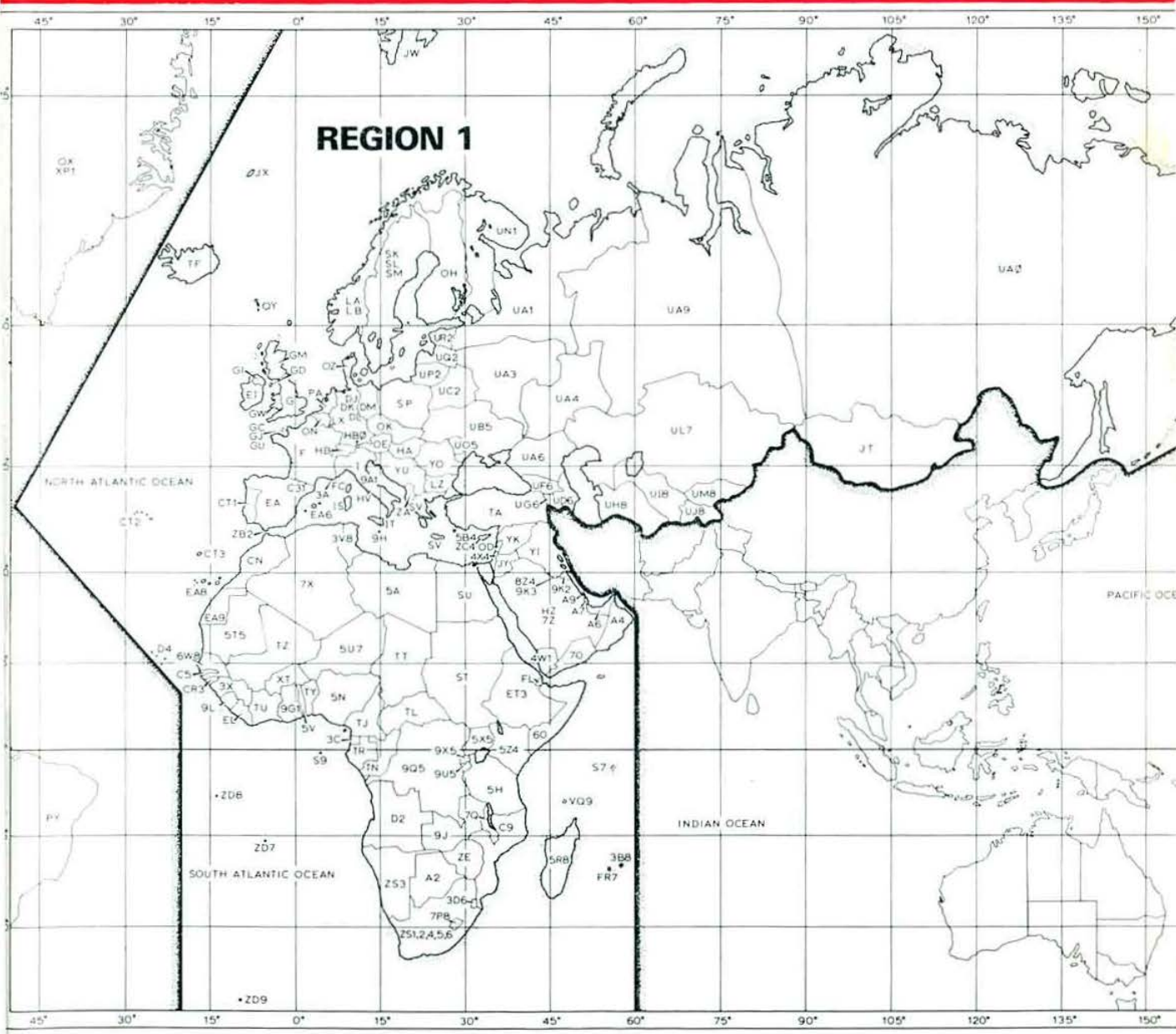
August 1977

radio communication

journal of the Radio Society of Great Britain



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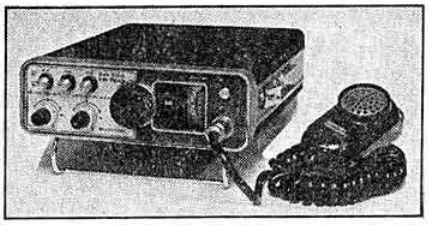
LONDON, MATLOCK, BIRMINGHAM, LEEDS, GLASGOW, S. WALES, SUSSEX.



TR7010 £175.00 INC VAT (EX-STOCK)

Work real DX with ease on 2 metre SSB and CW. The TR7010 combines a high performance receiver with a 10 Watt transmitter and provides mobile or fixed station capability at low cost. Supplied ready to operate from 144·1-144·34MHz, the TR7010 covers all CW, SSB and beacon activity. 48 channels with 5kHz spacing plus VXO and RIT provide continuous coverage. Operation in any other part of the 2 metre band can be carried out by a simple crystal change and no re-alignment is required.
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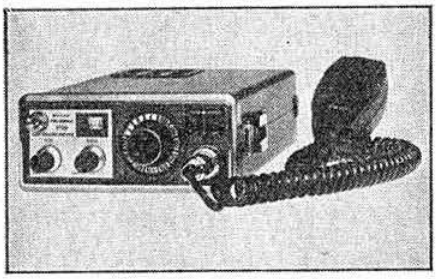
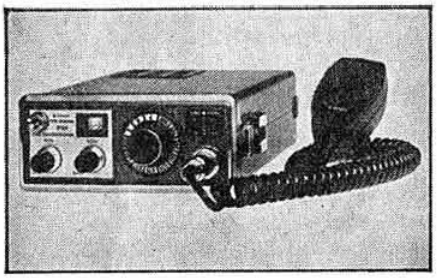
Join the SSB gang and work real DX for £175. Send for full details now.



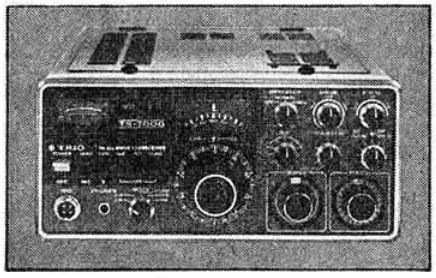
TR2200GX £130.00 (3 ch.) £160.00 (12 ch.) INC VAT (EX-STOCK)

This is the definitive 2 metre FM portable rig which has won praise from all over the world. Over 2W transmitter output with switched reduction to 400mW for local contacts. High gain receiver with double IF filtering at 10·7MHz and 455kHz for razor sharp selectivity.
The TR2200GX is supplied with all accessories including the battery charger for the optional Nicad battery pack, the removable telescopic antenna, the carrying case, the shoulder strap, external power lead, microphone and handbook. Fitted with 12 channels, the price is only £160 inc. VAT. If you wish to start out at a lower price, we can supply the rig fitted 3 channels for only £130. With all its performance, the TR2200GX is a must for the portable operator. At the price, it has to be the best around. Just look around at the next rally and see how many operators are carrying them.
Also available are a mobile mounting bracket at £9.45, a matching 10 Watt amplifier for £45 and a flexible antenna. Send for full details now.



TR3200 £171.00 INC VAT (EX-STOCK)

The newest FM handy transceiver from the ever expanding TRIO range. Superb performance for the 70cm operator with all the advantages of portability and TRIO reliability. 12 channel capability in the range 432-436MHz with three channels fitted (SU8, 18, 20). Transmitter output switched 2W/400mW and incorporating the exclusive TRIO 1750Hz tuning fork access tone generator (does that mean you can ring for credit?) High gain 5/8 wave antenna for enhanced performance on transmit and receive. Supplied complete with all accessories as for the TR2200GX and including the all important battery charger.
We have just received the first shipment of the VB3200 10W amplifier for the TR3200. Rather more complex than the VB2200, the VB3200 also includes a switchable receive preamplifier. Price . . . £95 inc. VAT. Send for details now.



TS700G £392.00 INC VAT (also including the matching VOX-3) (EX-STOCK)

Say what you will, the TS700G set the standard for all other 2 metre all mode transceivers. A very high standard which has yet to be surpassed. Full 2 metre coverage, VFO or 22 crystal channels, all mode operation AM, FM, USB, LSB and CW. Mains or battery supply. Normal and reverse repeater facilities at the turn of a switch. Trio exclusive tuning fork access tone generator with fully auto tone burst. Best quality signal on the band thanks to TRIO design excellence in low intermod amplifiers. It's simply the best rig that you can buy, and it's backed by the combined reputations of TRIO and Lowe Electronics.
15 Watts output; 0·25 microvolt sensitivity; first class strong signal handling receiver; European standard selectivity. If you haven't yet handled the TS700G, rush to one of our branches and be prepared to be impressed. Send for full details now.

SECONDHAND EQUIPMENT

We always carry a wide range of fully guaranteed trade in equipment. Since we make it a policy not to deal in miscellaneous scrap, we can offer an extended warranty on many of the used items and you can be certain that it will be right up to the mark. A small selection from our current stock. All prices include VAT but not carriage.

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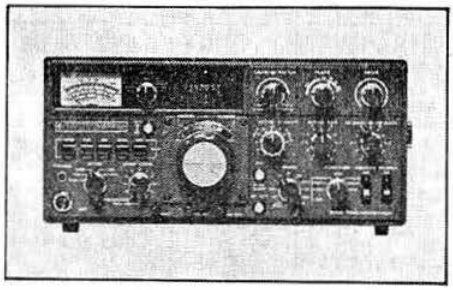
TR7010 **£140**
T599 **£165**
FL400 **£175**
HQ170A **£135**
QR666 **£115**
Liner 2 **£100**
Multi U-II **£205**
TR7200G **£135**
SB303 all filters **£165**
Uniden 2020 **£405**
TS700 **£295**
Liner 430 **£195**
TV502 **£110**
Venus SS2 **£195**
IC-202 **£135**
JR500S **£60**
LA106 **£150**
Hallicrafters FPM300 (new) **£265**

Since the second hand equipment turns around at a fast rate, please ring us before driving 100 miles to collect a rig that was sold the previous day. If you are looking for something special in the second hand line, our Maid Marian at Matlock will be happy to put your name into her 'wanted' file for two months and will inform you if we find just the rig you wanted.

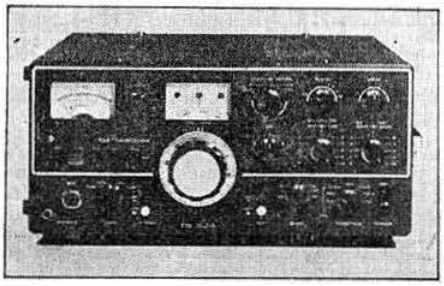
LOWE ELECTRONICS LTD

LONDON, MATLOCK, BIRMINGHAM, LEEDS, GLASGOW, S. WALES, SUSSEX.



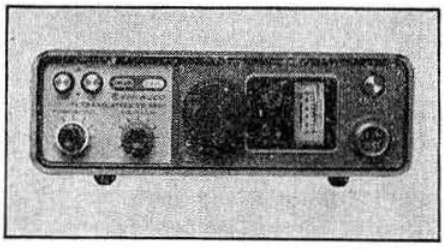
TS820 £625.00 INC VAT. (DGI £126.00) (EX-STOCK)

The ultimate transceiver . . . TRIO's TS820. No matter what you own now, a move to the TS820 is your best move. It offers a degree of quality and dependability second to none, and as the owner of this superb unit, you will have at your fingertips the combination of controls and features that, even under the toughest operating conditions, make the TS820 the leader that it is.
Unprecedented demand plus the painstaking care TRIO lavishes on each TS820 has created a back-log of orders, but rest assured, it's well worth waiting for. Once you have operated the TS820 you will not be satisfied with anything else.



