregoing (though perhaps it should come under "Operating technique") G3FPK offers the following thought:

"Probably due to inexperience, many operators after calling CQ announce they will 'tune the band'. Which way and what for? I ask 'What for?' because on two recent occasions I have answered a CQ from an fm station only to be told, 'Sorry, you have a very strong carrier. I imagine you are on a.m. My receiver is very good and doesn't receive a.m.' For goodness sake, if you can't receive a mode, say so when calling CQ!" Which could be said to

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second the G3CGQ lament last July about the mode-incompatibility incommunicado trend, a trend which will be stayed if not reversed when everyone heeds Item 9 of "A code of practice for the use of the 2m band" (see *FMD* last May). If your club secretary has not yet photocopied this from p337 and placed it on the notice board, suggest to him that he should.

The 70cm clip

Another addition to the increasing number of members who can use A3J on 70cm is G8DCA. Details of his home-constructed 20W sidebander will appear later in Tech Corner; like most of those on the band it gives full coverage and in consequence earns itself mixed mode contacts. In fact, during one of the summer openings it raised PA0GMS, who was on fm, and DC1KW, who was on A3J himself—and any number of G-men using A3.

In an earlier note we remarked that sharp 70cm beams so effectively exclude signals outside the main lobe as to give a false impression of activity on the band: always there are more stations there than the aerial lets you hear. Birmingham's G8AYY advocates two aerials for every station, a sharp-lobed 46-el Multibeam and a wider 4-over-4 slot being a possible combination; but, urges Paul Gaskin, "... do not introduce low-gain vertically-polarized aerials on 70cm".

As for bandscanning, also mentioned here earlier, G8AYY has added a Bandsearcher module to his TC7 Mk2 tunable i.f. (28–30MHz) and has adjusted it to scan 433·5 downwards once a minute. Fast bandscanning can be used to give a panoramic display on a crt of signals popping up in the 70cm band. Slow bandscanning permits the use of normal audio output. Either method can be readily applied to varicap-tuned tv tuners or to tunable i.f. units.

Touching on this general subject of knowing who is on and when, GW3ZTH asks for the publication of 70cm sked-lists and QRGs. Info to *FMD*, please, sked keepers.

Sked-lists would be welcomed also by Sheffield's G3NHE, if only to help him identify some of the distant carriers regularly heard, apparently engaged in local nets. Searching 70cm when one's net closes may bring a pleasant surprise in the shape of a call from a distant station (such as 'NHE) patiently waiting for you to finish and identify.

The summer's many tropo lifts with dx to the 70 centimentalists prompts the G3NHE observation that these openings can be very localized. "Stations in South Yorkshire were working PA and DJ by the hatfull when the Midlands could barely hear them and the south not at all," he says.

Not much in the way of lifts helped the GM4AGE/P foray to south-west Scotland. Even so, Ray Evans's cw was winkled out most nights in different counties by the waiting Yorkshire and Midlands operators, many beyond 200 miles QRB. We noted much help-your-neighbour-raise-Ray co-operation. One operator at extreme range who could barely hear GM4AGE/P was enormously helped by another (G3NHE as it happened) who placed his vfo on the 'AGE frequency within a hertz or so. All the other man had to do was resist the temptation to touch bfo or tuning knob and simply wait until the GM4AGE/P signal emerged from the noise. And so Lanark was worked on 70cm.

You can understand, in the light of this kind of spirit, why certain operators on 70cm send "CQ the grand band"!

Oscar's first 10 months

In the 10 months since it was launched on 15 October 1972, Oscar 6 has been used by 1,400 amateur stations, half of them in the USA. Of the remainder, Germany had 126 users, the UK 83, Japan 72 and France 63.

These facts emerge from the annual report of AMSAT. Another interesting statistic is that nearly 200 new stations come on to the satellite with each passing month, representing almost 70 different countries.

More Oscar-statistics, from our side of "the pond" this time: G6RH, one of the UK's most active satellite shooters, analysed his contacts up to Orbit 4,046 and found they totalled 996 of which 212 were with VE/W. Of 297 different stations worked, 67 were VE/W. In all, 40 countries have been worked but only 25 countries have come up with QSLs, still enough to earn Bob Holmes his ARRL 1000 Award some time back, but not encouraging to others aspiring to it. First UK station (so far as our information goes) to achieve the ARRL 1000 was G3IOR, then G6RH, G3PEJ and G3JVL.

Now comes news of what we believe to be the first Class B man to qualify. On 3 September G8CEX of Westcliff on Sea was handed his by the postman. When it is stated that cw is easier to push through Oscar than ssb, and that for every A3J contact via the satellite there are three by A1, the disadvantage facing the Class B would-be accessor of satellites will be appreciated. Additionally, of course, Barry Turner had that little problem of getting the QSLs in, too!

G8CEX is one of many who see the need to separate through-Oscar cw from ssb (note his comments here last month). Last December, early in Oscar's life, GW3FSP predicted that this might become necessary. The trend of thought seems to be to put A3J in the top 50kHz and A1 in the bottom 50kHz, with a bit in the middle where the two modes may get together.

What of Oscar 7? According to the annual report, AMSAT's board of directors on 30 June authorized an acceleration of work on it with a view to a launch in the first quarter of 1974. Four full-time engineers cost money, as do space-approved components: special funds come from ARRL and other influential and well-heeled sources. The subscriptions of the ordinary members of AMSAT are not used to pay salaries, states the report.

Beyond Oscar 7, other developments hinted at go to show that amateur satellite operation will be a continuing and developing part of the metre-wave scene. How successful AMSAT's activities have been to date may be seen from the fact that since Oscar 6 went up the membership has increased by 47 per cent. The annual report shows that there were 950 members and 60 member societies in 46 countries.

(*See also the item on Oscar in "QTC" and "Notes on a simple aerial arrangement for Oscar 6" in this issue.* —Editor.)

Clear take-off

Two AM contacts from an fm rig: in this instance AM means "aeronautical mobile". Three OH radio amateurs carried a 145·0 fm transceiver in their Piper aircraft when they headed for Aberdeen for a holiday in Scotland. They were contacted 160 miles out by GM8BRM/P and GM8CBQ/P, met at Dyce Airport and subsequently entertained by members of the Grampian FM Group.

More about German repeaters

We get it from DA2XU (erstwhile G8CEA) that the German for repeater is *relais*. Logical, come to think of it, even though the word does suggest to the British more a mechanical clink-clonk device than a thing like GB3PI. Richard Spencer goes on to summarize some of the sophisticated tricks the D-relais system gets up to:

DB0XH (and others) help vfo users who fail to net accurately; a distinctive tone is emitted if the man is lf, and a different tone if he parks hf. No tones and he is dead centre.

DB0YB transmits a dialling tone when not being accessed.

DB0YK gives 90s access and then drops out for 5min, a sure recipe for quick passing of traffic and no monologues.

DB0ZB closes down if an operator attempts to access it with more than 8kHz deviation.

While the Germans await the changeover to 600kHz separation of input from output channels, DB0VK Cologne does a balancing act by accepting input on 144·175 and 145·175 simultaneously, both giving output on 145·775MHz.

Contesting

No Saturday night graveyard atmosphere on 2m on 18 August: the band was athrob from end to end with signals from participants in the new QRP 144MHz Contest and with those from others anxious to work them. All over the UK, portables popped up on prime sites in a contest shot through with singular good humour: perhaps when you are confined to 1W input the last thing that happens is a rat race.

There was the man who cheerfully priced himself out of the market because he could not get his input down to less than 2W but was still determined to put in a check log. And the Oxfordshire group whose 10-over-10 had a 700mW pipsqueak at the base with tremendous effect; or the Midlander whose 1W of sideband p.e.p. worked well down into France, helped by the up conditions that obligingly prevailed over the four-hour contest period. Altogether, a worthwhile innovation to demonstrate the state of the QRP art.

Next day there was another state-of-the-art demonstration, this time of A3J. Last year's event attracted 29 entries. This year's, thanks to the huge increase in the use of sideband on 2m since 1972, should more than double that total if all those who were on put in a log. As always the area around 145·41 spread out to become a "mini-band" and there was understandably little A3J activity beyond.

Later, in VHF NFD, single-sideband reached an all time high on 2m for its first serious use in this contest by large numbers of stations. And of course there was the lifting of the former 25W power restriction to effect a further radical change in the feel of this ever-popular event. It is to be hoped that participating groups wrote their findings on the backs of their log sheets for the future guidance of the VHF Contests Committee. Feedback of this kind is valued by the committee in their endeavour to give the customers what they want.

Right upon us now is the annual uhf and microwave event, combined with the IARU one (rules on p348, last May). This contest always attracts large numbers of 70cm operators hopeful that high occupancy will coincide with long ranges; last year, frustratingly, the 500-mile equinoctial opening folded up two days before the contest date. This year extended tropo periods have demonstrated the potentiality of 432MHz for long haul, eg G8FQM of North London working into DM with A3J. In such conditions it is worth checking to see if they stretch to 23cm; on 24 August they did, and G4BYV grabbed himself a direct contact with F3LP that evening, without prior 70cm arrangement, a QRB of 120 miles that would represent a couple of hundred points to any contestant this coming weekend.

More FMD Certificates issued—and Supreme No 4

With all that topography behind him, Morris Wickham, GW8FQF, of Pensarn on the north Wales coast, decided that the best way to get the 432MHz FMD Certificate was to go out on those hills and see what could be worked. Now GW8FQF/P has certificate No 97; he followed this with a 2m claim for the home station which won him certificate No 343. Not far along the coast GW8ACG put in a couple of claims (one home, one away) which brought him Nos 340 for G(GW)8ACG/P (a reminder that you can claim for /P at any site in any UK prefix area), and 341 for GW8ACG. To G4BAU No 337, G3TLV 338, G8DXS 339, G8FAL 342.

A fat packet of six-plus-60 from High Wycombe represented the G3COJ claim for a 70MHz Senior Transmitting, duly exchanged for certificate No 12. Already Brian Bower held 144MHz Senior No 31 dated 28 October 1970 together with 432MHz Senior No 10, dated 15 March 1971. Three Seniors (or two Seniors plus one 23cm Standard) equals a Supreme, so it was with special pleasure that your VHF Certificates Manager affixed the distinctive gold sticker to a certificate form and sent it off to **G3COJ as only the fourth-ever winner of this top metre-wave award** (and the bold type for that last phrase is well deserved).

Not far away from G3COJ in the Chilterns area lives BRS33823: to John Fitzgerald goes 144MHz Receiving Award No 26. Both he and Heston's Anthony J. Humm, BRS32751, who has won certificate No 25, ask *FMD* to pass on their thanks to all 2m operators who replied to their QSL reports. "I was certainly encouraged by the comments some of the operators added to their cards," remarks A. J. H., while J. F. says ". . . 39 cards sent, all direct with sae, 32 received . . . a remarkable rate and a tribute to 2m operators."

Listen specially for . . .

. . . G8DHA of Cheltenham, who puts out a call on the hour on 432·7MHz nightly from 1900gmt.

. . . the AMSAT Net to keep yourself updated with Oscar affairs. It uses 14,280kHz, 1800–1900gmt, and 21,280kHz, 1900–2000gmt, on Sundays. Look for net-leader W3TMZ.

. . . G8AXC of Scarborough on sstv on 2m, a.m. or ssb. Laurie O'Loughlin has a flying spot scanner using a 931A fitted into an old 35mm slide projector usable either for sstv or for fast-scan video using his other callsign G6AGC/T (he can offer 625-line negative-going video with simultaneous sound via an fm sub-carrier generator, through a full gallon final with a pair of 4X150As).

. . . G4BZP/P on 3-4 November from the Border counties (English side). Carrying a QRP back-pack cw rig he will be able to operate from high spots inaccessible to vehicles. He does this regularly: during the August QRP contest he logged GC and F stations at S9 plus when atop Dun Fell in Westmorland at 2,760ft. He might be there next month.

Foregatherings

Glamorgan VHF/UHF Group: a big crowd for the G8AGU talk in September about a solid-state transverter. Details of further meetings from GW3ZTH.

Leicestershire VHF/UHF Group: 18 October, Charles Keene College, Belgrave Rd, Leicester, Room 117, 7pm; "ICs at vhf", by G8FNT, Plessey.

Problems of "point four one"

. . . yes, we refer to the procedure for setting up a sideband-to-cw contact in the 145·41 region of 2m. Derbyshire's G3LGK comes up with the thought that a cw slot near the sideband area would be a good thing to have, noting the increasing amount of inter-mode speech-to-key QSOs now to be heard around "point four one" (and not surprising, either, both being "bfo-on" modes).

Brian Sandall's suggestion is to set up cw at nominally 145·2 to 145·3 ". . . with a useful 50kHz between these for inserted carrier a.m." This accords with the long established axiom that ". . . for cw you tune down", though it is worth adding that the 2m bandplan has always admitted cw to *any* part of the 144–146MHz spectrum as a tool to use when phone (of any kind) gives out.

Sidebanders who wish to use cw in the low end of 2m cannot easily do so with transverter rigs carefully peaked with lots of spurious-reducing tuned circuits nearly a meg-and-a-half higher up the band. But no problems on or near "point four one": it is just a case of getting into the habit of looking a bit below that spot for the morse. Over to the dual-mode operators for further comment.

Operating procedures

Plenty of G4-plus-threemen can keep up with the best FOC-men when it comes to sending telegraphy. There are many more who cannot, and when, following suggestions in *FMD* that they should have a go at the lf cw end of 2m, they find they cannot keep up with the Joneses, simply because the Joneses send too fast, they begin to feel they are wasting their time. Requests to "QRS pse" are ignored; the other fellow blithely bats away at 16w/min, or rudely abandons the QSO altogether.

Now if this should dissuade intending key-men from trying at all, let us hasten to add that the generality of cw operators on 2m are so pleased to welcome a new callsign down at the lf end that they adapt themselves instinctively to his own speed of sending, and there is pleasure all round at a satisfactory contact initiated and completed. Putting themselves in the other fellow's place, particularly if he happens to be a former G8-plus-three and more familiar with A3 than A1, they appreciate his immediate problem.

So no opprobium upon the man who says "Pse QRS": plenty on those who fail to do so when asked!

Vive la petite puissance!

On both sides of the Channel the interest in *le QRP* is positively dynamic. Form your own theory why: a conscious reaction against the "blasting through on 2m" trend, or enquiring minds keen to see what can be done with milli-watts?

If you raise F1AYI or F1ANH, recently worked in Brittany from Brighton by G8BDJ, ask them how their *puissance* is. You will probably find it is half a watt (BDJ had 50mW to his 2N706 pa when he raised them—and the QRB was 250 miles). This on 2m? Yes, F1AYI was—*but 'ANH was on 70cm.*

Another Brittany station, F1CRP/P, was S9 with a 2W sender when heard by G4BZP/P on the Cumbrians in the RSGB 2m QRP Contest (". . . potentially a very interesting event," adds 'BZP). The QRB? Just short of 400 miles.

If it can be done on a watt or two or less, why use more? Judging from the number of QRP transmitters now being built, either from kits or from individuals' own know-how, a considerable number of metre-wave people are not just asking this question but answering it for themselves in very practical terms.

What they say

"Even when 2m is fairly empty, few ssb people seem to tune down the rest of the band and those who do seem to find a general reluctance to switch on (or absence of!) the bfo on the part of the a.m./fm operators"—G8DCA.

"It would appear that vhf, both amateur and commercial, has made its indelible mark upon Liverpool. When recently searching fruitlessly in local shops for a particular type of copper aerial wire for hf band use, I was repeatedly informed: 'What you want is low-loss coaxial' "—G3YSH.

"I am closing the logs up to 10 September 1972, so if anybody has not had a QSL card for contacts on 70cm or 23cm before that date please let me know and I will do the necessary"—G8ARM (41 Hassendean Road, London SE3).

"What *would* we do without the /P stations reliably sending cards from areas where the locals are asleep, and so helping others with their certificate claims?"—G8ATY.

"During NFD many 4m operators lost contacts because they did not check their own frequencies after each CQ"—G4AYT.

". . . goodly proportion of lids operating at times during Field Day"—G3FPK.

"About piracy (*FMD*, Sept), I cannot agree that the amateur's role is more to deter than detect. Surely any law-abiding responsible citizen has a duty to ensure that law breakers are brought to book. Some amateurs are too ready to condone pirates or even lend them equipment"—G4BZP.

Harold Jones, G5ZT

The sudden passing of G5ZT of Plymouth in August removes one of the patriarchs of amateur radio in the south-west. Although the owner of an "elderly" callsign, Harold Jones was thoroughly up to date in the way he practised the art, and his many metre-wave activities included a fascination with the Oscar satellite and its propensities for world-wide communication. "Zed tock" was a character who will be greatly missed.

25 YEARS BACK

"New Distance Record on the 2350Mc/s band: On Sunday, September 19, Messrs Noel Bevan, G8IH, and Leonard Grimshaw, G3CBN, established two way communication over a distance of 13 miles during an attempt to exceed their previous range of two miles, set up in June . . . R5 S7/8 both ways . . . High Salvington to Brighton Race Hill."

RSGB Bulletin October 1948.

[A month later the record was raised to 24 miles.]

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

JUST what does "security" mean? Readers will most likely have shared the writer's astonishment at the recent suppression of the location of G3SSO from a television programme on the grounds that security was involved. This happened in spite of the fact that the information is readily available from many reference sources (including the *RSGB Callbook*).

G3FKM would be grateful if anyone knowing the present whereabouts of VP8LV would let him know.

A reminder that, now that postal rates have been increased, envelopes lodged with QSL sub-managers are inadequately stamped. Please send along a small supply of additional stamps to *your* manager.

Top Band news

A special news sheet received from W1BB notes that the first Europe/W7 contact on the band took place between W7DZO and G3YUV on 28 December last, and that other "firsts" were established when VK3CZ and VP8KF made contact on 7 July, and the former worked LU5HFI four days later.

W4ZMQ, WB2JYM and WB2VPZ hope to be on the air from the Cayman Is during the cw section of the CQ WW DX Contest, and also hope to be using their T4XB/R4B combination on 160m possibly for a few days before the contest.

Arthur, VK3CZ, heard DHJ, two OKs and a G on 25 and 26 August at 2040. He has provided a list of sunrise times in VK3 and they are as follows: 1 October – 1956, 15 October – 1934, 1 November – 1912, 16 November – 1859, 1 December – 1851, 15 December – 1851, 1 January – 1901, 15 January – 1914, 1 February – 1932, 15 February – 1948, 1 March – 2004, 15 March – 2019, and 1 April – 2036. He will be on 1,825kHz on Fridays, Saturdays and most Sundays, listening in the "dx window" between 1,825 and 1,835kHz.

DX news

KH6ASN/KB6 is said to listen for European signals on 14,285kHz at 0700. He will be on the island for 18 months and hopes to acquire a VR1 call in addition to the KB6. K7SAD/KW6 will also be on Wake Is for the same length of time and should be active on all bands 3·5 to 28MHz on cw and ssb. Readers who remember Stan, KC6BK, will be interested to know that he has now moved to Yap in the Western Caroline Is and has the callsign KC6SK. KH6HDB/Kure is Gene, formerly K5LTH/KH6, who is hoping to join some of the members of the recent Tongareva expedition on an expedition to the Southern Line Is (VR7) next year. ZL1BKE has appeared on the air from 5W1AN and says that he is using an FT401 and a dipole which seems to be putting a good signal into the UK. ZK1DX is another ex-New Zealand amateur who has been worked on 14MHz ssb.

During their visit to Nauru, JA1MCU, JA1OCA and JE1CKA made nearly 5,000 contacts. Their licences are valid until June 1974 and a return visit is being considered. C21DC and C21DR (formerly VK9DR) are the only two resident stations but C21NI is the club station and is said to be active on 14,250 between 1100 and 1400.

Readers who had the pleasure of contacts with Darleen, WA6FSC, during her dxpedition of a few years ago would wish to join your scribe in congratulating her on the birth of her first child (a daughter) on 4 August. Darleen is now HC2YL and her husband is HC2OM.

W0DL is in Taiwan and has applied for permission to operate as BV2DX or W0DL/BV2. The stations heard using UX3 prefixes during mid-July were celebrating the sixth "All Union Meeting of Komsomol and Youth" and the sites of the various transmitters were associated with important points in the defence of Moscow during the second world war.

Garth Hamilton, formerly 5H3LV, has become VE7AUE, and invites those still needing 5H3LV, 5H1LV, 5H3LV/A or 5Z4LV confirmations to contact him at the address given in *QTH Corner*. Another well-known African callsign holder—ET3GB—has moved and may be reached via his new callsign—OA6CV. ZD3D left Gambia at the end of September for Lesotho and hopes to have a 7P8 licence soon.

Special efforts are being made to induce stations in rare "CQ" zones to be active on 7 and 3·5MHz in order to help those working for single-band WAZ awards.

There is now a World DX Net which meets every Friday at 0400 and 1400 on 14,250kHz under the supervision of UW9WR. UK5MAF is reputed to collect the calls during the previous week of those who desire to join in.

Those still needing QSLs for contacts with ZF1WF, VP2VAV or W4GIW/VP7 should apply via K4CDZ.

In accordance with No 749 of the Geneva Radio Regulations, the callsign series A7A-A7Z has been allocated provisionally by the ITU to the State of Qatar.

News from overseas

John Oliver, G3EJS/9J2RO, managed to qualify for a South African licence and is now ZS5WO. As his G licence was obtained using his service qualifications he was required to take the RAE and morse test. The latter had its amusing implications as John is employed in the Post Office in Pietermaritzburg and was required to take other aspirants for *their* tests because the office did not feel competent to do it! In spite of this a certificate of ability to send at 12 wpm was required from him. John now has several hundred watts of ssb and a quad aerial and sends his best wishes to old friends.

Karl Muller, A8132, hopes to be on the air as a 3D6 in the not too distant future. He reports that there has been an increase in amateur activity in Swaziland with the newly active 3D6s AL, AM, AR (wife of AL), AU, and AY (wife of AU). The latter two will operate on 3·5MHz and this will be the first activity from 3D6 on this band since ZD5E left.

* 10 Knightlow Road, Birmingham B17 8QB.