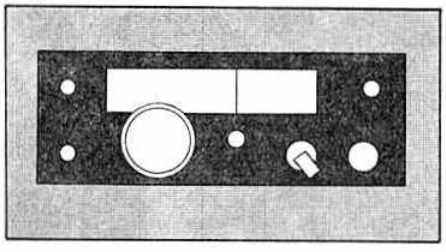
TS520 £432.00 INC VAT. (£405 without dc inverter) (EX-STOCK)

As a TS520 owner, you go on the air with a sense of pride and confidence. Thousands of these precision built beauties are in operation all over the world . . . in ham shacks, field day sites, in DX and contest stations and in countless mobile installations. No other rig has ever offered the performance, dependability, versatility and value that is built into every TRIO TS520. The TS520 covers 80-10 metres and combines a first class receiver with a 200 W PEP transmitter. A full range of matching accessories is available including a 2 metre transverter.
You have certainly heard the TS-520s clean signal on the air and have probably heard a lot of glowing praise by other hams. So if you don't own a 520, maybe it's time you did. Send for full details.



TR8300 £230 INC VAT

New from TRIO, the TR8300 offers the discerning 70cm operator the best possible FM rig for this expanding activity band. Incorporating the rugged reliability that makes the TR7200G the 2 metre favourite, the TR8300 is a welcome addition to the TRIO range. Over 10 watts output and a sensitive receiver, fitted with 8 channels with facilities for a total of 22, automatic tone burst and all matching accessories, the TR8300 represents an opportunity to obtain the highest quality equipment at a realistic price. It is backed of course by the combined reputations of TRIO and Lowe Electronics and is available this month. See it soon.



TR??? £225.00 INC VAT

Another addition to the TRIO range will soon be available. NB. I said addition, not replacement. Next month folks.
Many more good things are on the way from TRIO—and from all the other manufacturers whose products we stock. Remember that we carry the widest ranges of equipment and accessories available today and although it is clearly impossible to list them all in the limited advertising space, you only have to send 48p in stamps to receive catalogues, price lists and the infamous antenna book. If you wish to spread the purchase load, we offer short term (easy) credit as well as long term (ouch) facilities. Details in our price list.

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The FT221R. The multimode USB, LSB, A.M., F.M., CW, (with semi-break-in and side tone), 2m transceiver offering the choice of phase locked VFO or 44 crystal channels, simplex or repeater (600Hz up and down shifts) with unique 'double push' auto tone burst, mains or 12V (3A) operation, excellent selectivity, SSB 2.4kHz (1·7: S.F.) or FM 12kHz. Front panel adjustable VOX and mic gain, a calibrator (1MHz ÷ 10), 1kHz readout and linearity sensitive squelch, clarifier with IRT and IRT with ITT (makes F.S.K. easy), switchable "S" and centre zero tuning meter, noise blanker, serviceable plug in boards all contained in 11½" (14") × 5" × 11½", 22lb, rigid package. 600kHz and 1·6MHz shifts over 4MHz. **Now the YC221 digital readout unit for about £75.**

FT221R

THE FRG7, general coverage receiver Ex-Stock

UNPARALLELED IN ITS CLASS AND ONLY £145 (VAT 12½%)

The FRG7 is a general coverage solid state receiver with specifications unparalleled in its price range. It uses a Barlow Wadley Triple-mix, drift cancelling loop for continuous, spin-tuned inclusive coverage of 0·5 to 30MHz with calibration accuracy better than 5kHz. Frequency selection is accomplished by setting the RF (pre-selector and range switch), dialling up the required number of megahertz, then tuning the VFO knob as normal.

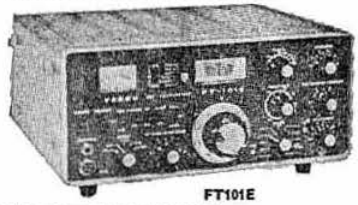
The receiver is sensitive (0·5μV for 10dB, S + N/N (SSB)) and stable (within 500Hz for any 30 minutes after warm up) with A.M., SSB and CW modes catered for. A 3 position audio filter, RF attenuator, dial lamp conservation switch, recorder and phone sockets are fitted. It is mains powered, but should the supply fail, or portable operation be required, 8 dry cells are automatically switched in.

The FT101E complete HF station—ex stock.

The FT101E. A complete mains or 12v. DC station contained in a compact 30lb. package, 260W, PIP of SSB (with in-built RF speech processor) 180W, CW and 80W or AM 10 to 160m (inc. 10 MHz RX). The sensitive and selective (permeability tuned RF stages and 8 pole crystal filter) receiver offers: threshold adjustable noise blanker, switchable 25 and 100 kHz calibrator, ± 5k clarifier (with separate on/off switch), etc., etc.

The VFO is stable and linear (readout to 1 kHz), external VFO or crystal control can be selected, with LED indicators illuminated accordingly. Carrier level is adjustable for: tune up, AM and for CW operation, whose performance with the semi break-in keying, with side tone, and the optional filter installed is of a high order. Linear and transverter provisions are made with sockets for: relay contacts, ALC output, all internal HT supplies, low level RF heater links and switches, etc., etc.

New service manual for the '101' series in stock £12.00.



FT101E

SOLID STATE MOBILE LINEARS (UHF & VHF) FROM KLM and AMPERE

2 or 70. Superb RF sensing and dc bias arrangements for all modes. C/w mounting bracket 12V dc 10W drive 2·5" × 5·2" × 7·5" (8·5") (+ VAT at 12½%), free delivery.

APB82A	145MHz	80W out	£99.00
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2 metre, SSB/CW/FM, RF sensing with manual override, "Microstripline" techniques 12V D.C. 10W drive 2" × 6" × 10" (11") (VAT + 12½%), free delivery. (Over 15 different models—S.a.e. details) **PA10/160/BL** 145MHz 160W output **£160**

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144MHz, FM, 2W of RF and ½W of audio. Immunity to image and IF breakthrough and performance to rival all walkie-talkies and many a mobile sets.

C/w F plug, leather handle/whip case and telescopic whip.

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F to UHF adaptor **£1.65** (all + VAT).

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Ideal for the SWL, the YL or even the XYL as the monitor receiver to keep you in touch Tiny (2½" × 1½" × 4½") and light (8 ozs.) slip into your pocket or onto your belt with the optional case. Sensitive double conversion superhet with 12kHz. band width, auto squelch, and generous audio output c/w Nicads, Mains Charger, Earpiece, Antenna.

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MR2 144MHz. 12 switched channels **£53**

MS2 144MHz. 4 scanning channels **£62**

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MR2

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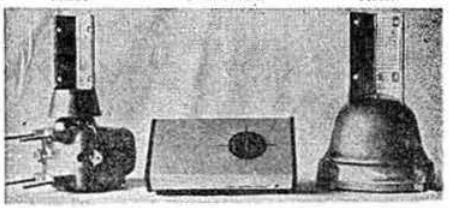

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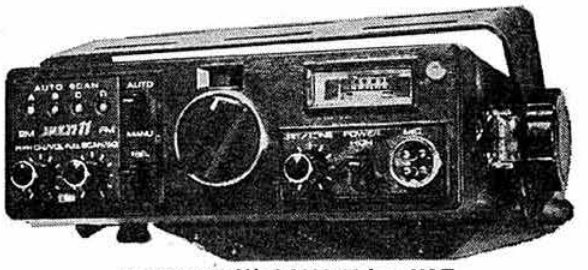

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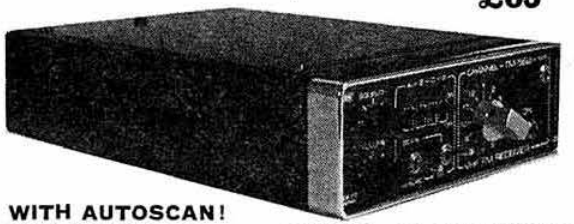

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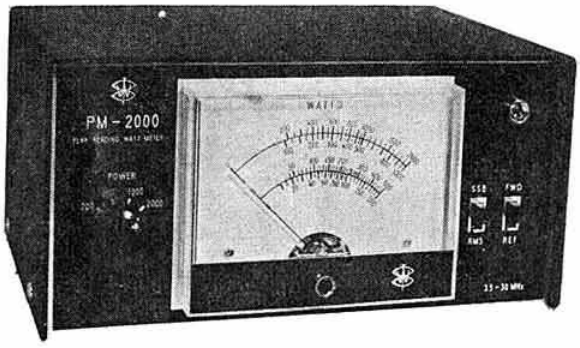

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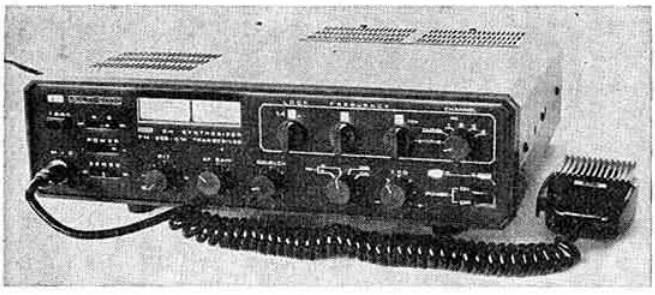

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1N758A	10v	z	.25
1N759A	12v	z	.25
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1N5244B	14v	z	.25
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14-pin	pcb	.25	ww	.40
16-pin	pcb	.25	ww	.40
18-pin	pcb	.25	ww	.75
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24-pin	pcb	.35	ww	1.25
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4011	.20
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4014	1.10
4015	.95
4016	.35
4017	1.10
4018	1.10
4019	.70
4020	.85
4021	1.35
4022	.95
4023	.25
4024	.75
4025	.35
4026	1.95
4027	.50
4028	.95
4030	.35
4033	1.95
4034	2.45
4035	1.25
4040	1.35
4041	.69
4042	.95
4043	1.25
4044	.95
4046	1.50
4049	.80
4050	.60
4066	1.35
4069	.40
4071	.35
4082	.45

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7400	.15
7401	.15
7402	.20
7403	.20
7404	.15
7405	.25
7406	.35
7407	.55
7408	.25
7409	.15
7410	.10
7411	.25
7412	.30
7413	.45
7414	1.10
7416	.25
7417	.40
7420	.15
7426	.30
7427	.45
7430	.15
7432	.30
7437	.35
7438	.35
7440	.25
7441	1.15
7442	.55
7443	.85
7444	.45
7445	.80
7446	.95
7447	.95
7448	.95
7450	.25
7451	.25
7453	.20
7454	.25
7460	.40
7470	.45
7472	.45

7473	.25
7474	.35
7475	.35
7476	.30
7480	.55
7481	.75
7483	.95
7485	.95
7486	.30
7489	1.35
7490	.55
7491	.95
7492	.95
7493	.40
7494	1.25
7495	.60
7496	.80
74100	1.85
74107	.35
74121	.35
74122	.55
74123	.55
74125	.45
74126	.35
74132	1.35
74141	1.00
74150	1.00
74151	.75
74153	.95
74154	1.05
74156	1.15
74157	.65
74161	.85
74163	.95
74164	.60
74165	1.50
74166	1.35
74175	.80

74176	1.25
74180	.85
74181	2.75
74182	.95
74190	1.75
74191	1.35
74192	1.65
74193	.85
74194	1.25
74195	.95
74196	1.25
74197	1.25
74198	2.35
74221	1.00
74367	.85
75108A	.35
75110	.35
75491	.50
75492	.50
74H00	.25
74H01	.25
74H04	.25
74H05	.25
74H08	.35
74H10	.35
74H11	.25
74H15	.30
74H20	.30
74H21	.25
74H22	.40
74H30	.25
74H40	.25
74H50	.25
74H51	.25
74H52	.15
74H53J	.25
74H55	.25

74H72	.55
74H101	.75
74H103	.75
74H106	.95
74L00	.35
74L02	.35
74L03	.30
74L04	.35
74L10	.35
74L20	.35
74L30	.45
74L47	1.95
74L51	.45
74L55	.65
74L72	.45
74L73	.40
74L74	.45
74L75	.55
74L93	.55
74L123	.55
74S00	.55
74S02	.55
74S03	.40
74S04	.35
74S05	.35
74S08	.35
74S10	.35
74S11	.35
74S20	.35
74S40	.25
74S50	.25
74S51	.45
74S64	.25
74S74	.40
74S112	.90
74S114	1.30

74S133	.45
74S140	.75
74S151	.35
74S153	.35
74S157	.80
74S158	.35
74S194	1.05
74S257 (8123)	.25
74LS00	.45
74LS01	.45
74LS02	.45
74LS04	.45
74LS05	.55
74LS08	.45
74LS09	.45
74LS10	.45
74LS11	.45
74LS20	.40
74LS21	.25
74LS22	.25
74LS32	.40
74LS37	.40
74LS40	.55
74LS42	1.75
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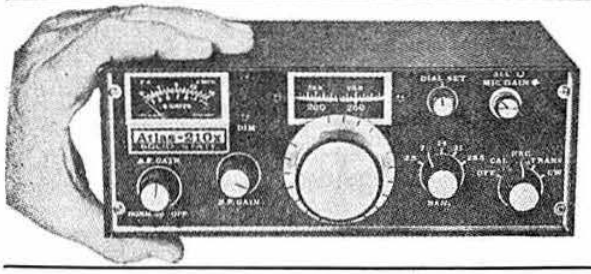

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SSB	0·5-2MHz	1·0uV
	2-30MHz	0·3uV
AM	0·5-2MHz	3·0uV
	2-30MHz	1·0uV

(AM: 1000Hz @ 30% modulation.)