In a letter received just after the deadline for September *MOTA*, GM3XVI notified your scribe that he had been given permission by the Rhodesian PMG to operate from ZE7JV's equipment for a short period as GM3XVI/ZE. It seems that K6DM/ZE was also authorized. Henry says that this arrangement was made because both visits were of short duration and there was no time for a temporary ZE callsign to be issued through the usual channels, and it seems to be the first time that this has happened.

Robert Kramer, WA9FCT/KL7, is due to be posted to the UK in November and expects to be stationed at RAF Bentwaters (near Ipswich). Until that time he will be active from Alaska, mostly at weekends, between 14,270 and 14,310kHz, looking especially for British contacts.

Dxpeditions

From 8 to 20 October, HB9NL and HB9AIC will be on the air from Liechenstein on all bands 1·8 to 28MHz on cw, ssb and sstv daily. Callsigns will be HB0NL and HB0AIC. Schedules can be made beforehand by contacting HB9NL or HB9AIC. QSLs will be sent via the bureaux, or direct if a sae and IRCs are sent to the addresses given in *QTH Corner*.

W4GIW and about seven other amateurs from the Atlanta area intend to visit Curacao for the CQ WW DX Phone Contest and operate on all bands from 1·8 to 28MHz. Their callsign is not yet known but QSL cards will be made out by K4CDZ.

In the rumour category, a visit by WB5BID to Bouvet Is is still mentioned as a possibility in mid-February. The difficulty involved in making a landing on the island is very considerable; as it is also at Malpelo Is which is being mentioned as a target under consideration by a group of USA amateurs. All previous visits to Malpelo have had assistance from the Colombian navy.

Members of the Richardson RC, including W5s EQT, MYA and QBM, will activate VP2MYA during the weekend of the CQ WW DX Phone Contest on all bands from 1·8 to 28MHz.

K4DAO, who recently operated as CR8AM, should now be in Darwin and there is a possibility that a visit to Cocos-Keeling Is (VK9) may be made. He may also continue across the Indian Ocean in his trimaran *Kathy K*, stopping at "available dx spots".

According to *West Coast DX Bulletin*, VK4AH is thinking of making a visit to Lord Howe Is for 10 days or so during November. The same source also mentions interest by WB5BID in a trip to South Sandwich (the writer considers this to be a very difficult proposition since seeing photographs taken by GM3RFH during the last operation from the islands in 1964).

The 16th Jamboree-on-the-air

This will take place during the weekend of 20-21 October, and as in previous years the starting time will be 0001 local time on the 20th—the end being 48 hours later. In addition to these times some stations may operate on the Friday evening —this is *not* a contest and therefore the hours of operating are flexible. World Scout frequencies are as follows: 3,590, 3,740, (3,940 in USA), 7,030, 7,090, (7,290 in USA), 14,070, 14,290, 21, 140,21,360, 28,190 and 28,990kHz. Local licensing regulations must be observed and it should be remembered that UK regulations do not permit unlicensed visitors to speak into the microphone.

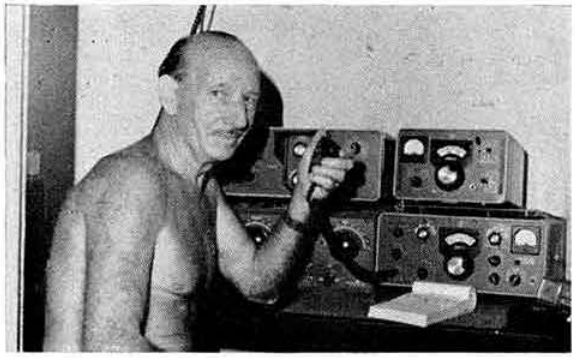
Pat Vizard, G4AYL, who received her callsign in February 1972, enjoys dx operating on the hf bands and thinks there should be more yls on the air. She and her om, Dave, G3UKS, share the same FT401 transceiver and have joint QSL cards

Contests

The CQ WW DX Contests

0000 27 October–2400 28 October (phone).
0000 24 November–2400 25 November (cw).
All bands 1·8 to 28MHz. Exchanges consist of RS/T plus CQ zone (British Isles are in zone 14). Three points are gained for contacts with other continents, one with stations in one's own continent. Contacts are permitted with stations in the same country as the entrant for country or zone multipliers but no QSO points may be claimed. The multiplier is the total number of countries (as per DXCC and DARC country lists) and CQ zones worked on each band added together. The final single-band score is the total number of zones plus countries multiplied by the total QSO points. The multi-band score is the total of zones and countries on each band added together and multiplied by the total QSO points. There are three categories of entry: (*a*) Single-operator, single- or all-band, (*b*) Multi-operator, single-transmitter (all-band) and (*c*) multi-operator multi-transmitter. In (*b*) only one signal and one transmitter may be used during the same time period. In (*c*) several transmitters may operate simultaneously but only one signal per band is allowed. Use separate log sheets for each band with 40 QSOs per page and indicate date, time, station worked, number sent, number received, points claimed and name of new country/zone (if appropriate). Total QSO points and multipliers should be shown at the foot of each sheet. Log sheets may be obtained from *CQ* (sae and IRCs please)—a few summary and log sheets are available from G3FKM. Logs go to: CQ WW DX Contest Committee, 14 Vanderventer Avenue, Port Washington, LI, NY, 11050, USA. Phone logs must be posted before 1 December and cw before 15 January.

Results of the **1973 WAB Contests** are as follows: hf phone—WA1EUO (69,850), YU1KWX (46,620), G3MZV (28,350), G3ABG (19,065), G4ASZ (2,550) (All mixed band). G3RDC was third on 14MHz with 2,175 points, and G3WWX the only 21MHz entrant. In the cw event G3MZV led with 7,155 points (14MHz), and G3ABG (5,945) and G8KU (5,044) operated on all bands. In the lf phone section, G3MZV (289,120), G3ZAY (285,580) and G3VLX (220,150) led the multi-band entries. G3RDC was top on 3·5MHz with



Allan Papworth operating as VQ9MC. Allan is now back in the UK, as reported in June *MOTA*

272,640 from a multi-operator station—G4AZN (109,600) having leading single-operator score on that band. G4AEE (9,890) and SM4DHF (6,475) led on 7MHz. The lf cw section was won by G3MZV (66,495), and G3XTJ (52,700) on all bands and G4APM (16,815) on 3·5MHz only. Listeners winning the hf phone, lf cw and lf phone contests were BRS32525 (86,955), BRS15822 (34,435) and BRS32525 (34,435) respectively.

In the **1972 USSR Contest**, GW3INW (4,312) and GM3YEH (176) were the only multi-band UK entrants. G3NSY (12,410), G8KU (1,856) and G3OCA (1,092) operated on single bands and A7082 was the only UK listener to enter.

Results of the **1972 CQ WW DX Contest** (cw section) have been received from W1WY:

Single-operator, Single transmitter

	Points	Band		Points	Band
G3LNS	**983,014**	All	G5BAU	181,204	**21MHz**
G3FXB	840,264	,,	**GM5BBJ**	**19,248**	,,
GW3SYL	**291,346**	,,	**GI3LLQ**	**4,900**	,,
G2DC	130,680	,,	GM4BFX	2,574	,,
G2AJB	97,811	,,	**G3RZI**	**242,198**	**14MHz**
G3JKY	66,719	,,	G3MXJ	99,225	,,
G3XTT	52,000	,,	**GW3NJW**	**66,484**	,,
GM6RV	**37,761**	,,	G3PVA	36,624	,,
G3VDW	18,737	,,	GM3BSQ	3,668	,,
G3MWZ	16,128	,,	**G3KDB**	**71,928**	**7MHz**
GM5AXO	5,525	,,	**GW4BCC**	**6,501**	,,
G2BOZ	**77,256**	**28MHz**	**G3RRS**	**52,302**	**3·5MHz**
G4AMJ	31,626	,,	G3ESF	27,225	,,
GW3GHC	**2,,987**	,,	**GM3WDF**	**5,280**	**1·8MHz**
G3CWL	3,978	,,	**G3ZTQ**	**495**	,,
G3HCT	**245,108**	**21MHz**	GM3YOR/A	52	,,

Multi-operator, Single transmitter

G3SSO	**1,073,284**	G3PDL	373,041

G3HCT was world fourth on 21MHz, and GM3WSF world second on 1·8MHz. Congratulations to these and to all certificate winners (printed in bold type).

Awards

The WHHW (Worked Hamburg and the Harbours of the World) Award

Available to licensed amateurs and listeners. Requirements are contacts with 40 stations located in 40 different harbours throughout the world, with at least five continents represented, but not including stations in one's own country. In addition, 10 contacts are needed with stations in the Hamburg area and including at least five different DOKs from the following: E02, E07, E13, E14, E16, Z07, Z27 and Z28. DOKs E07 or Z27 must be included. Contacts must have been made since 31 December 1972. The award is a copper clad epoxy board showing a view of Hamburg harbour and applicants should send a list of their contacts (certified by two licensed amateurs) plus one of their own QSLs and DM10, USA $4, or 17 IRCs to: Kurt Stegert, DK4HD, 21 Hamburg 90, Soltauer Ring 10, XIV, Germany.

Diploma Islas Baleares

Issued to any licensed amateur or listener who can prove contact with or reception of the following numbers of EA6 stations since 31 December 1968: European applicants: 15 on two bands, or 10 on at least three bands. Others need 10 on two bands or seven on three or more bands. Each station may only be worked once per band and if contacted on more than one band contacts must be on different dates to be eligible. Send certified lists of QSLs (with 10 IRCs) to PO Box 34, Palma, Majorca, Spain.

Readers who are interested in awards are reminded that *Amateur Radio Awards*, compiled by RSGB Awards Manager C. R. Emary, G5GH, is now available price £1.40 post free from RSGB HQ. This book contains details of all the world's main certificates, country lists, ITU and *CQ* zone lists, ITU callsign allocations and other useful information.

QTH Corner

C31CA	F2PY, P. Pollidoro, 82 Montpezat-Du-Quercy, France.
C31DS	F6ARV, C. Reynes, 164 Av Charles de Gaulle, 33 Bordeaux Cauderan, France.
C31GW	F5EQ, J. P. Manquest, 2 Rue de Lucet, 35 Parame, France.
C31HB	DL8NU, E. Diebel, Silcherstr 12, 7061 Weller/Rems, Germany.
CR3WB	via CT1BH, Rua D Pedro V 92, Vila Nova de Gaia, Portugal.
CR8AM	via WB6BGQ, 127 Rio Del Mar, Vallejo, Cal, 94590, USA.
ex-ET3GB	G. Brumley, Box 825, Arequipa, Peru.
HB0AIC	H. Bruno, Wesemlinterstrasse 8, CH-6006, Luzern, Switzerland.
HB0NL	A. Frank, CH-6233, Bueron, Switzerland.
IA5ALL **IA5RVB**	R. Fiorenzo, Via Riborgo 32/1, L-17040 Santuario Sarona, Italy.
JW1SO	via LA1RO, L. Hansen, 4280 Skudeneshavn, Norway.
JY3ZH	(formerly JY6FC) PO Box 11020, Amman, Jordan.
KB6BU	via WB6IKI, 2263 Anthony Drive, Ventura, Cal, 93003, USA.
KH6ASN/KB6	via K9KXA, 6430 Lakewood Av, Chicago, Ill, 60626, USA.
KJ6DI	via K4RHU, 127 E Montague Av, N Charleston, SC, 29406, USA.
K7SAD/KW6	via WA7GQA, Kay Hargis, 2615 W 5750 S, Roy, Utah, 84067, USA.
PJ8AA	via W2BBK, 79 Glennwood Rd, Englewood, NJ, 07631, USA.
PJ8MS	via WB2VKO, 16 Derby Lane, Dumont, NJ, 07628, USA.
TR8SS	via DJ5IO, Max Haas, Nailaer Str 106, 8671 Lichtenberg/Obfr, Germany.
VQ9BP	W. Pomeroy Jr, PO Box 220, Mahe, Seychelles Is.
VS5MC	via DK5JA, Nansenstr 3, 4152 Kempen, Germany.
ZK1DX	PO Box 90, Rarotonga, Cook Is.
3D6AU/AY	PO Box 941, Mbabane, Swaziland.
3D6AX	WA5IEU, 1516 First St, New Orleans, La, 70130, USA.
ex-5H3LV	G. Hamilton, c/o 2340 Queens Av, W Vancouver, BC, Canada.
5W1AN	R. Beets, Box 1147, Apia, Western Samoa.
8R1AE	PO Box 844, Georgetown, Guyana.
	RSGB QSL Bureau, G2MI, Bromley, Kent, BR2 7NH.