Output: Capable of 200mW output on ssb at 2MHz with input signal of 0·5μV and 2 watts output with 5μV input.

Audio Distortion: Less than 5% @ 2 watts

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RSGB NEWS BULLETIN SERVICE

The RSGB news bulletin, callsign GB2RS, is broadcast every Sunday morning on hf and vhf, giving almost complete coverage of the British Isles. Its main purpose is to provide an outlet for amateur radio news items and announcements which, by virtue of their topicality or urgency, cannot wait for the next issue of *Radio Communication*.

The bulletin is prepared early on Thursday morning, and news items, marked "GB2RS news" should reach RSGB HQ by first post that day (telephoned items can also be accepted until 10am). No guarantee can be given of inclusion in part or whole of any item submitted and, once broadcast, items are not usually repeated.

SCHEDULE

Time	MHz	Location and coverage (hf) or beam heading (vhf) of station
0930	3·65	G2MI, Bromley, Kent (SE England)
1000	3·65	G8ML, Cheltenham (SW England)
	144·50	GM3UAG, Ellon, Aberdeenshire (NNW)
	144·50	G8GGK, Croydon, Surrey (NE)
1015	3·65	GI3GAL, Belfast (N Ireland)
	144·50	GI3TLT, Bangor, Co Down (N)
1030	3·65	G2CVV, Derby (N Midlands)
	144·50	GM3UAG, Ellon, Aberdeenshire (SW)
	144·50	G3PWJ, Brierley Hill (NW)
1045	144·50	G8CDP, Middlesbrough (NW)
	144·50	G8GGK, Croydon, Surrey (SW)
	144·50	G3SMT, Stockport (NNW)
1100	3·65	G5VO, Bridlington (NE England)
1115	3·65	G3LEQ, Knutsford (NW England)
1130	3·65	GM3TCW, Wishaw, Lanarkshire (S Scotland)
1145	3·65	GM3HGA, Aberdeen (NE Scotland)

An rtty news bulletin, callsign GB2ATG, is also transmitted every Sunday at 1200 and 1900 on 3·590MHz and at 1230 and 1245 on 144·6MHz. This bulletin carries items of interest to rtty enthusiasts.

CURRENT COMMENT

The following letter from the Home Office has been received by the general manager

Dear Mr Jessop
Further to my letter of 26 April 1977, I am afraid that because of continued misuse of the existing repeaters and the growing volume of criticism, up to Ministerial level, we are having to look more closely into the problem and awaiting legal advice.
For this reason we are reluctant to licence any additional repeaters until the trouble is resolved, because to start operations in more areas would only cause further trouble and proliferation of complaints. I see a danger in this that, much as we do not want to concede victory to the wrongdoers, the increasing political pressure would be such as to force our hand.
I realise that this is a disappointment for you but am sure you will see the need for prudence.
In the circumstances I must ask you for the renewal fee for the existing repeater stations, and I should be glad therefore if you would forward directly to our Accounting Department at Tolworth the sum of £225.50, together with the attached remittance form, in respect of 41 stations.
The renewal date for the licence will continue as 7 April.

Yours sincerely
C E Godsmark

QTC

amateur radio news

Regional Representative, Region 14

Due to change of employment and other commitments, Mr A. Mitchell, GM3UDL, has resigned from the office of regional representative for Region 14, and nominations are therefore invited to fill the vacancy.

Not later than 31 August 1977 any five corporate members resident within Region 14 (Central, Dumfries and Galloway, Strathclyde), may nominate any other qualified corporate member resident in the region for the office of regional representative by delivering their nomination in writing, together with the written consent of such person to accept office if elected, to the general manager at RSGB headquarters. Each such nominator shall be debarred from nominating any other person for this election.

In the event of more than one person being nominated, a ballot will be conducted, details of which will be published in the October 1977 issue of *Radio Communication*.

Area representative, Grampian

This post is at present vacant and as two nominations have already been received to fill it, an election will have to be held. Before this can be held an opportunity must be given for any other possible candidates to be nominated.

Not later than 31 August any five members resident in the Grampian area may nominate any other qualified member resident in that area for the post by sending their nomination in writing, together with the written consent of such person to accept office if elected, to the regional representative for Region 12, Mr F. Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus DD8 3NR.

Details of the ballot which will then be held will be published in the October 1977 issue of *Radio Communication*.

"RADIO COMMUNICATION"

CHANGE OF ADDRESS

From 1 August the *Radio Communication* editorial office has been transferred to Chelmsford, and all contributions, Members' Ads, and correspondence concerning the **CONTENT** of the journal should now be addressed to:

The Editor,
Radio Society of Great Britain,
88 Broomfield Road,
Chelmsford,
Essex CM1 1SS.

It is stressed that all other RSGB matters, **INCLUDING "RADIO COMMUNICATION" DISTRIBUTION,** will continue to be dealt with at RSGB headquarters. Editorial material addressed to headquarters and non-editorial matters sent to the new editorial office will result in unnecessary delay and expense.

Raynet uhf repeater channel

At the last meeting of Council it was decided to uphold the VHF Committee/RWG decision to reserve RB8 for any future applications for Raynet repeaters. Council also reaffirmed the decision of the VHF Committee to confirm allocations in accordance with IARU fm channels.

This supersedes the Raynet Committee recommendation for RB0 reported in "QTC" last month.

Facts and figures

The Home Office advises that the following numbers of amateur licences were in force at 30 June 1977:

Class A 16,146 Class B 6,388

At the same date the latest callsigns issued in the G4 and G8 series were G4GEP and G8NKX respectively.

Personal insurances for members

Readers will no doubt remember the earlier reference to club insurances provided by the Sun Alliance & London Insurance Group. They may also be interested to know that the Sun Alliance automatically provides accidental damage cover on all television, radio (including communication equipment but not antennas and masts), hi-fi and similar equipment while in the home as part of their new Master-Cover policy on the contents of the dwelling.

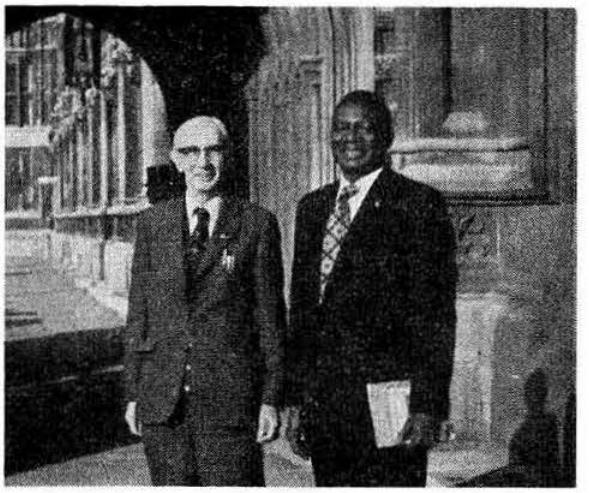
Preferential terms are available to members of the Society. For further information please contact: Sun Alliance & London Group, 40 Chancery Lane, London WC2A 1JB (Telephone: 01-831 7414 Ext 261).

IARU International Working Group meeting

A meeting of the International Working Group of the IARU was held in the UK from 24 to 26 June 1977. Present were: N. B. Eaton, VE3CJ (chairman); E. J. Allaway, G3FKM; R. L. Baldwin, W1RU; V. C. Clark, W4KFC; M. J. Owen, VK3KI; D. H. Rankin, 9V1RH, and R. F. Stevens, G2BVN (secretary).

The primary reason for the meeting was to consider, and advance, preparations for WARC 79. This included a survey of the requirements of the different countries and societies for future assistance and a review of the position concerning the various amateur service allocations. Officers from IARU HQ and the regional organisations will attend meetings and conferences during the next 18 months. These occasions will present opportunities for personal contacts with officers of national societies in all three regions. Arrangements were made for a further meeting of the IWG at Geneva in February 1978.

The International Working Group is comprised of members from all three regions, convened by IARU President, N. B. Eaton, VE3CJ, to co-ordinate world wide preparation for WARC 79.



Lord Wallace, RSGB President, and Kofi Jackson, 9G1AJ, secretary of the Ghana Amateur Radio Society, during a visit to the Houses of Parliament

December RAE

The RSGB will run an examination centre in London for the December RAE, and those wishing to take the RAE at this centre should write to Mr A. H. Othen, (Dept RAE) RSGB HQ, enclosing a 9p stamp for return postage. Forms will be issued late in August. Also listen to the GB2RS News Bulletin for fuller details and any alterations.

Scottish Amateur Radio Convention

Adam Smith Centre, Kirkcaldy

10 September 1977

Exhibition and trade stands: 9am-6pm
Convention: 1pm-5.30pm
Dinner: 7.30pm

Admission: Convention and Exhibition, £1 payable at door. Convention, Exhibition and Dinner, £4 50, obtainable only in advance from Andrew Givens, GM3YOR, 41 Veronica Crescent, Kirkaldy, Fife KY1 2LH.

Facilities for the disabled. Bar open throughout the day

The centre is situated close to Kirkcaldy railway station, which is on the main Aberdeen—London railway line, and on one of the main roads through the town quite close to the main shopping centre.

Welsh Amateur Radio Convention

Oakdale Community College, Oakdale, Blackwood, Gwent

25 September 1977

Trade exhibition **Exhibition station**

Exhibition of early radio equipment

LECTURES

"A visit to the Seychelle Islands", by R. Brown, G3LQP/VQ9RB. "The launching and post-launch control systems for Ariel 5 one of the UK satellites", by J. Wright, G3VPW, of the Appleton Laboratory.

Increased parking space this year.

Overnight accommodation details from R. B. Davies, GW3KYA, 16 Vancouver Drive, Penmain, Blackwood, Gwent NP2 OUQ, tel 225825.

Observations on the flyswatter antenna

by DAIN EVANS, G3RPE*

Introduction

Much of the success amateurs have achieved on 10GHz has been due to their being prepared to transport themselves and their equipment to either the tops of hills and mountains to work over long line-of-sight paths, or to the coast to take advantage of super-refraction via humidity ducts formed over the sea. The next advance may well come from using the various modes of anomalous propagation which are known to exist over land paths but which will probably require amateurs to operate from their homes because of the relative unpredictability of these modes.

Operating 10GHz equipment from domestic locations immediately raises problems in mounting the antenna accurately, in weatherproofing it and in feeding signals to it. New waveguide at about £1/ft is quite expensive, and even good quality coaxial cable has a loss typically of 0·5–1dB/ft and therefore cannot be used in long lengths. When this topic was discussed at a recent microwave round table, the most popular solution suggested was to avoid feeder problems altogether simply by mounting *all* the 10GHz equipment up the mast and feeding the dc, af and i.f. supplies instead. This approach still presents problems, of course. If the equipment is to be mounted semi-permanently, then weatherproofing will need careful attention. On the other hand, if it is fitted to the mast only when it is to be used, then some ingenious engineering will be required to ensure that this can be done speedily and reliably as a matter of routine.

An alternative approach is the flyswatter or periscope antenna shown schematically in Fig 1. Although this form of antenna is widely used professionally, it seems to have received little attention from amateurs other than G3JVL. In this system, the feed is usually a parabolic dish (although not necessarily so), and this directs signals upwards at a reflector mounted so as to reflect them horizontally. The area of the reflector illuminated normally is an ellipse which will have the ratio of major to minor dimension equal to 1·41 if the reflector is set at 45°. An elliptical reflector obviously could be used, but a rectangular one is usually preferred for ease of handling, and this actually produces extra gain. The reflector may be planar or curved parabolically, and the purpose of this article is to give an indication of the performance of both types in an amateur context. Although interest in this antenna originated from operating at 10GHz, its potential at other frequencies will be briefly considered.

Design data

The generalized data from which the effective gain of various configurations can be worked out are given in Fig 2 for plane reflectors and in Fig 3 for curved reflectors. The overall gain is a complicated interaction between some factors over which one has a wide choice, such as the size of the feed and reflector, other factors such as the feed/reflector spacing over which one has a restricted choice, and fixed items such as the wavelength.

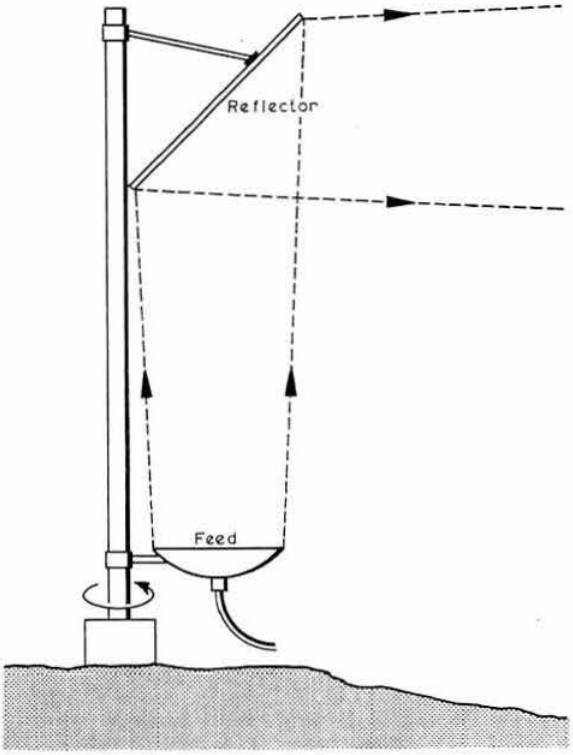


Fig 1. Configuration of flyswatter or periscope antenna

It is one of the problems of generalized data of this type that the interaction between the various factors may not be at all obvious: indeed, it is often easy to gain a quite misleading impression. There seems to be no other way of avoiding this and getting a "feel" for the topic other than to look at a fair number of examples, and this article represents the results of an exercise of this sort.

The way of using the data is as follows:

(*a*) Calculate the ratio a/R; ie the ratio of diameter of the dish feed and the minimum dimension of the reflector. If a feed other than a dish is used, then use the diameter of a dish of equivalent gain.

(*b*) Calculate the value of the function $\lambda d/4R^2$ remembering that λ, d and R must be in the same units.

(*c*) Determine from Fig 2 or Fig 3 the gain or loss corresponding to these values.

(*d*) Add this gain or loss to the gain of the feed.

Systems using plane reflectors

Fig 4 illustrates the effect of dish and reflector size on overall gain in systems in which the minimum dimension of the reflector is made equal to the diameter of the dish feed. The reflector is assumed to be mounted at an angle of 45° to the horizontal so that the maximum dimension is made 1·41 times the minimum.

The important feature of these results is that they show

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

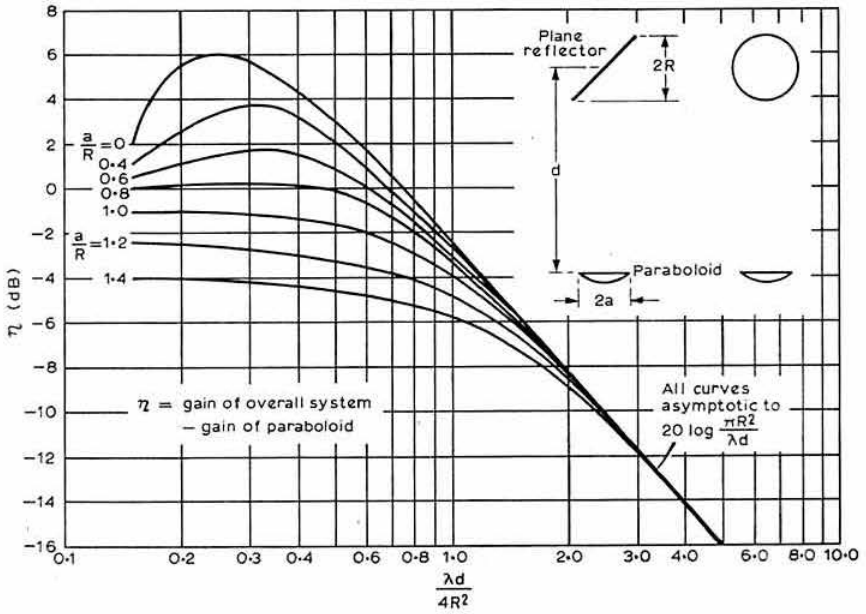


Fig 2. Relative gain with plane reflector [1]

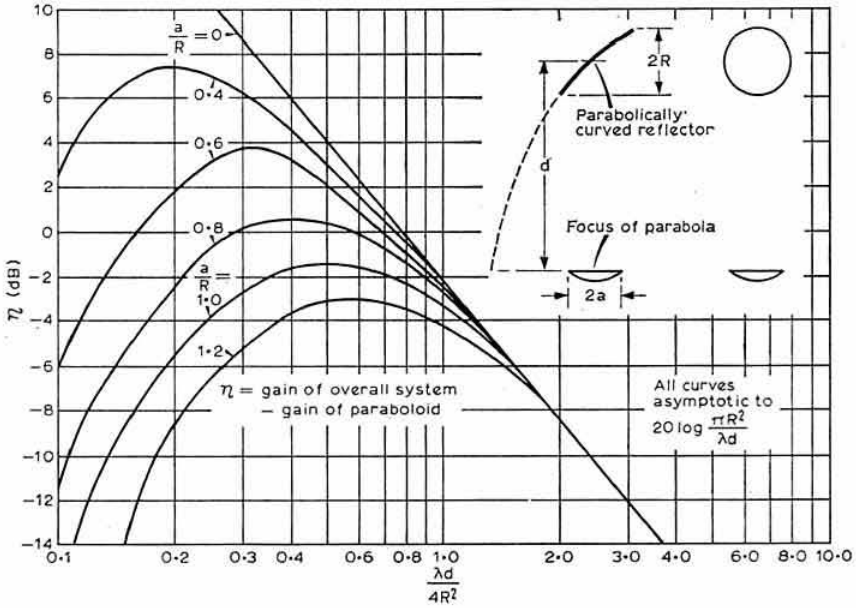


Fig 3. Relative gain with parabolically curved reflector [1]

that it is comparatively easy to achieve a reasonably high antenna gain in absolute terms despite the "transmission loss" being high in some cases. For example, a dish 1·5ft in diameter used with a reflector 1·5 × 2·1ft in size which is mounted 30ft up a mast will still have a gain of 25dB, despite a transmission loss of 5dB.

The effective "feeder" losses are interesting. With a dish 1ft in diameter, the loss is about 0·3dB/ft. Although rather high, it is still less than that characteristic of even good quality coaxial cable at this frequency. On the other hand, the loss with a dish 3ft in diameter is only about 0·05dB/ft, which is about the same as brass waveguide No 16. As would be expected, the losses when using 1·5 and 2ft dishes are at intermediate values, 0·2 and 0·1dB/ft respectively.

Fig 5 illustrates for two sizes of feed the rather complicated way in which the overall gain is related to the size of reflector used. The lowest curve refers to a small feed used with a small reflector, and its performance can hardly be described as sparkling. However, by using a larger reflector the performance of the system improves dramatically, with the

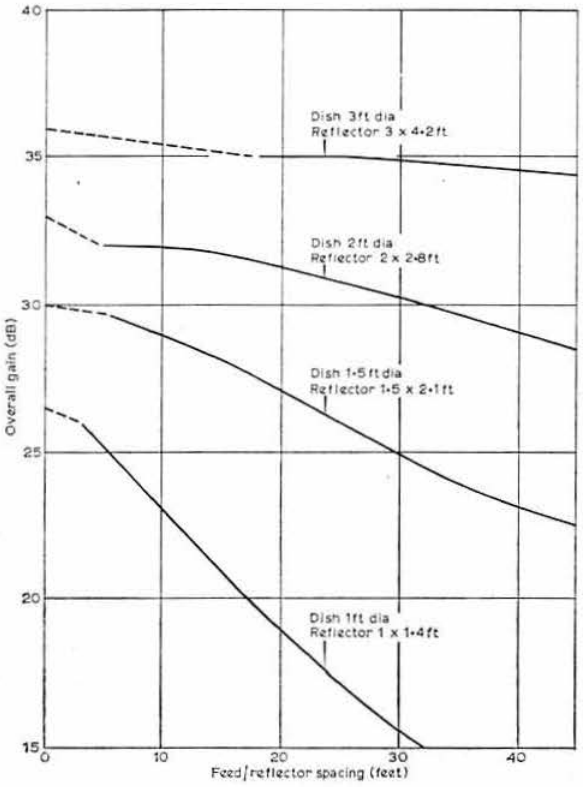


Fig 4. Overall antenna gain at 10GHz as a function of dish size, plane reflector same size as dish

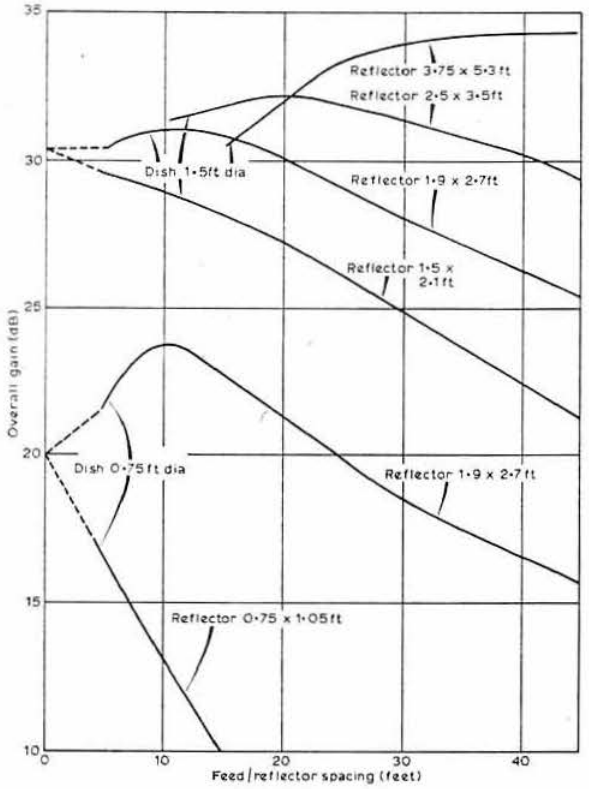


Fig 5. Overall gain at 10GHz for 0·75 and 1·5ft dishes as a function of plane reflector size

original 20dB gain still available at a feed/reflector spacing of 20ft. The upper four curves show the effect of reflector size with an "average" size of dish 1·5ft in diameter. Note that the peak gain is displaced to larger dish/reflector spacings which it may not be possible to use in a particular installation. At a spacing of 15ft, for example, the data suggest that the maximum overall gain is achieved with a reflector of *intermediate* size.