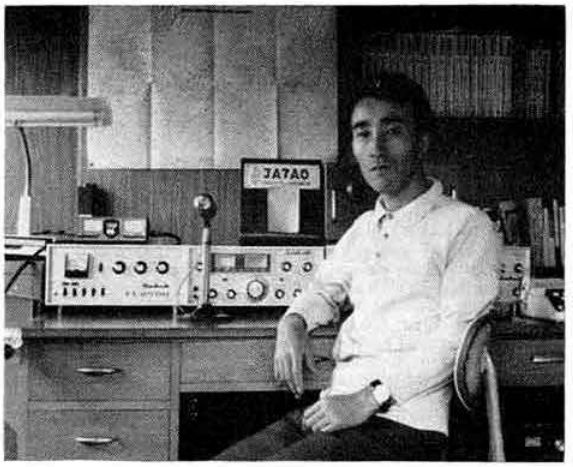
Band reports

Another not very good month on the higher frequencies. According to *West Coast DX Bulletin* a medium sized sunspot appeared on 25 August after 16 days without any of significance.

Many thanks to the following for information used in compiling this section: G2BJY, G2CDT, G2HKU, G3AAE, G3GVV, GW3NJU, G3NKQ, G3RFG, G3UOL, G3ZUJ, G5JL, G6GH, BRS17567, BRS25429, BRS31301, BRS34075, A7056, A7511 and A8312.

Stations listed in italics were on cw, all others on ssb.

1·8MHz. 0000 *K2GNC, W2EUS.* **0100** *PY1RO, WB8APH.*



Tok, JA7AO, holds the record for the contact established over the longest distance on 160m—signals travelled 11,200 miles when he contacted VP8HF on 9 July *(W1BB photo)*

3·5MHz. **0000** EA6BL, *LU2DKG*. **0100** EA8CR. **0400** *PY4BTU*, VE3DBN, ZL4BT, ZS6DW. **0500** OA4OS. **2200** CT2AE, LUs, 7X2MD, *9H1BB*. **2300** C31CA, KP4AST, KV4FZ, M1C, YA1TCA, ZD7FT, 9M2CJ.

7MHz. **0000** TI3QH, *ZC4BI*. **0400** *CE2IC*, *YV3YD*. **0500** CP1AA, *HI8CRO*, HP3ML, *KP4DBO*, *KZ5OW*, *LU5NFI*, *PT2JB* (Brasilia), *XE1FE*, ZLs. **0600** CE3RY, CT2AH, PYs, TI2CF, VKs, *K6AHV*, *W7YTN*, *ZD9AC*, *ZM4NH*. **0700** *ZLs*. **1800** *TA1QX*. **2100** JA4DEN. **2200** FY7AL, LU6KAN, VU2BX. **2300** CT2BG, *CR6AL*, *CR7IZ*, CX3AE, EP2WB, *FG7TG*, M1C, *ZP5EC*, *4K1A*, 9M2CJ.

14MHz. **0400** JY3ZH, VU2ABV. **0500** *K4II/HC1*. **0600** KB6CY, ZK1DX, 5W1AN. **0700** KH6s, KJ6DI, KS6TR, WB8MZN/KS6, TA2AE, VK9FL, 5W1AU. **0800** IB0PV (Ponza, Pontine Is—QSL to I0PV), KH6HDB/Kure, *UA0YAE*, VR1AC, YJ8XX, ZK2BD, 3D2s CM, EU. **0900** DU1JMG, YJ8s BD, KM. **1000** *JT0AE*. **1100** KL7s, WA4VXR/MM (Ocean Stn Charlie, 52° 42'N 35° 30'W). **1300** *JD1YAA*, 5U7BA (BP 877 Niamey). **1400** A4XXF, *JT1AM*, VK8OM, *YK1OK*. **1500** JD1AHN, *KG6JAR*, VS5LH, W6/W7s, *4S7AS*, 5X5NK. **1600** A51PN, A6XK, AP2MJ, JAs, VS5MC, XT2AE. **1700** CR8AM, JW1SO, *KM4CMQ*, *9M8FDS*. **1800** ZD7FT. **1900** CR3WB, XU1AA, XW8FB, *ZS3AK* (QSL to DJ9FH). **2000** FG7TD, HZ1TA, VQ9M. **2100** W6/W7. **2200** FP8CZ. **2300** VP2AA, XQ3ED.

21MHz. **0800** *M1I*, *3D6AW*. **0900** A4XFF. **1000** *4K1D*. **1100** C31HB. **1200** DUs, *VQ9M*, VS6FB, ZD7FT. **1300** *F0AVG/FC*, HM1GN, KA6TO, 9V1GO. **1400** DU1REX. **1500** M1D, TR8WR, VP8JE (QSL via WA5FWC). **1600** A2CCY, AP2ZR, HC2HM, W6s. **1700** VS9UA (QSL to G3UAO), 5N2ESH. **1800** KG4DS, OJ0AM, VQ9MC. **1900** CE8CF, TU2DO, 9X5VA. **2000** CE3PY, TR8VE, VP8ML. **2300** HC0AM, HKs, VE4/VE6.

28MHz. 0900—1000 Europeans.

All correspondents are thanked for their assistance, and special thanks are due to the following for information obtained from their publications: the **DXers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*), **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0INA/PA0TO*), **DX News Sheet** (*Geoff Watts*) and the **29 DX Club Newsletter** (*George Allen*).

Please send all items for the **November** issue **to reach G3FKM** no later than **10 October,** and for December by **7 November.** Note that these are the *latest* dates—information received earlier is even more useful!

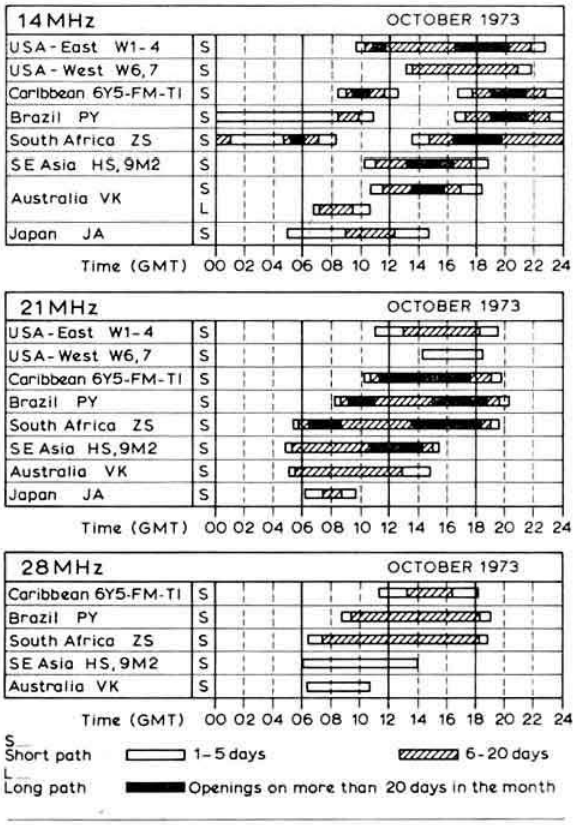
Propagation Predictions

Conditions on the hf bands are at their best during October and November. As we are at present in the declining path of the sunspot cycle, this maximum will be considerably lower than that of 1972. Conditions in October will therefore be worse on **28MHz** and on **21MHz** than in the autumn of last year. Conditions will improve on the hf bands compared with those of the summer. On favourable days (days with above average F2 MUFs) traffic with Central America and South-East Asia should be possible, in some instances also with Australia. Communication with the USA will improve considerably compared with last month, and further improvements will be in dx traffic to Central America, South-East Asia, Japan and Australia.

There will be little change compared with the previous month in dx conditions on **14MHz.** On favourable days it might be possible to reach Australia on the indirect path (from Europe in a south-westerly direction) during the hours before noon.

No change is expected on **7** and **3·5MHz** compared with last month. Daytime distances will be further compared to the summer months. 3·5MHz will be interrupted repeatedly by the dead zone in the latter half of the night.

The provisional sunspot number from the Swiss Federal Observatory for August 1973 was 25·6. The period 12 to 20 August was almost completely devoid of sunspot activity. The predicted smoothed sunspot numbers for December, January and February 1974 are 24, 22 and 20 respectively.



COUNCIL PROCEEDINGS

A brief report of the Council meeting held on

9 July 1973

Present: *Dr J. A. Saxton (President, in the Chair), Dr E. J. Allaway, Messrs J. O. Brown, R. W. Fisher, W. J. Green, R. J. Hughes, E. G. Ingram, G. R. Jessop, W. F. McGonigle, L. E. Newham, C. H. Parsons, J. R. Petty, W. A. Scarr, A. W. Smith, R. F. Stevens, G. M. C. Stone, F. C. Ward, (members of Council), D. A. Findlay (general manager) and A. W. Hutchinson, (editor).*

An apology for absence had been received from Mr B. D. A. Armstrong.

President's honour
All members of Council congratulated Dr Saxton on his appointment as a Commander of the Order of the British Empire, and Dr Saxton thanked them for their kind congratulations.

Minutes of 46th Annual General Meeting
The minutes of the 46th Annual General Meeting held on Friday 1 December 1972 were approved for publication.

Finance report
The Honorary Treasurer stated that it was too early to report on the financial results for the year ended 30 June 1973 but first indications were that there would be a surplus.

President's Ad Hoc Committee
The President introduced a report on certain headquarters administrative matters drawn up by his Ad Hoc Committee and invited comment on three recommendations. After discussion, Council accepted these recommendations.

Membership and affiliation
It was resolved:

(i) to approve the applications for membership, transfers and reinstatements for April and May and accordingly elect 288 new members:
(ii) to accept reduced subscriptions from 42 members;
(iii) to waive the subscription for 1973–4 of 21 members on the grounds of blindness or other disability;
(iv) to grant life membership to Mr F. D. Smith, TechCEI, AMSERT, G3VKI.
(v) to grant affiliation to the Aberdeen VHF Sideband Experimental Group, the Advance Electronics Amateur Radio Club, the Heriot-Watt University Amateur Radio Society, the Hull University Radio and Electronics Society, the Mexborough and District Amateur Radio Society, the National Air Traffic Signals Training Establishment Amateur Radio Club, the Openshaw Technical College Radio Club, the University of Bath Amateur Radio Club and the Wigan and District Amateur Radio Society.

City and Guilds Radio Amateur's Examination Advisory Committee
It was reported that Mr Scarr, who had been chairman of the committee for many years, had now relinquished this position, and that Mr Hughes had been elected to succeed him.

Retirement of Mr R. J. Hughes, G3GVV
Mr Hughes, Immediate Past-President, explaining that he had been a Council member since 1968, said that he felt the Society must encourage the younger members, and to this end he would not seek renomination; there would thus be opportunity for new blood on Council.

Nominations for election to Council
The following Council members retire in rotation at 31 December 1973: Ordinary members—Messrs Armstrong, Ingram and Stevens; Zonal members—Messrs McGonigle, Parsons and Smith.

Mr Fisher, Zone B, was co-opted during the year and therefore retires but is eligible for re-election.

Mr Armstrong had informed the general manager that he would not accept nomination for re-election.

Oxfam
It was reported that the general manager had attended an informal meeting with the MPT at which Mr M. Harper, Overseas Services and Supplies Officer of Oxfam, had been present.

The MPT had indicated that they were sympathetic to the request from Oxfam that UK licence holders should be allowed to pass third party traffic to Oxfam. Third party messages would be restricted to notification of any preliminary information received from an overseas amateur of a disaster. Messages would only be permitted until such time as the international telecommunications system was able to deal with the traffic.

Full details would be discussed with Oxfam but in the meantime Council welcomed the suggestion in principle. The Raynet Committee would be advised of the discussions.

Committee minutes and recommendations
Council accepted the minutes of the following committees:
HF Contests (29/3/73), Interference (27/4/73), VHF Contests (30/4/73), Mobile & Exhibition (4/5/73), VHF Contests (24/5/73), Membership & Representation (8/5/73).

Correspondence
The Norsk Radio Relae Liga had sent a gift of a plaque as a token of appreciation of co-operation between NRRL and RSGB.

The Regional Representative, Region 9, Mr H. W. Leonard, was expecting to hold an ORM in Plymouth during October and hoped that Society representatives would be able to attend.

Mr Ward indicated that he might be able to attend the ORM depending on the date of the event.

Mr H. B. Jones, GW8HFI, on behalf of himself and two other members, had asked the Council to consider the financial position of the younger licensed members. Mr Jones suggested a class of membership to cover licensed amateurs who are students.

The letter had been referred to the Membership and Representation Committee for comment.

Letters on the subject of repeaters had been received from P. Barville, G3KJB, and J. E. Hoare, G3PJI; D. H. Squires, G8BMA; D. J. Macrae, G3ZXP; B. Coverly, hon sec Swansea RS; J. D. Harris, G3LWM; J. Royle, G8ACN; and W. S. Poel, G8CYK. All had been passed to Mr Stone, VHF Manager, for consideration, together with several others on the subject, by the VHF Committee.

2m band plan
Mr Stone had provided a situation report on the UK 2m band plan. The IARU Region 1 2m band plan was to be reviewed at a meeting of vhf managers planned for mid-October 1973. Considerable informal discussion took place on this subject and Council members were invited to comment, preferably in writing and before the next Council meeting, to Mr Stone or headquarters to assist the VHF Committee in its deliberations.

Zone G Conference and Region 13 ORM
It was confirmed that Mr Hughes and Mr Stone, in addition to Zonal member Mr Smith, would attend the meeting in Edinburgh on Saturday 22 September 1973.

Looking ahead

6 October—Region 7 ORM, "Winning Post", Whitton, Middlesex.

25-27 October—Amateur Radio Retailers Association Exhibition, Granby Halls, Leicester.

8 November—RSGB lecture at IEE by L. Moxon, G6XN.

16 November—RSGB Dinner Club, Royal Westminster Hotel, Buckingham Palace Road, Victoria, London.

18 November—South-east Counties HF Convention, Airport Hotel, Crawley, Sussex.

RAYNET

by S. W. LAW, G3PAZ*

By the time this is read Exercise Diamond will be the subject of discussion where two or more members are gathered together. As this column is written some weeks prior to the event, no doubt there will be plenty to report in next month's issue. At this stage it would be pointless to report on the known programmes of various groups, but the indications are that a great deal of work has been put into this widespread exercise, and G3MBQ will no doubt be able to fill many pages of the incident/exercise ledger. From what we have gleaned, the liaison with user services promises well for our image, and publicity should also give us a good boost in many areas.

Geographical challenge
As all controllers should be aware, it will not be very long before the great upheaval which will completely change the present concept of the long-standing county boundaries and create large blocks of "metropolitan areas" in their stead. This will call for some considerable rethinking and discussion between adjacent groups as to the areas to be covered; in fact it may prove politic to split some and unite others or even create new groups having new names. This may well mean a great deal of work for many controllers but please rest assured that the Raynet Committee will be only too glad to provide any advice or assistance where problems arise, so do not hesitate to send in your queries should you strike a few snags. In any case, check now with your local authority or library reference department in order to get a true picture of the changes involved in administrative boundaries. Bear in mind that the changes will in all probability also affect your user services, so check with them too. They will appreciate that you have every intention of continuing and even improving the service we set out to provide.

The music goes round and round
Nothing pleases us more than enquiries about our aims and objects. Apart from requests for information on the formation of groups in the UK from, for example, Aylesbury, Hertfordshire, Northampton and Northumberland, the Raynet stand at the Woburn RSGB Rally were delighted to be asked for a full run-down on our system and methods from visitors from America and Hong Kong with a view to possible adoption of some of our ideas. Well, "If you make a better mousetrap the world will beat a path to your door!" So we are not doing such a bad job, provided we do not whisper down that traditional well but in effect climb our (aerial?) pole and "holler". So keep up that liaison and publicity.

Radio location?
A question from one of our correspondents has raised an interesting point. No doubt there are many of our members who have taken part in df hunts; and very interesting and enjoyable these can be by day or night, on foot or /M. But let us surmise that it were feasible for persons traversing potentially dangerous areas to carry a form of pocket beacon transmitter within the terms of the MPT regulations? How many groups could arrange to pinpoint the signal and provide positional information to a user service if requested in addition to the usual message-passing service? Up to now the matter has not received any official attention but, with the growing interest in rescue work in all spheres, it is within the bounds of possibility that some serious thought may be given to this type of facility. Perhaps a few df exercises might make a change and ensure your readiness to step in on the ground floor should this come to pass in the future.

Honorary registrations secretary: **Mrs Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.**

* 130 Alexandra Road, Croydon, Surrey, CR0 6EW.

YOUR OPINION

The Editor
Radio Communication
Sir—Compared with former times, the number and variety of special stations now being licensed in the UK seems quite remarkable.
Referring to the announcement in the June *Radio Communication* of GB3SUN, one cannot but wonder what form the special QSL card will take.
Have the possibilities of sstv been considered by this station for future occasions?

James C. Pershouse, 9M2DQ

The Editor
Radio Communication
Sir—Reference P. G. Taylor's letter in the July issue, I am able to supply from stock the type of equipment he describes, namely, transmitting type variable capacitors and switches for use in construction of equipment for the hf bands. In the main the equipment is second hand, or still fitted to surplus items, and I would advise would-be purchasers to call in person to inspect components required.

John F. Coggins,
Managing Director, Baginton Electronics, Coventry

OBITUARIES

The Society records with regret the deaths of the following amateurs.

Mr W. E. Gibbs, G2CVB
William Gibbs died on 13 August at the age of 61.

Mr H. Jones, G5ZT
Harold Jones died on 17 August at the age of 64. He was a founder member of the Plymouth Radio Club in 1948, having by that time been licensed for nearly 20 years, and was one of the first amateur tv licence holders in 1952. He was active on 2m, especially via Oscar, and contributed much to the Plymouth Club's NFD effort.

Mr J. P. O'Brien, G2BCH
Jack O'Brien died on 1 August after a short illness. He was first licensed as GW2BCH in 1946 when he was active on hf; but ever since moving to Clacton-on-Sea he devoted most of his efforts to 2m activity.

Mr S. Rogers, G2FGT
Stan Rogers died on 29 July. His callsign was re-activated last January after a 10-year silence, and he was latterly very active on 2m.

MOBILE RALLY NEWS

Hull Mobile Rally report
This second mobile rally to be organized by the Hull & DARC was marked by almost perfect weather, resulting in an attendance of around 900, and a total of 54 mobiles talked in by the 1·8 and 144MHz stations. The programme of entertainment for the ladies and children was very well received, as was the lecture for the amateurs. Provisional date for next year's rally is 26 May.

Torbay Mobile Rally report
Novel attractions at the Torbay Rally, organized by the Torbay ARS, included a miniature telephone exchange routing calls to various parts of the site, and a display of radio-controlled model aircraft. Over 500 people attended, and awards were made to: A. Whatmore, G8EQL (best mobile equipment), I. T. Richardson, G3XLP/M, and S. Roberts, G8EWV (farthest contacts on 1·8 and 144MHz respectively).

CONTEST NEWS

1973 Summer 1·8MHz Contest results

This event attracted 41 UK entries, two less than last year, but overseas entries nearly doubled. Comments on conditions were generally favourable, although no stations outside Europe were worked for points.

S. Wilson, G3VMW, operating /A from Irton Moor, near Scarborough, takes first place, with K. Spicer, G3RPB, second. Third place was so hotly contested that three rechecks failed to separate the contenders, G3RVM and G3TR, the first of only seven multi-operator entries received.

The majority of logs were neat and well presented; a few were excellent, but one or two disastrous. A log entry which is illegible or ambiguous will be regarded as incorrect. As the table of results shows, only one station submitted a perfect log.

After considerable deliberation at a recent meeting of the HF Contests Committee it was unanimously agreed that the outcome of any contest should be decided at the time of the contest, and not by subsequent reference to any record of the event. Accordingly, the committee wishes to make it known that the now common practice of tape recording a contest in toto, and using this record to check the log before submission, is, although not in direct contravention of any of the rules, not within the spirit of the contest.