Systems using parabolically curved reflectors

The advantage of a curved reflector over a plane one is shown in Table 1, the values of gain being the maximum that can be obtained at each particular value of a/R. The advantage is significant only at low a/R ratios, that is when relatively large reflectors are used. Fig 6 shows the extent of the improvement for two sizes of dish feed, and again demonstrates that it may not always be practical to take advantage of these improvements.

Table 1—Comparisons of plane and curved reflectors

	Gain relative to dish feed		Advantage of
	Plane reflector	Curved reflector	curved reflector
a/R	dB	dB	dB
0·4	3·6	7·4	3·8
0·6	1·8	3·8	2·0
0·8	0·4	0·8	0·4
1·0	—1·0	—1·3	—0·3
1·2	—2·5	—3·0	—0·5
1·4	—4·0	—	—

This is simply because the enhancement of gain is observed over only a narrow range of values of the function $\lambda d/4R^2$, and that other considerations affecting the actual values of λ, d and R that have to be used may take it out of this narrow range. Even if the extra gain can be obtained, whether or not this justifies the effort of fabricating a curved reflector specially for the particular dish/reflector spacing to be used can only be decided in individual cases.

Variation of performance with frequency

Fig 7 shows how the overall gain varies with height at a number of frequencies of amateur interest for a system consisting of a feed dish 1·5ft in diameter with a plane reflector 3·75 × 5·3ft in size. The curves show that at lower frequencies not only is the gain of the dish feed reduced, but the transmission loss also tends to increase and thereby reduces the gain even further. The latter effect is a reflection of the displacement of the value of the function $\lambda d/4R^2$ to higher values as λ increases.

If a "standard" for antenna gain is taken as 20–25dB, a value obtained from 1 to 4 long Yagi antennas, then this particular flyswatter system will certainly be competitive at frequencies of 5·7GHz and above, and probably at 3·4GHz if feeder losses are taken into account. At 2·3GHz and below, this antenna clearly is not competitive. Nevertheless it is worth noting that, while it may not be justifiable to set up a reflector of *this* size specially for these lower frequencies, if

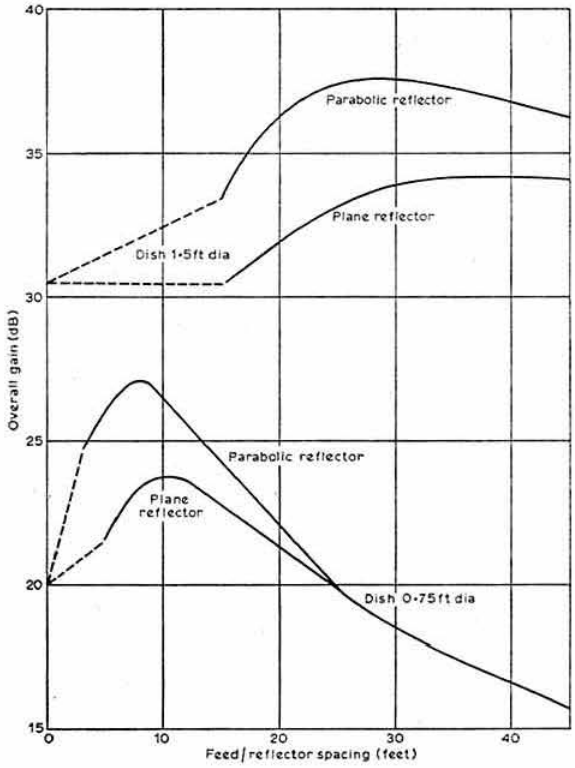


Fig 6. Comparison of plane and curved reflectors

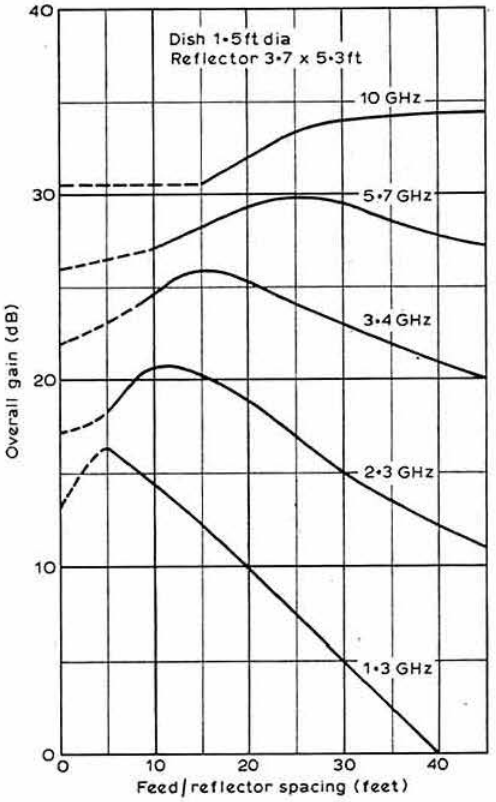


Fig 7. Gain of specified system as a function of frequency

one is already available then an antenna of moderate gain can be produced for the effort of just fitting a suitable feed.

Practical aspects of construction

Some of the factors affecting the construction of flyswatter antennas are as follows:

(*a*) With these and other high-gain antennas, the axis of rotation must be truly vertical otherwise the beam will point successively above and below the horizon as it is rotated. If this deviation is larger than a small fraction of the beamwidth of the antenna in the vertical direction, then the overall gain may be significantly reduced.

(*b*) It is not essential but it would appear simpler if the feed directs signals vertically upwards. A plane reflector in this case would be set at precisely 45° to the horizontal. Aligning the system would presumably only require the feed to be fitted with its centre immediately below that of the reflector, and the latter tilted to eliminate any squint while keeping the antenna peaked in azimuth. Curved reflectors will probably have to be set at the correct angle by trial and error.

(*c*) There is no reason why the feed should not be fitted some distance up the mast if this is more conventient for operating via, for example, a bedroom window.

(*d*) It is necessary that the reflector be flat, or curved parabolically, and not distort under wind pressure or other cause, within an overall error of $\pm$ $\lambda/10$. If a mesh reflector is used to reduce windage, then the spaces between the wires should not exceed $\lambda/10$ at the highest frequency of operation. For more details see [2].

(*e*) As noted earlier, there is no reason why horn or Yagi antennas should not be used as the feed.

(*f*) One of the advantages of the flyswatter system is that a vulnerable part of any antenna, the feed itself, is readily accessible. It would seem to be worth spending much effort to make it possible to remove, replace and interchange feeds reliably so full advantage can be taken of this accessibility.

Conclusions

The object of this work was to examine the flyswatter antenna system to see if it was likely to be of value in an amateur context. This would certainly appear to be the case, and it is suggested that the next steps should be to investigate the practical aspects of these systems in greater detail, and also their potential at lower frequencies. These will be dealt with in a later article which will also include, it is expected, the results of various trials.

References

[1] *Antenna Engineering Handbook*, ed H. Jasik, McGraw-Hill.

[2] *VHF/UHF Manual*, RSGB, third edition, pp8.52-8.53. □

After living with the G8IBR 144MHz receiver

by N. DAVIES, G8IBR *

"THE beacon isn't there, the band is dead, not a signal can be heard. I'll just check the repeater frequency—that's dead as well!"—This is just the set of circumstances which would cause many a receiver builder to start checking it out, feeding signals in, or even stripping parts out. It is this suspicion that one's own equipment is not as good as it should be that often produces a feeling of dissatisfaction even though the same failings on a piece of commercial equipment would be accepted. This, together with the fact that one has an intimate knowledge of the workings of home-built equipment, means that it is always being added to or modified as imperfections are removed and one's ambitions for it grow.

The article on the author's 144MHz receiver (*Radio Communication* December 1976) took some time in preparation and the equipment has now been in operation for about two years. The concept is right and the author would certainly follow the same path again. Most of the modifications are minor and have been done mainly to ease operation while transmitting. This applies, especially, to the frequency counter which enables the receiver (and thus transmitter) to be put onto the calling channel or any other predetermined frequency.

Minor modifications

Locking of the phase-locked loop

This originally required winding the tuning control from one end of the band to the other—a laborious process. It was eliminated by using a changeover switch, centre biassed off, made to short the wiper of RV3 on the psd amplifier either to +12V or earth. This offset the system so that on release it locked on. The changeover switch was required, as one could be either side of the natural frequency of the voltage controlled oscillator. Thus one pushes it one way on switch-on at the low end of the band or the other way at the high end. The switch was mounted on the top of the back of the receiver (Fig 1).

Receiver independent tuning

As the phase locked loop has been used as the source for the transmitter, the receiver requires an independent tuning

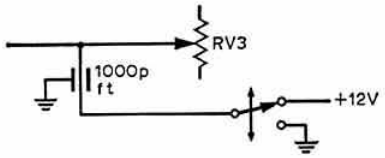


Fig 1. Modification to phase-locked loop

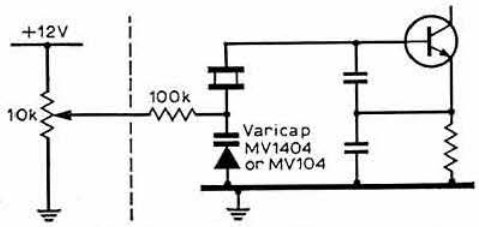


Fig 2. Receiver independent tuning control

control. This was easily accomplished by pulling the 11·155 second local oscillator with a varicap diode. This gives about ±2kHz of variation (Fig 2).

Mute

A relay was put in the receiver which removed the drive to the loudspeaker and headphones socket, when the transmitter was switched on. This had a biassed switch in series with the coil put on the back panel so that it could be depressed to check the netting accuracy of the transmitter.

The drive

This was made from a number of anti-backlash cogs sandwiched between two $\frac{1}{8}$in aluminium plates engineered to fit into the relatively small space available. The final ratio is 137:1 which requires a "steam-roller" type knob to move from one end of the band to the other.

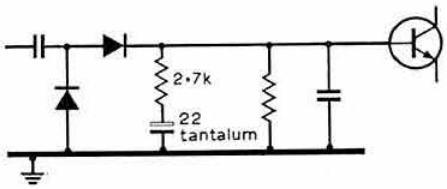


Fig 3. AGC modification

AGC

An improvement in the time constant has been made by adding a resistor and capacitor across the agc detector (Fig 3).

The addition of a crystal filter

This was mentioned in the original article and has been incorporated to prevent cross-modulation occurring in the i.f. strip of the receiver. The circuit used to match the filter to the 75Ω output of the mixer and the 300Ω input of the i.f. amplifier is shown in Fig 4. A 15kHz-wide ITT filter has been used very successfully but if this cannot be obtained, the Toyo 10M-5B-1 has been tried with equal success.

Matching consisted of cutting off the leads to the input/output windings of the 1kΩ matching transformers and replacing these with four turns for the input transformer and eight for the output.

I.F. input

A relay operated from a back-panel switch connects the input of the i.f. amplifier to a socket allowing converters driven from the local oscillator to be fed in. Multiplying the lo by three gives a frequency 30·21MHz above the 70cm band, which may be mixed with 21·4MHz to produce an i.f. of 10·7MHz. This gives 6MHz of 70cm coverage.

* 1 Jarvis Field, Little Baddow, Chelmsford, Essex.

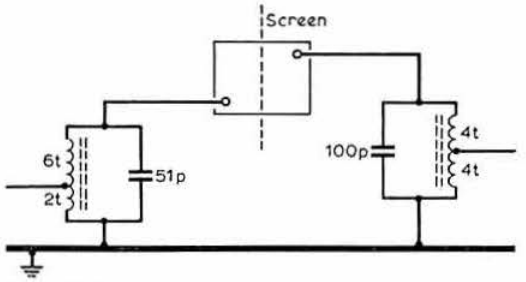


Fig 4. Addition of crystal filter ITT type 455LQU901T. Coils on FX2073 toroid core

Frequency counter

The intention of this counter was simply to improve the setting accuracy of the receiver which already had a reasonable dial mechanism calibrated in 100kHz steps. This display, which simply gave three decimal places, was considered very adequate. This meant that a frequency of 144·274MHz would be seen to be about 144·27MHz on the dial with the counter showing 0·274, giving an accuracy of ±1kHz.