S. K.

UK SECTION

Posn	Callsign	Claimed score	Checked score	Cnty
1	G3VMW/A*	510	487	YS
2	G3RPB*	482	469	LD
3	G3RVM*	484	457	WE
	G3TR*†	462	457	SY
5	G5BQ	455	450	KT
6	G3WDF/A	455	442	EX
7	G3WXS	443	433	GR
8	GW3UCB (op G3WKH)	434	424	CV
9	G3IGW	436	422	YS
10	G3XTJ	417	404	LD
11	G4BJM	406	396	BS
12	G3ORY/A	413	393	SF
13	G3XWZ	395	386	NM
14	GM3OLK	390	377	FE
15	GM4BGS	420	368	LK
16	GM3YOR	365	350	FE
17	GW6TM†	373	334	DB
18	G3SYM	333	320	HE
19	G3LHJ	319	308	DN
20	G4BPO†	322	302	SF
21	GM3PFQ	319	297	FE
22	G3TLF	316	294	YS
23	G4BYG	303	285	YS
24	G4AMH	290	279	SY
	G3UEG	306	279	SY
26	G8RZ	266	264	CD
27	G3JVJ	268	256	WK
28	GW4BCA	259	247	CV
29	G4BWA/P†	272	241	KT
30	G4BXN	257	240	SY
31	G3ATF	223	216	MX
32	G2BTO	233	211	LE
33	G3VLX	272	204	KT
34	GI2FHN	194	181	DW
35	GM4CAD†	142	177	LK
36	G4BWP	179	163	BD
37	G3WRR	160	160	SY
38	G2FNK	159	135	MX
39	G3XUS†	171	132	SX
40	G4APG	148	124	SY
41	G3VJZ	119	98	EX

OVERSEAS SECTION

1	DK6QI*	260	256
2	OL1AOH*	170	167
3	OK1FON*	124	113
4	OK1AXD	121	109
5	OK1KPU	84	53
6	OL6AQJ	40	32
7	OL1AQL	58	27

* Certificate winners † Multi-operator entries

BERU 1973 results

BERU '73 was won by Bob Nash, VE3KZ, operating from the Radio Club of Humber College as VE3HUM. J. Ravenscroft, VE2NV, was in second place, with 5Y4XKL (5Z4KL in disguise) in third position. UK honours go this year to Al Slater, G3FXB, who has been a consistent BERU entrant for many years.

On the receiving side, Eric Howell, BRS24775, retains for yet another year the Receiving Rose Bowl. In second place was A8132—Karl Muller who operates from near Mbabane, Swaziland, and who hopes to be a licensed 3D6 by next BERU.

Conditions were generally poorer than last year and there was considerably less activity from the rarer Commonwealth areas, particularly the Caribbean. The 24-hour duration continues to provoke considerable comment and as last year there are about as many in favour as against.

The exclusion of VO from the areas list was in no way a political move on the part of the RSGB and anyone who did not claim credit had their score adjusted accordingly. It is regretted that this Contest continues to clash with others—however, the Contests Calendar is very full at this time of year and short of moving BERU by many months, it would seem to be impossible to ensure a clear weekend.

TRANSMITTING SECTION

Posn	Callsign	Band posn if single-band entry	Points
1*	VE3HUM		4,114
2*	VE2NV		3,972
3*	5Y4XKL		3,608
4*	G3FXB		3,579
5	VE7UZ		3,482
6*	G3HCT		3,348
7*	ZL4BO		3,274
8	9H1CH		3,114
9	G3SSO		3,080
10	VE2AYY		3,014
11	G5RI		3,000
12	VE2WA		2,999
13	VK3XB		2,930
14	ZM2CD		2,878
15	G2HDU		2,817
16	VE4MF		2,774
17	VR1AA		2,771
18	VK2BPN		2,768
19	VE3BWY		2,649
20	9L1GC		2,632
21	VK5BV		2,586
22	VE3HD		2,565
23	G2QT		2,514
24	G3MXJ		2,487
25	G3SJE		2,194
26	G3BZU		2,101
27	9J2GE		2,041
28	G3KSH		2,010
29	ZM1HV		1,910
30	VE2AYU		1,786
31	VK3ZC		1,592
32	VO1AW		1,557
33	3D6AX		1,484
34	ZB2CJ		1,444
35	G3JKY		1,422
36	VE2LY		1,402
37	G3VW		1,366
38	G6RC		1,353
39	VK6RV		1,302
40*	VK3KX	1/21MHz	1,295
41	VK2GW		1,281
42	G3VDL		1,253
43*	VK3MR	1/7MHz	1,230
44	G3EBH		1,202
45	VE7HQ		1,180
46	5Z4LW	2/21MHz	1,129
47	VP7DX		1,069
48	G3APN		1,016
49	G2HLU		982
50*	VP2MJ	1/14MHz	959
51	G3PVA	2/14MHz	904
52	G2AJB		868
53	G3JVJ		834
54	VE6AVO		796
55	G3GNS		795
56	ZE3JO		773
57	VE3BZ		709
58	G3ZDD		705
59	G3RUG	3/14MHz	658
60	G8QZ		650
61	G3ZEN		581
62	G8KU	3/21MHz	580
63	G3LPS	2/7MHz	573
64	VE5RA		486
65	5Z4NX	4/21MHz	476
66	G3NKQ		459
67	G3JZV		439
68*	VK3RJ	1/3·5MHz	380
69	G3NKS	5/21MHz	360
70*	VE7BS	1/28MHz	275
71	G2BLA		259
72	VK2VN	4/14MHz	235
73	G3CWL	6/21MHz	180
74	G8PG	5/14MHz	175
75*	VU2UR		125
76	G3PYC	7/21MHz	50

RECEIVING SECTION

Posn	Station	Points
1*	BRS24775	2,928
2*	A8132(3D6)	2,303
3	BRS6604	2,252
4	BRS15822	2,232
5*	BCRS195	1,539
6	BRS18461	982

* Certificate winners

BERU call areas active on each band

3·5MHz
VE1 VE2 VE3 [VE4 VE7 VK2 VK3 VK4 VK5] VK6 VO [VP7 VR1] ZB2 [ZL1] ZL2 [ZL3] ZL4 8P6 9H1 9L1.

7MHz
VE1 VE2 VE3 [VE4 VE5 VE6 VE7 VK1] VK2 VK3 [VK5] VK6 VO [VP2S] VP7 [VR1] VU ZB2 ZL1 [ZL2 ZL3] ZL4 5Z4 8P6 9H1 9L1.

14MHz
VE1 VE2 VE3 VE4 VE5 VE6 VE7 VE8 VK2 VK3 VK4 VK5 VK6 VK7 VK8 VK9 VO VP2M VP7 VP9 [VQ9 VR1 VU] ZE ZL1 ZL2 ZL3 ZL4 [3D2] 3D6 5Z4 8P6 9H1 9J2 9L1.

21MHz
VE1 VE2 VE3 VE4 [VE5] VE6 VE7 VK2 VK3 VK4 VK5 VK6 VK7 VK8 VO VP7 [VP9 VR1] VS6 VU ZB2 ZE [ZL1 ZL2 ZL3] ZL4 3B8 3D6 5Z4 8P6 9H1 9J2 9L1.

28MHz
[VE2 VE3 VE7 VK2 VK3 VR1] ZE [ZD9 ZL1 ZL2 ZL3 ZL4] 3D6 5Z4 [8P6] 9H1 9J2 9L1. [3D2] Call area not contacted by UK contestants.

Equipment used by leading stations

Callsign	Transmitter	Receiver	Aerials
VE3HUM	KWM2/30L-1	51S-1	TH6DXX. Inverted-Vs.
VE2NV	32S3/amp	75S3	TH4. GP
5Y4XKL	FT101	FT101	Quad, LW
G3FXB	FLDX500	FRDX400	Quad. Inverted-Vs.
VE7UZ	Home-brew	HQ170	Quad. 2-el vert
G3HCT	T4XB	R4B	Quad. GP
ZL4BO	32S1	32S3	4-el. 3-el. Inverted-Vs
9H1CH	T4XB	R4B	3-el. GP. Inverted-V
G3SSO	KWM2	51S-1	3-el. Dipoles

Comments

"Big rock makes efficient screen to North America"—ZB2CJ.
"Gave all the Gs 599 to fool the QRMers. 24 hours quite enough for me"—5Y4XKL.
"Thunderstorm at 50 miles made 80m interesting"—VE3HUM.
"No UK station heard at all!"—VR1AA.
"3-5/7 very poor with high QRN. Contest should revert to 48 hours"—9L1GC.
"Would prefer 48 hours. Excellent turnout from G"—VK2BPN.
"VK3MR's rhombic flattened my ears"—VK5BV (G6CJ).
"Wish EU would check 14MHz long path around 1600gmt"—VE7HQ.
"What did . . . . . do to deserve such a ghastly call"—G3JKY.
"Have you considered selling Rose Bowl miniatures? Maybe you could make some money"—VE3HD.
"Single-band awards a disaster"—G3SJE.
"Like 24-hour period. Conditions fair"—ZM2CD.
"Please send rules for circulation to VUs"—VU2UR. (Will do!)

RSGB HF Contests Championship 1972–3 results

Posn	Callsign	1	2	3	4	5	6	Total
1	G3SSO	60	—	70	—	30	80	240
2	G2QT	50	50	50	—	—	50	200
3	G3WJN	80	—	40	—	—	—	120
4	G6UW	—	—	—	60	50	—	110
5	G3PDL	—	40	—	50	—	—	90
	G3TR	30	—	60	0	0	—	90
7	G3ZPC	—	—	—	35	40	—	75
8	G3RVM	—	—	—	40	25	—	65
9	G6BQ	—	—	—	25	20	—	45
10	G3MXJ	—	0	—	—	—	40	40
11	G2DC	15	20	—	—	—	—	35
12	G3MGL/A	—	30	—	0	—	—	30
13	G3TBK	0	15	—	—	—	—	15
14	G3KSH	0	0	—	—	—	10	10
	G3VLX	—	—	10	0	0	—	10
	G3WDF/A	—	—	—	0	10	—	10

Contests

1 21/28MHz Telephony Contest 1972.
2 7MHz CW Contest 1972.
3 7MHz Telephony Contest 1972.
4 Second 1·8MHz Contest 1972.
5 First 1·8MHz Contest 1973.
6 BERU 1973.

Awards

The G2QT Trophy to the Government Communications HQ station G3SSO.
Runner-up certificate to F. Cooper, G2QT.

RSGB HF Contest Championship 1973–4 rules

1. RSGB General Rules for HF Contests do not apply.
2. No entries for the championship are required.
3. The championship will be decided on the basis of RSGB HF single-operator contests held between 1 October 1973 and 31 March 1974.
4. Points will be awarded to the leading 10 UK stations in the results tables published in *Radio Communication* as follows:

	Position									
Contest	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
21/28MHz phone	80	70	60	50	40	30	20	15	10	5
7MHz cw	70	60	50	40	30	25	20	15	10	5
7MHz phone	70	60	50	40	30	25	20	15	10	5
2nd 1·8MHz 1973	60	50	40	35	30	25	20	15	10	5
1st 1·8MHz 1974	60	50	40	35	30	25	20	15	10	5
BERU 1974	100	90	80	70	60	50	40	30	20	10

5. Points gained by stations using the same callsign entering two or more of the six individual contests will be totalled and a table published in *Radio Communication*.
6. **Awards.** The winner will receive the G2QT Trophy. A certificate will be awarded to the runner-up.

1973 Second 1·8MHz Contest rules

1. The **General Rules for RSGB HF Contests**, published in the January 1973 issue of *Radio Communication* will apply.
2. **When.** From 2100gmt Saturday 10 November 1973 to 0200gmt Sunday 11 November 1973.
3. **Contacts.** CW (A1) only in the 1·8—2MHz band. County code letters, as published on page 53 of the January 1973 issue of *Radio Communication*, must be sent after the report/serial number group; eg for a contact from Surrey, 579001 SY.
4. **Scoring.** Six points for each of the first six contacts with stations in any one British Isles county, three points for the seventh and subsequent contacts with stations in that county; six points for each contact with a station outside the British Isles.
5. **Logs.** Column (5) should be headed "County Code Letters Received". Entries should be addressed to: The HF Contests Committee, c/o S. V. Knowles, G3UFY, 32 Nursery Road, Thornton Heath, Surrey, CR4 8RF.
6. **Awards.** The Victor Desmond Trophy will be awarded to the winning station. The Maitland Trophy will be awarded to the Scottish member with the highest aggregate number of points in this contest, combined with the First 1·8MHz Contest, 1974.
A Certificate of Merit will be awarded to the second- and third-placed entrants.
7. **Under-18 Section.** An additional Certificate of Merit will be awarded to the highest placed entrant whose 18th birthday falls on or after 15 November 1973. Entrants wishing to compete for this award should state their date of birth on the contest cover sheet, and mark clearly at the TOP of the cover sheet "UNDER 18". Entries will only be eligible for this award where operation has taken place under the entrant's own callsign, and from the "main address" as stated on the station licence.

144/432MHz CW Open Contest rules

Dates and times. 2000gmt 3 November to 0100gmt 4 November.
All entries and check logs to: VHF Contests Committee, c/o 100 Shirley High Street, Southampton.

The following General Rules, published in the January 1973 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9b, 10a, 11—24. A multiplier of five should be applied to the total 432MHz score.

1973 Grafton Top Band Contest (G2AAN) results

Posn	Callsign	Score	Posn	Callsign	Score
1	G3WDF/A	125	11	G3ZYE	49
2	G3ZJK	115	12	OL1AOH	37
3	G3XSC	113	13	G4BSC	25
4	G3WXS	105	14	G2BTO	24
5	G3IGW	101	15	GW4BCA	22
6	GM3YOR	82	16	G3YCY	21
7	G3UXP	65	17	OK2PAW	18
8	G3FJE/A	64		OL6AQJ	18
9	G3ZVW	55	19	EP2BQ	5
10	G4BHF	54	20	G2AVC	3

Certificates to follow for first, G3WDF/A, and second, G3ZJK.
Winner of a.m. section: G3ZVW.
Best overseas log: OL1AOH.
Best Dx station: EP2BQ.
Check log received from SWL G. Parsons.

Contests calendar

6-7 October	—VK-ZL-Oceania Phone
6-7 October	—UHF NFD
6-7 October	—IARU 423/1,296MHz (Rules in May issue)
13-14 October	—VK-ZL-Oceania CW
13-14 October	—21/28MHz (Rules in May/August issues)
20-21 October	—WADM CW
20-21 October	—7MHz CW (Rules in June issue)
27-28 October	—CQ WW DX Phone
3-4 November	—7MHz Phone (Rules in June issue)
3-4 November	—144/432MHz CW (Rules in this issue)
10-11 November	—OK DX CW/Phone
10-11 November	—2nd 1·8MHz
10-11 November	—Ex-G
11 November	—70MHz Cumulative
24-25 November	—CQ WW DX CW
9 December	—144 MHz Fixed

For **70MHz Cumulative Contest** rules and **432MHz Cumulative Contest** rules see September issue.

MEMBERS' ADS

These low-cost flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the last page of each issue of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 25p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No other correspondence concerning this service can be entered into.

The closing date for each issue is the 4th of the preceding month but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

See the current order form on the last page for further details.

Post to : MEMBER'S ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE

FOR SALE

12-core 1A cable, suit Ham-M, brand new, 18p/yd; heavy 75Ω coax, unused, ⅜in od, 12p/yd, carr pd. Send reply coupon for samples. GD3TIU, QTHR. Tel Marown 442.

TA 33Jr beam, has never been used, £28 ono G4AXD QTHR. Tel W Malling 841021.

Pye mk 4 cctv camera, lens, spg, control unit, monitor, remote modulator, cables, handbooks, £80; AR88D £45; SSM converters, 2m £10, 70cm unused £12; 4CX250s £5; 4CX150s; £2.50. Standen, Willow Garth, Danthorpe, Burton Pidsea, near Hull, Yorks. Tel Burton Pidsea 511.

R1155 df, removed loudspeaker output, tatty but working, £2.50; No 38 set 75p; HC6U xtal, 12·975MHz 75p; *Wanted* valves types 832A (2). G8FPP QTHR.

AR88 rx, vgc, £36 deliver reasonable distance; 4m fet converter, i.f. 1·7-2·4MHz, £5. G3RDQ, 30 Slade Rd, Stokenchurch, High Wycombe, Bucks. Tel Radnage 2461.

HQ1 Minibeam; 2m 10-el Yagi; R220 4m rx; 4m tx and control unit; VCR97 (2). *Wanted* SB610 monitor scope. Buyer to collect or carr extra. G3WQM QTHR. Tel York 73672 after 6pm.

Cossor scope 339A, double beam, working, needs attn, cct, £5; Panadaptor US Navy 450/475kHz type RCX, width ± 100kHz, manual, £8; fm tuner, Rogers integral psu, o/p to multiplex, 88-108MHz, cct, £3. G3TCL QTHR. Tel 01-508 1958.

Two FT241 xtals, spaced approx 1·8kHz at around 470kHz, 75p; QQV0310, QQV026, 5763, 50p ea; 829B (3E29) and QQV0320A with bases, 75p ea; basic dfm pcb 75p; 1in crt 75p. G3ZKO QTHR. Tel 061-973 0217.

Sphinx tx, good cond, £35; new ICs—TAD100 and filter (2) with data £1.25 ea, CA3020 (1) £1, 710 (1) 25p; xtals—3·679, 3·540, 7·010 (2), 9MHz, 50p ea; DET24 £1. G3ZKO QTHR. Tel 061-973 0217.

Diode Circuits Handbook by R P Turner 75p; *Electromagnetism* by Slater and Frank, £1.10; *Elementary Technical Electricity* by Huck 60p, all as new, sae list other books. H. H. Seymour, 6 Chichester Bldgs, Swan Mead, London SE1 4RY.

FTdx560, exc cond, little used, matching YD-844, mic and SP400 spkr, manual, £150. *Wanted* KW204 tx. G2CST, 5 The Ashes, Glossop, Derbys. Tel Glossop 61062.

Hammarlund HQ170A, exc cond, manual, Eddystone plinth, spkr, £90 ono. A. Kenway, 16 Hilliers Lane, Beddington, Surrey. Tel 01-688 5033.

Crystals HC/6U 3·749MHz (5 off), 80m walkie-talkies, club net freq, only £2.50. G4AXX QTHR. Tel 01-554 9457.

Parabeam 14-el with brackets, good condition, (varnished), £10; B40 and B41 with mains lead £12.50 and £8.50 or £20 pair, buyer collects. R. Phipps, 26 Spinnery Hill Crescent, Parklands, Northampton.

Pyramid linear, 800W, little used, exc cond, £35; Quad 22 stereo pre-amp, unused, FM22 tuner—what offers? *Wanted* KW Z-match and Heathkit balun coils. G3FLD QTHR. Tel 0952 3758.

Heathkit HW7 wired to prof standard, only three months old, rf attenuator added, £29; pair 4CX250Bs with uhf bases £5; pair 4-125s with bases £5. G3KLF, 20 Oaklands, Fenstanton, Hants. Tel Slepe 8439 evngs.

Panda PR120V tx, phone/cw, £20 ono; Panda atu £4 ono; pair Selsyns £2; transformer, pri 0-200-220-240-260, sec 6·3 at 2·8A, 31 at 0·3A, 250-0-250 at 65mA, 6·3 at 0·6A, £1.25; VR105/30 20p, all buyers collect or carriage extra. G8EUU QTHR.

Heath HM102 swr and power meter £12; Tech TE15 "Tradiper" transistorized dip meter £10, both near new. G2KF QTHR. Tel 072-681 2337 (Cornwall).

14AVQ 10-80m trap vertical £12, buyer to collect. Shilvock, tel 021-262 2787.

Collins 75S1, factory converted to S3, mint, with phones, extra auto transformer, unused coaxial feeder, £150. J. L. Burd, 61 Corporation Avenue, Llanelli, S Wales.

HW100 with homebrew rack mounted psu and manual, vgc, £100, prefer buyer collect or carriage extra. G8EQB QTHR.

FT2FB, mic, xtals on 144·40, 144·48, 144·60, 144·80, 145·00, 145·20; AS-2HG 52Ω ground plane and coaxial, £110 the lot, as new, tested; 2m 5W a.m. tx, mic mod, xtals on 144·525, 145·000, mic, £25; ditto KT340, speaker, £20 ono, needs peaking, dusty, prefer buyer collect all. G8BUQ, 19 Du Pre Walk, Wooburn Green, High Wycombe, Bucks. Tel Bourne End 20009.

G2DAF ssb tx, psu, £32.50; hro, 9 coils (bandspread, 80, 40, 20), psu, speaker, manual, spares, vgc, £24.50 ono; xtal calibrator No 10 £2; Jason fm tuner £2.50; crt modulation monitor £3.50. *Wanted* FT101. G2HCV QTHR. Tel 01-954 2960.

EC10 mk 2, mint, Echo 8G, 40/10m, boxed, mint; Heathkit QPM16, requires checking, all reasonable. *Wanted* KW Ezee match, G-whip mobile aerial. Baxter, 251 Harrogate Road, Eccleshill, Bradford, Yorkshire. Tel Bradford 639823.

Exchange or sale, 2m tx, 40W+ input, Geloso 4/103 exciter, QQV03/10 amp, QQV06/40 pa, modulator miniature 807s, twin internal PSUs, 3 xtals, enclosed 19in chassis. *Wanted* RA1 or similar, around £27, or why. G8AWX QTHR. Tel Sutton-on-Sea 753.

CR100 £12; R1155, S-meter and internal mains psu, £10; PR30X preselector £4.50; Sentinel 2m pre-amp £4; Philips tape recorder, portable, £5; cassette recorder £8.50; 8-10W audio amp £5; PCR psu £4. G. Webb, 41 Gallows Hill Lane, Abbots Langley, Watford, Herts. Tel Kings Langley 64172.

Inoue tx and rx, power unit/speaker, vgc, £120 ono, or will exchange for Heath HW100 in sim condition; Class D wavemeter, conv mains input, vgc, £4.50; xtal calibrator No 10 £2. G3RTN, 1 Ramsey Street, Scarborough YO12 7LP.

HW17A £45; EC10 mk 1 £30, vgc; Solid State Modules 2m converter, 4-6MHz i.f., £10; Microwave Modules 2m tx, 1W output, modulator, £10, buyer collect. Tel 05-093 63355.

EA12 rx £110; 2000B £160; KW Viceroy IV £50; Tiger 200 a.m./cw tx, offers, many meters, Woden transformers. G2QT QTHR.

Eddystone EC10 mk II, 8 months old, v good condition, also Codar PR40 preselector, 1·5-35MHz, £65 ono the pair. N. Roberts, "Westwold", Burrows Lane, Prescot, L34 6JW. Tel 051-426 6145.

UR67 co-ax 24p/m; Hansen swr bridge £3; desk mic £2; flat-face scope tube SE5JP31, with mu-metal shield and socket £5. Tel 01-432 2343, 8-4 weekdays only.

Clearing shack, equipment, components, etc, send sae lists. G8DDM QTHR. Tel Penn 4483.