The counter was intended to be as simple as possible but did in fact grow beyond what was originally desired. Two units became necessary due to shortage of space in the vicinity of the front panel and the failure of an attempt to use a 555 timer as the gate generator. This failed because its stability was too poor even if it was set to a reference, such as a beacon, on switching on. Breathing on it moved the reading an impossibly large amount.

The display and counter

As the receiver worked from a 12V supply, cmos logic was the obvious choice wherever possible. The master counter consists of three 4029 reversible binary decade counters. These were chosen because, as the receiver local oscillator goes up in frequency as the receiver frequency comes down, they would need to count down. Also, any desired offset could be put into the jam inputs to calibrate the system. This meant that if the receiver oscillator read 5·798MHz at 144·300MHz the counter could be set to read the 300.

The output from these counters feed three 4511 latch-display drivers which in turn drive the three led displays. The 4511 is a cmos device with bipolar transistor output stages in it which are capable of supplying the current required by the displays, unlike normal cmos gates and counters. The display current is limited by a single 150Ω resistor and, despite initial trepidations, there does not seem to be any current hogging by any of the displays or segments; neither does the variation in brightness, caused by the display current variation with number, seem very apparent.

IC1 gates the input frequency to the counter during the positive portion of the gate waveform. The negative edge of the gate waveform fires the first part of the dual monostable IC2 which produces a short pulse enabling the latch, thus storing and displaying the number previously counted. The trailing edge of the first monostable fires the second which restores the counter to whatever offset has been put into the preset inputs. The display continues to present the stored frequency while the cycle repeats, etc.

The gate and drive unit

In order to prevent any possible loading affecting the stability of the receiver oscillator, a mosfet was used to provide a high-input impedance, with a further transistor to bring the level up to such as to drive the logic. A ttl decade counter is used as a prescaler, as the counting rate of complex cmos counter is not guaranteed at the oscillator frequency of 4·6MHz.

The interface between the ttl output and the cmos was accomplished by using as high a voltage on the ttl as possible, and ac coupling onto a resistive pot chain.

A 100kHz crystal oscillator drives three 4029 decade counters which in turn drive a D-type divide by two, thus producing a 10ms gate every 20ms. This with the prescaler produces a count to read to 1kHz.

Pre-setting the counter

First, the receiver is tuned to a reference frequency such as a beacon, a repeater or known crystal oscillator and the reading on the counter noted.

EXAMPLE

If tuning to the Wrotham beacon on 145·150 gives a reading of, say, 456 with all the preset input at 0s (earth):

Taking the first decimal place

The counter started at 0 and counted down to 4, ie it counted minus 6. We want it to finish at 1, therefore we set it to 7 (7 − 6 = 1). This is preset into the counter in binary pins 3, 13, 12, 4 of IC5 being set at 0 1 1 1 (earth, 12V, 12V, and 12V).

The second decimal place

It counted down 5, we want 5, therefore set in 0. Pins 3, 13, 12 and 4 of IC4 are set to 0s.

The third place

It counted down 4, we want 0, therefore set in 4. Pins 3, 13, 12 and 4 of IC3 are set to 0 1 0 0.

If the system counted up, this procedure would of course be a little more straightforward.

The author set the counter up for zero beat on the upper sideband as he is usually on ssb. This means an error of about 2kHz exists for a.m. and fm signals and 4kHz for the lower sideband position.

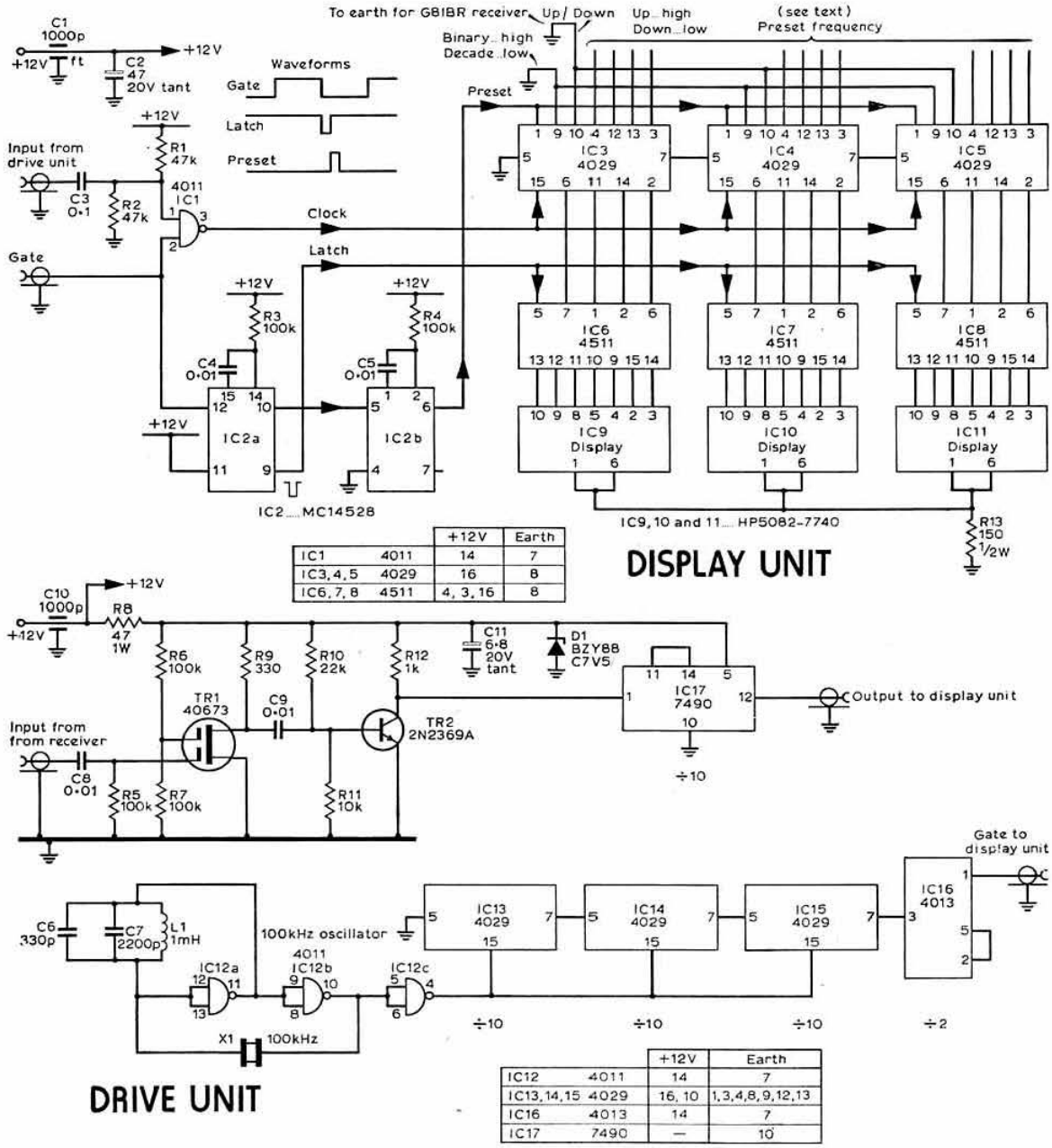
Conclusion

The counter works perfectly although it has become a little more complex than the author had originally hoped. It could be simplified by being built in one unti, IC1 and IC12 could be the same device. ICs 13, 14, 15 and 16 could be replaced with two dual-decade counters. It is, though, very

Components list

IC1, IC12	4011	
IC2	MC14528 (4098)	dual monostable
IC3, 4, 5, 13, 14, 15	4029	counter
IC6, 7, 8	4511	Latch/driver
IC9, 10, 11	HP 5082-7740	display
IC16	4013	d-type
IC17	7490	decade counter L
C1, 10	1,000pF feedthrough	
C2	47μF 20V tantalum	
C3	0·1μF 160V 20% polyester	
C4, 5, 8, 9	0·01μF 100V 20% ceramic	
C6	330pF 150V 5% polystyrene	
C7	2,200pF 150V 5% polystyrene	
C11	6·8μF 20V tantalum	
D1	BZY88 C7V5	
L1	1mH Plessey	
X1	100kHz crystal	
R1, 2	47kΩ	
R3, 4, 5, 6, 7	100kΩ	
R8	47Ω 1W 10%	
R9	330Ω	
TR1	40673	
TR2	2N2369A	
R10	22kΩ	
R11	10kΩ	
R12	1kΩ	
R13	150Ω TR5 ¼W 2%	

All resistors Electrosil TR4 ¼W 2% unless otherwise stated.



		+12V	Earth
IC1	4011	14	7
IC3,4,5	4029	16	8
IC6,7,8	4511	4, 3, 16	8

		+12V	Earth
IC12	4011	14	7
IC13,14,15	4029	16, 10	1,3,4,8,9,12,13
IC16	4013	14	7
IC17	7490	—	10

Fig .Frequency counter circuit diagram

versatile because of the up-down counting options and because of its ability to be preset. This would make it suitable for adding to many existing receivers.

The author can now set the receiver to 144·3MHz and expect to hear anyone on the calling channel. He can also transmit on that or any other pre-arranged frequency and expect to be heard. It thus satisfies the requirements that caused it to be designed and also gives the bonus of being able to check the frequency of any other signals which may be heard.

The end result is a receiver which the author is very pleased to own and to have built. Its performance is really excellent and it has become the variable frequency source for both a 144MHz transmitter and equipment being built for 432MHz.

CMOS crystal-controlled toneburst

by T. DAVIES, BSc, GW4ADL*

DIFFICULTIES experienced in producing a suitably stable, 7400 based multivibrator toneburst led to the construction of a crystal-controlled circuit, employing a cmos chip. This has proved "rock" steady, despite the fact that (for space economy) the crystal blank is mounted sandwiched between two squares of tinplate taped together.

No originality is claimed for the idea, but the author's implementation is quite straightforward. The prototype was installed in a Heathkit HW202, total cost being around £1.50, excluding crystal.

Circuit operation

When ptt is closed, the 0·1μF capacitor C1 charges via a 10MΩ resistor. This grounds pin 12 (RESET) and allows the oscillator/divider chain to run for about a half-second. The time constant can be changed if required by altering C1. The 470kΩ resistor ensures discharge of this capacitor when ptt is released.

The CD4060 was chosen because it contains two inverters which may be connected to form a crystal oscillator. An internal connection disables these inverters when RESET is high, so on standby the whole chip is inactive. In fact, current consumption in this mode is a few microamps, rising to 3mA for the half-second of toneburst.

A 50kΩ potentiometer connected to the appropriate divider output attenuates the signal fed to the microphone input via a 1nF capacitor.