EC10 with original box, £40 ono; RAE correspondence course £7; Pye 2207 with cable £6; Murphy 821 with mic £5, without £4; all low band. B. Harrod, 7 Church Street, Hingham, Norwich, Norfolk. Tel 371.

Unica UR-1A general coverage receiver solid stage fet front end, 550kHz to 30MHz, Q-mult, S-meter, bfo, anl, 12V dc or 240V ac, modified and realigned, as new condition, 2 years old, suit swl, £18. Russell, 13 New Road, Bolter End, High Wycombe, HP14 3NA.

Mosley Tri-band trap dipole £3.50 plus 30p carriage. G3FTA QTHR. Tel Hastings 3828.

HW17A excellent condition, plus handbook, £45 ono, buyer collect. G8FER QTHR. Tel Loughborough 63355.

Hudson FM120 Mk II base stn, working on 2m, tx/rx, also RC96 remote control unit for above, £50 ono. G8BGJ QTHR. Tel Burgh Heath 56464.

Drake TR4C tx/rx, as new, still under guarantee, with neat home-brew power supply and speaker unit, £270 ono; homebrew linear amp, two 4CX350Bs with separate power supply, £35; G2DAF tx, Collins filter, single 6146 with power supply £25; home-brew linear amp three 6HF5 to match G2DAF tx, with power supply, £25; home-brew transistor receiver, 2 filters in tandem, further details by request; two Zenith 15A variacs, £12 each ono; 12ft mobile aerial, remote tuning facility, £15, further details by request; stereo headset, National Midland, new, £4; transformers, valves etc, for list and gen write or phone (evenings) G3KKJ, Ulverston 53685.

Hustler 4BTV trap vertical aerial, 10-80m £19. *Wanted* general coverage rx. Wilkinson, Rosehurst, Wetherby Road, Bardsley, Nr Leeds. Tel 093786 2502.

Heathkit amateur bands receiver, HR10B, £35 ono; Pye Cambridge transmitter, working but tatty, £12 (on 2m). R. J. Holding, 93 Orchard Ave, Croydon. Tel 01-654 1629.

70cm and 23cm combined portable homebrew transmitter, 12V positive earth, QQV03-20A pa on 70cm, 2C39A cavity tripler, 10W output on 23cm, transistor modulator and psu, £45, sae more details. G8ACE QTHR. Tel 0763-41164.

FTdx401, mint, new Sept 1972, £200, delivery by arrangement, details G3JBU QTHR. Tel 0604 43020.

HW12A 80m transceiver, HB23a, ac psu, £60; HP13a dc psu £25; 62 set £12, 80m Tavasu Whip £4, all in fb condition; carriage extra. *Wanted* Minibeam for 20, 15, 10. G3ZZS QTHR. Tel Plymouth 31707.

HF band beam and hp linear amplifier required for university radio club G3UKC. G3XUE QTHR. Tel Bradford 639542.

Marconi MKIII broadcast camera channel working order 21in monitor £10; lopt and scancoil sets for 2in tubes £1; *Wanted* EMI ccu type 2106/2 also control panel type 215. B. Summers, 7 Orchard Close, Gainsborough. Tel 2802/3940.

HW12 & homebrew power unit, £47 or sensible offer; hro (ux valves) £5 or offer; various power units, transformers, useful sets, sae list. G3NBU QTHR. Tel 073-529 2257.

Dartronic scope model 510, no circuit, mint, offers; quantity Celestion speakers unboxed, brand new, 8in by 5in, 8Ω, £1.50 each; Codar CR70A, 4 months old, £20; Zenith variac 2A, needs rewind, £2. GW3TMP QTHR.

AM25B/V Pye Vanguard, complete, manual, 145·928MHz, £20; Airmec hdset £1; Solarscope CD1014 with probes £30. G8DIM QTHR. Tel 061-794 1778.

HW101 trans, few months old, immac condition, any trial, £145. G3ZLN QTHR. Tel 55200.

Trio JR-500S, good working order, £40 ono; Sentinel dual gate mosfet 2m converter, i.f. 28-30MHz £10; also TA-31 beam £10; 62 set £10 ono, prefer buyer inspects and collects. R. F. Philpot, 58 Hutton Drive, Hutton, Shenfield, Nr Brentwood, Essex.

Video equipment, Pye "Lynx" transistor 625l tv camera £35; Ikegami TK204D camera £25; various monitors Pye PTC1203P 625l pulse and bar generator £8, Pye 2691 B6Z tv test pattern generator £8, various monitor tubes. B. S. Homer, 32 Ironmill Lane, Crayford Kent DA1 4RR. Tel Crayford 24625.

Marconi TF142E distortion factor meter £18; TF144G sig gen £12; TF675E pulse generator £5; TF428B vtvm £3; Airmec 712 vtvm £2; Scalamp £10; chart recorder £5; various 19in cases; Pye "Lynx" 625L camera £35. R. C. Whitbread, 32 Ironmill Lane, Crayford, Kent DA1 4RR.

70cm J-Beam MBM46 as new £6 buyer collects; Microwave Modules convtr, i.f. 28-30, £9; DK2VF reflectometer 2/6s, E180Fs, 3/20As, sae list. G3AAV QTHR. Tel Leeds 51100.

Creed 7B with silencer psu, etc, £25 ono; lots of other gear and components, sae for list. G3ZDN QTHR. Tel Potters Bar 55391.

Freq meter LM14, pp, handbook, £15; boom headset £4; 50yds RG8U £5; BC348 pp £12; 60 ass crystals £5; 30 ass relays all types £5; spare valve set HW100 inc 6146s £5. G3KPW QTHR. Tel Grays Thurrock 71621.

Drake R4A/ T4X/ psu/ handmike, excellent condition, giving up pro tem, seen working, manuals, boxes, could deliver reasonable distance £260.00. G3RDT QTHR. Tel Bagshot 73577.

Heath GR78 rx, vgc, recently checked by Heath, complete with handbook, best offer over £50, also 4m/70cm converters £10 ea. J. Raynes, 32 Hawthorn Avenue, Immingham, Lincs. Tel Immingham 4596.

Transistor receiver, 2-4MHz, as handbook (pp16.15, 16.16) with 144MHz mosfet converter, £18; exch TA33 jr for 2m tx/rx or why. All letters answered. G4ADF QTHR.

Crystals 8075·00, 8077·00, 8077·08, 8081·25, 60p each post paid. *Wanted* circuit diagram for Murphy TR821, vhf, tx/rx. G3MWO QTHR. Tel Beyton 218.

Trio JR310 rx, very good condition, any trial, £55 ono; *Wanted* transistor front end, amateur bands. Mr A. Giannecchini, 9 Coxwold Road, Fairfield, Stockton. Tel 65974.

Antique Philips radio (circa 1934), working, £5; BC639A, cascode front end, with p/p and internal speaker, perfect, £10; HW100 and p/p, new, £75; TA33JR and KW balun £12 buyers collect. G6XY QTHR. Tel Kenilworth 52679.

Eddystone EC10 mk1 £35; homebrew tx/rx, similar KW2000, £50; KW2000 12V dc power supply £20; rotator CDE TR44 £35; 4CX250Bs with bases and chimneys £6 ea; 4X150Bs £2 ea, carriage extra. G3JRL QTHR. Tel Preston (Dorset) 2760.

Amateur's small junk box, valves, meters, bits and pieces, yours for collection, suit beginner or club. R. G. Taylor, 9 Cooper Road, Henley-on-Thames, Oxon.

HW32, with matching HW23 psu, complete, excellent condition, £55; Labgear top band tx, £12.50; Class D wavemeter, £5, buyer collect or carriage extra. G3SPU QTHR. Tel Melksham 703696.

KW202 rx with matching speaker, KW E-Zee match and earphones, mint condition, little used, £120. C. S. Robinson, 29 Tootswood Road, Bromley, Kent. Tel 460 3936.

KW101 swr meter, 50Ω, S0259, £6; KW110 Q-Multiplier £12. G3ZZR QTHR. Tel Witney 3792.

Beam turning gear, motor indicator, P unit plus 20yds screened cable, brand new, all heavy duty, £20; Q-mult, Heathkit, with manual, £5; AR88D, manual, £1; power selsyn indicator £3.50 unused. G2DWN QTHR.

Crystals—5MHz HC6/U 75p; 8·95MHz HC18/U 75p, send 3p sae with remittance and order. Richard Bowell, 16, Margarite Way, Wickford, Essex.

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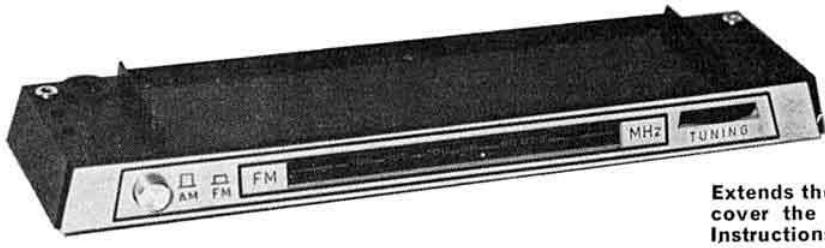

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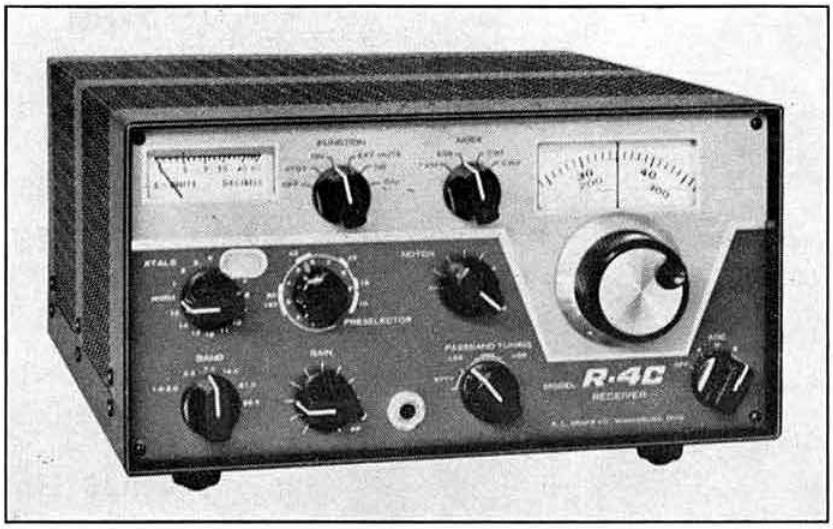

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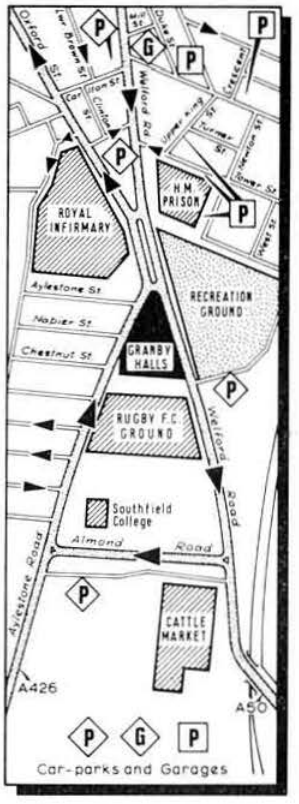

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