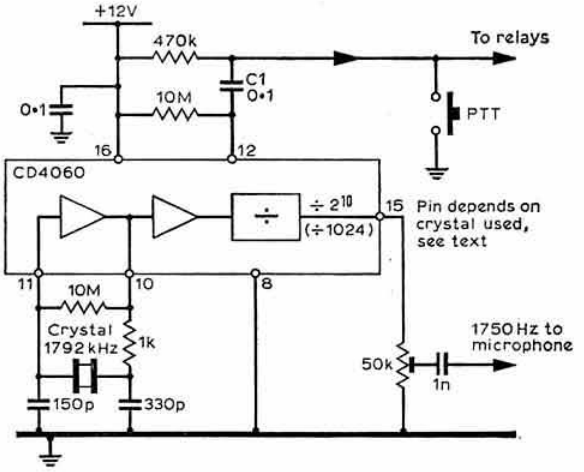


Fig 1. Toneburst generator

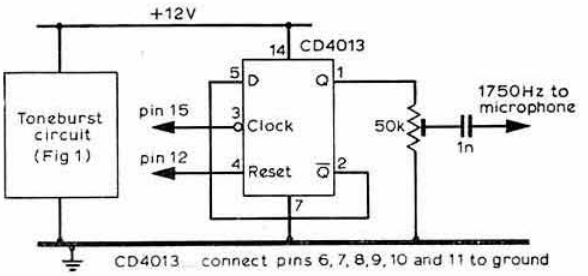


Fig 2. Modifications when using a 3,548kHz crystal

Crystals

A 1,792kHz crystal was etched onto frequency from around 1,700kHz for the prototype, but other frequencies can be used as listed in the table. Several of these have been advertised in *Radio Communication* recently, so no difficulties should be experienced in this respect. A 3,584kHz crystal can be used only if a further ÷2 stage is added due to the absence of a $\div 2^{11}$ output on the 4060. Interconnection of the basic circuit with a 4013 dual D-type is illustrated in Fig 2. Frequencies

(Continued on p605)

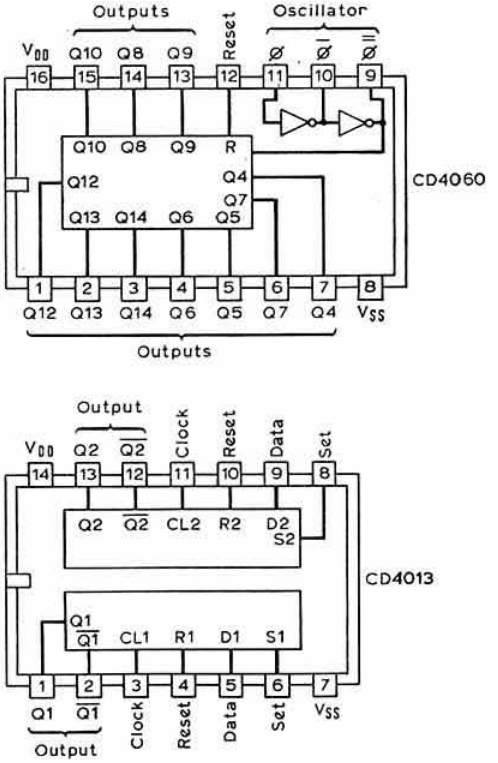


Fig 3. Pin connections

* 59 Bath Road, Morriston, Swansea SA6 7AT.

Modifying the Yaesu FT221 for 1·6MHz shift for uhf repeater working

by A. McCANN, G3AZI *

THE author recently purchased a Microwave Modules MMT 432/144 linear transverter which, together with the Yaesu FT221, is used for 70cm multi-mode working. The following simple modifications to the FT221 provide the 1·6MHz frequency shift necessary when working through UK uhf repeaters. In addition to some minor wiring changes, the modification requires the purchase of two new crystals, a 14·0222MHz HC25U and a 14·2000MHz HC18U.

A bonus in doing this modification is that FT221 owners who dislike the present arrangement of having to switch to REVERSE REPEATER and use the BAND switch in the 145·0MHz position in order to work through the vhf repeaters will find that they can now switch to the 145·5MHz position of the BAND switch and use the NORMAL REPEATER position. In fact, any FT221 transceiver owner who is not interested in 70cm working can just purchase the 14·0222MHz crystal and carry out the appropriate part of the wiring changes to achieve this more normal arrangement for working through the vhf repeaters.

Incidentally, do not be afraid of "diving into" £400 worth of "black-box"—anyone who has a soldering iron with a $\frac{1}{4}$in or $\frac{3}{16}$in bit and can "tin" a piece of copper wire should have no difficulty. The whole work takes no more than about 30min at the outside—not counting the four or more weeks waiting for the delivery of the crystals.

Wiring changes

Disconnect all external connections from the FT221 (power supply input, antenna, microphone etc) and turn it upside down, resting it on suitable padding. Remove the base panel (12 screws) and disconnect the loudspeaker plug. Identify the BAND switch as shown in Fig 1.

On the underside of the main chassis, locate socket J13 (into which the LOCAL module plugs). From pin 29 a white/blue wire runs to the 146·5MHz position on the S2B wafer of the BAND switch; join a short length of insulated wire between this contact on S2B and the 145·5MHz contact on the same wafer. In the same way fit short insulated links between the following positions of the BAND switch wafers:
(*a*) S2C 145·5 position and S2D 145·0 position;
(*b*) S2C 146·5 position and S2C 145·5 position.

In order to identify the various positions of the BAND switch note that the 145·0 position on S2D has an orange wire attached and the 145·5 position has a yellow wire attached. The other positions can be counted clockwise and anticlockwise from these and all the wafers are in line—they are simple single-pole eight-way switches.

This completes the wiring modifications but while the bottom is off the set the owner may wish to consider incorporating some other simple modifications which the author has found useful.

Supplementary alterations

Solder a link between pins 1 and 2 on socket J2, the TONE IN socket on the rear apron. This prevents loss of audio output from the loudspeaker if the five-pin DIN plug should be removed or inadvertently drop out.

By wiring the centre pin of J10 (the phono socket on the rear apron marked COM) to the +13·5V line, a source of power is available at J10 for powering external accessories. In addition, on "transmit" +13·5V will be available at J9 and could be used for operating antenna changeover relays, switching in a linear power amplifier, operating a "time-out" indicator for repeater use etc. Of course, during "receive" +13·5V appears at J8, and this is used by the author to supply a Datong UC/1 hf up-converter. Alternatively the centre pin of J10 may be connected to earth to provide an earth at J9 when in the "transmit" position which could be used to supply a switched earth to the MMT 432/144 instead of relying on the rf-activated transmit switch in the transverter. The wire to the centre pin of J8 could then be disconnected from the relay connection and connected instead to +13·5V, thus providing an auxiliary power take-off socket at J8.

The TONE IN socket makes a useful connection into which to feed a speech processor, since at this socket +13·5V, microphone input and "press to transmit" connections are all available.

The base panel can now be refitted after re-connecting the loudspeaker plug, making sure to connect it the right way round so that the screening of the wire is continuous.

Fitting crystals

Turn the FT221 the right way up and remove the top panel after lifting up the four press stud fasteners. Remove the two cross-head screws holding the LOCAL board in position and unplug the board. Plug the 14·0222MHz crystal (HC25U size) into position X210 marked on the board. Solder the 14·2000MHz crystal (HC18U size) into the X206 position, cutting off the excess wire. Refit the LOCAL board, securing it with the two cross-head screws.

The modifications are now complete and all that remains, before refitting the top panel, is to bring the two new crystals on to frequency.

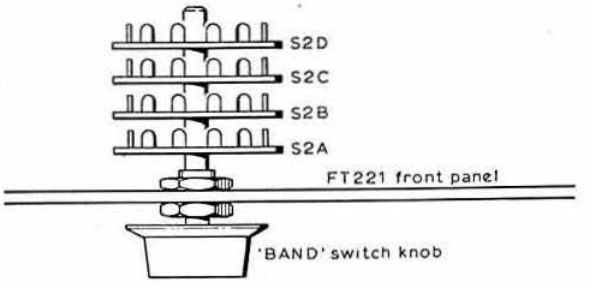


Fig 1. FT101 bandswitch

* 105 Todd Lane North, Lostock Hall, Preston, Lancs PR5 5UP.

Adjustments

Connect power supply to the FT221 and switch to FM (no need yet to connect antenna or 70cm transverter). With the BAND switch in the 145·5MHz position and REPEATER switch off, MARK switch on and tuning dial at 145·80MHz, press the LOCK button (below and left of the tuning knob.) Turn the tuning knob (while holding the dial stationary with the LOCK button) until the point of zero-beat with the internal calibration oscillator has been established.

Take care now to disturb none of the controls except for switching the NORMAL-REVERSE switch and the REPEATER switch into the REVERSE-REPEATER condition, ie both switches "up". This means a frequency of approximately 145·200MHz is being received even though the dial still reads 145·800. All that remains to be done is to adjust the trimmer capacitor TC10 associated with the new 14·0222MHz crystal (X210) to provide a zero beat in the loudspeaker. Again, take care that no other controls have been disturbed during this adjustment.

The next step is to tune the 14·200MHz crystal for the 146·5MHz band segment. Still with no antenna or 70cm transverter connected, switch to the 146·5MHz position on the BAND switch, with REPEATER switch off, MARK switch on, MODE switch at FM. Set the tuning dial to any 100kHz point, for example 146·700, and adjust the trimmer capacitor TC06 associated with the new 14·200MHz crystal (X206) for zero beat in the loudspeaker.

Testing on the air

Having completed the adjustments and connected a vhf antenna, the set should be tuned to the local repeater frequency with the BAND switch in the 145·5MHz position. It should then be possible to hear nearby stations on the repeater input frequency accessing or calling into the repeater when the REVERSE REPEATER switches are selected, and the same stations through the repeater when NORMAL REPEATER is selected.

With the MTT 432/144 transverter connected to the antenna socket, similar results should be possible on uhf by selecting the 146·5MHz position of the BAND switch and tuning to the local repeater frequency (say, 146·700MHz on the dial if the local repeater is on RU4). With the switches in the NORMAL REPEATER position reception will be on 146·700 + 288 = 434·700MHz and transmit on 433·100MHz. With the switches in the REVERSE REPEATER position reception will be on 433·100MHz (the RU4 repeater input frequency), and transmission would be on 434·700 if the PRESS-TO-TRANSMIT button was operated. However, this should not be done while in range of an operative repeater which uses that output frequency.

All that is now necessary is to refit the top panel of the FT221 and start using it in earnest.

Redundant facility

The previous "upside-down" type of repeater operation, where it was necessary to select the input frequency of a repeater on the FT221 tuning dial in the 145·0MHz segment of the band and put the switches in the REVERSE REPEATER positions, remains unaffected and now redundant, but there is no point in removing the facility at present, unless there is need for a 14·100MHz crystal elsewhere.

Note regarding IARU Region 1 and British repeaters

As can be seen from various publications, the IARU Region 1 repeaters are quoted as operating with the repeater input frequency in the 433MHz part of the band. The foregoing modifications will give this configuration with the NORMAL/REVERSE repeater switch in the NORMAL position.

British repeaters are using the reverse configuration of the IARU convention and it will therefore be necessary to use the switch in the REVERSE position.

CMOS crystal-controlled toneburst

(Continued from p603)

close to those listed can be used provided the final output (after division) is within 10Hz of 1,750 (eg ± 10kHz in 1,792).

Alternative crystals for toneburst

Crystal frequency (kHz)	Required division	Output pin of 4060
1,792	1,024	15 (Q10)
896	512	13 (Q9)
448	256	14 (Q8)
224	128	6 (Q7)
3,584	2,048	(See Fig 2)

The top end of the 50kΩ preset should be connected to the appropriate output pin.

Conclusion

No provision for frequency trimming was made, since an error of 1kHz in 1,792 results in only 1Hz error in 1,750. Layout is non-critical, lending itself to pcb construction, though the prototype was built on matrix board. Remember to use an ic holder and to take the usual mos handling precautions.

The extremely low power consumption and wide supply voltage range (5 to 15V) makes this circuit ideal for installation in most contemporary fm transceivers, particularly battery-powered portables. □

EQUIPMENT REVIEW

The Datong UC/1 up-converter

by J. P. MARTINEZ, G3PLX*

UNTIL a few years ago, the normal method of getting on to 144MHz was to fit a converter in front of the station hf bands receiver. Who would have thought then that there would be any point in covering the hf bands by fitting a converter in front of the station 144MHz receiver? However, this is precisely the function of the Datong UC/1 up-converter unit. The point is that it is now common practice to use self-contained 144MHz receivers with ssb/cw facilities, and the use of an i.f. frequency much higher than the bands covered eliminates most of the problems which contribute to the complexity and cost of conventional hf general-coverage receivers.

The UC/1 signal path starts with a preselector covering 90kHz-30MHz in six ranges, with a three-position attenuator, followed by a low-gain fet buffer. This is followed by a dual-fet mixer with its output in the 144MHz band. The local oscillator for this mixer is in the range 115-144MHz, tuned in 30 steps by voltage-control from preset potentiometers controlled by the two MHZ switches. On each step the oscillator is locked precisely to the appropriate harmonic of a 1MHz crystal oscillator. Thus at each position of the MHZ selector, signals from the appropriate megahertz band are mixed to the range 144-145MHz. The mixer output goes directly to the output, and also to a conventional 144MHz converter built into the unit, with its output in the range 28-29MHz. Thus the unit can also be used to convert an amateur-bands-only receiver covering 28MHz, into a system covering 90kHz-30MHz, and also the 144MHz band. The UC/1 is built into a 10in by 8in diecast box, with S0239 signal connectors, and a three pin DIN socket for the dc supply, which can be between 9 and 15V.

In use at the reviewer's home with a 6ft rod antenna, and feeding a single-conversion mosfet-front-end 144MHz receiver, the performance was quite remarkable. The sensitivity was such that, with one exception, there was far more noise from the antenna than from a 50Ω resistor, indicating that for all practical purposes the unit would never degrade the signal-to-noise ratio received on any antenna of 6ft or bigger. The exception was on the bottom preselector range, below 300kHz, which is hardly surprising with an untuned whip. A 60ft wire antenna at another location gave excellent results right down to about 80kHz. On the mf and hf bands at night, even with the rod antenna, it was possible to switch in 15dB attenuation without degrading the s:n ratio. On a few frequencies, notably around the 6MHz broadcast band where there are some very strong signals at night, it was neccesary to switch in this 15dB to cure some intermodulation products, evident as distorted low-level spurious signals on each side of pairs of strong transmissions. Inserting an attenuator between the UC/1 and the 144MHz receiver proved that some of this overloading was occurring in the 144MHz receiver, but there was still a bit remaining due to the UC/1. However, since the performance is not degraded with the 15dB attenuator switched in at night, it was just a matter of switching it in if this problem was encountered. The 30dB position was never needed while using the rod antenna.

The harmonics of the 1MHz crystal oscillator were, on most bands, buried under antenna noise, and were only audible on the bands above 20MHz, or with the antenna removed, and were about 20dB above the internal noise level. The only other "birdie", when used with the reviewer's 144MHz receiver, was a carrier at 21·4MHz. This was identified as the local oscillator signal in the UC/1 appearing on the image frequency of the 144MHz receiver, which had a 10·7MHz i.f. While it would be unfair to blame the UC/1 for this, it is worth pointing out that the level of this local oscillator signal, measured at −40dBm, indicates that the image rejection of the 144MHz receiver would have to be about 90dB to prevent a birdie being audible. This birdie will appear when tuning to twice the i.f. of the 144MHz receiver and, of course, will not be found if this i.f. is above 15MHz. Using the 28-29MHz output into the reviewer's Hammarlund SP600 verified this, and the performance of this combination was not noticeably different from the other configuration. However, when used as a 144MHz converter the gain of the UC/1 was not sufficient to overcome the poor front-end noise of the ageing SP600, and so this combination was not quite as good as the 144MHz receiver alone. This should not be a problem with modern amateur-bands-only receivers.

Although bench measurements are not quite as important on an hf receiver as actual on-the-air performance, some routine tests were made. The overall gain, from hf to 144MHz, was fairly constant from one preselector range to another, being between 10 and 16dB at the top end of the variable capacitor travel except on the bottom range where it was 0dB. At the bottom end of the range of this variable, the gain was somewhat lower, the lowest being at the bottom of the bottom range, where the unit showed a loss of 17dB. In all cases the gain to the 28MHz output was 8dB higher. The gain when used as a 144MHz converter was 11dB and in this mode the image response was 70dB. Needless to say

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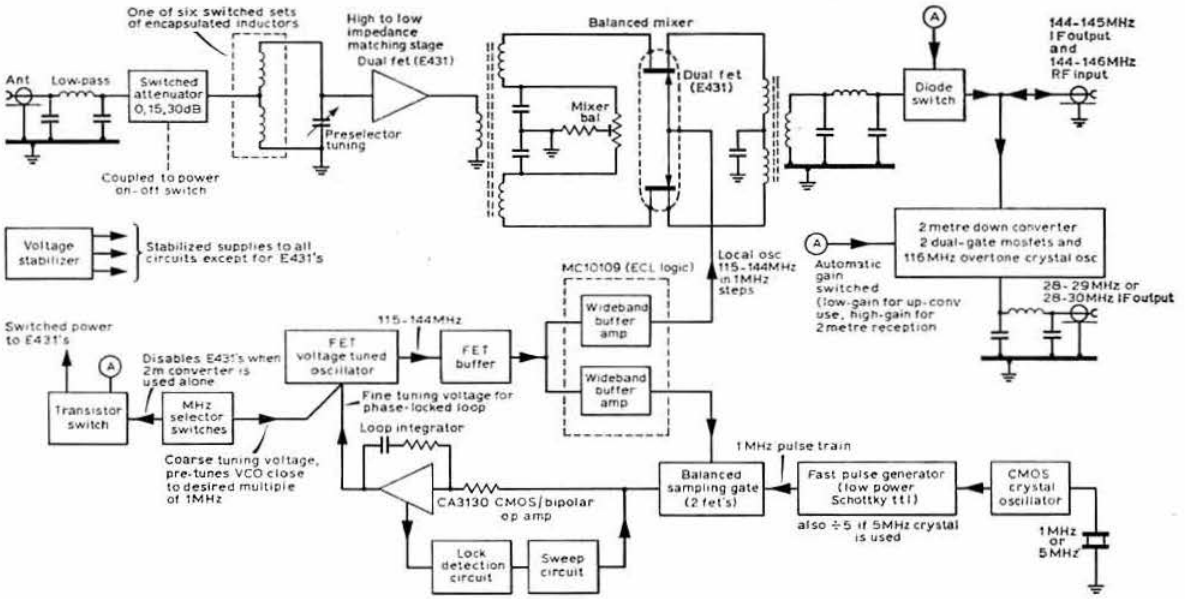

Fig 1. Block diagram of Datong UC/1 up-converter

there was no sign of any image response in the hf mode, this being the main advantage of the up-converter approach, where the image frequencies are in the region of 250MHz. In this mode the i.f. breakthrough of 144MHz signals at the hf input socket depended a lot on the preselector tuning, but was 55dB at the worst point. Since the average hf antenna makes a poor 144MHz antenna, this figure will be a lot better in practice.

Third-order intermodulation distortion was measured by the usual two-signal technique and showed that in the worst case, where the gain was highest at 10MHz, two input signals of 3·5mV pd would produce spurious products 60dB below each one when measured at the 144MHz output, and when measured at the 28MHz output two signals of 1·5mV at the input gave the same result. The 115-144MHz local oscillator output at the 144MHz socket was, as mentioned before, at −40dBm, (2·2mV pd), and gave rise to the birdie in the reviewer's receiver. At the 28MHz output this birdie was well suppressed by internal circuitry, except on the "0MHz" band where it produced an output at 28MHz of 6mV.

As received, the 1MHz crystal was 10Hz low, giving rise to a small frequency error; that is, the frequency as read from the dial of the 144MHz receiver was high by about 1·2kHz. However, an internal trimmer was discovered which enabled this small error to be removed. This trimmer is not mentioned in the instruction sheet, and there is no circuit diagram or servicing information included. This is the only criticism of any sort that can be made of the UC/1. For the G8 + 3 station with existing 144MHz equipment, it must rate as the most cost-effective way of getting on to the hf bands prior to getting a G4 licence. For the enthusiastic swl, using the UC/1 with, perhaps, a purpose-built 28-29MHz tunable i.f. would give a performance and versatility equal to receiving systems two or three times the price.

The UC/1 reviewed was supplied by Datong Electronics Ltd, Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE. □

NEW PRODUCTS

High power rf fet VMP4

Siliconix announces the availability of the VMP4 mospower fet which is claimed to be the first high power rf mosfet to become commercially available. Several advantages over bipolar rf power transistors are claimed for the new device. A sample and design kit is available containing a VMP4 transistor, data sheet and application note. Siliconix also announces the VMPA2 series of devices which are claimed to combine the advantages of both power bipolar and mos transistors.

Further information on the VMP4 and VMPA2 can be obtained from Siliconix Ltd, Morriston, Swansea SA6 6NE.

Mechanical filter MFL45501

A recent addition to the range of Toko mechanical and ceramic filters is announced by Ambit International. This is the MFL45501 mechanical filter which is a 6 element unit suitable for both receiver and transmitter applications. It is stated that the new filter will cost less than £10 in single units. Further information can be obtained from Ambit International, 37a High Street, Brentwood, Essex CM14 4RH. Tel (0277) 216029. □

Propagation study for satellite links at 12GHz

by R. O. PHILLIPS, G8CXJ*

THE European Space Agency, ESA, plans to launch an experimental communication satellite in mid-September; the orbital test satellite (ots) being placed into a geostationary orbit at a longitude of 10°E. One of the principal features of ots is that it will operate in the 11 and 14GHz frequency bands, whereas most existing communication satellites operate at 4 and 6GHz. Satellite systems have been operating at these frequencies for many years and data collected indicate that the effect of the atmosphere is quite small—ie fade depths of not more than a few decibels for 99·9 per cent of the time. However, very little information is available on the propagation margins required at 11 and 14GHz and one of the objectives of the ots mission is to obtain such data. The purpose of this article will be to give a brief outline of the propagation experiments to be undertaken within the ots programme and to indicate how radio amateurs could take part. It is intended that more detailed descriptions of suitable equipment will be given in subsequent articles.

The ots beacon experiment

In addition to the communication package, the satellite will carry a repeater unit which receives circularly-polarized beacon signals from a number of earth stations and relays them back to earth again together with an on-board generated beacon signal. It is this latter beacon that is of direct interest since it is here that a worthwhile contribution to the study could be made by radio amateurs. The beacon will operate at 11·786GHz with a maximum equivalent isotropically radiated power (eirp) of about 1,200W (30·7dBW) toward the centre of the coverage area. The polarization of the transmitted signal will be left-hand circular and there are basically two types of measurement that can be carried out:

1. Down-link signal strength variation (ie fading);
2. Down-link polarization isolation.

An outline of the equipment requirements for each type of measurement is given below.

Down-link fading

The purpose of this experiment is to determine the maximum depths of fade that could be expected at a given location for various percentages of time, eg 50, 95 and 99·9 per cent. In order to make meaningful measurements, it is necessary that the received signal should remain above the level of the receiver noise during the worst fades. Obviously a compromise must be reached between what is desirable and what is physically and economically practical to radio amateurs.

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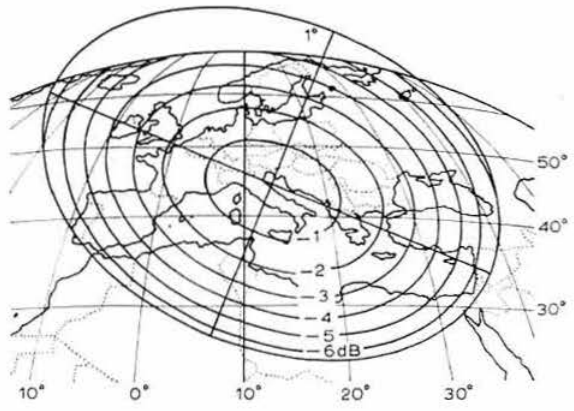

Fig 1. Satellite effective radiated power relative to beam centre value (30·7dBW). Satellite position: altitude, 35,786km; longitude, 10°E; latitude, 0°

Assuming a phase-locked receiver is used, then the demodulator threshold would be at a carrier-to-noise ratio of about 8-10dB. Thus, in order to measure fades of up to, say, 20dB it would be necessary for the received signal level to be 28-30dB above the receiver noise level under "clear sky" conditions.

To calculate the received carrier-to-noise ratio the following parameters need to be considered:

(*a*) field strength or power flux density of the beacon signal;
(*b*) gain of receiving antenna;
(*c*) noise figure of the receiver and the associated bandwidth.

Fig 1 shows the coverage area for the beacon transmitter and indicates the signal level that would be obtained relative to the peak value at the beam centre. Thus it can be seen that the power transmitted in the direction of a receiving station in London would be 2dB less than the peak value, ie 28·7dBW. The elevation angle to the satellite from London is about 30° and the free space path loss at the beacon frequency is 205·5dB. Therefore the signal level that would be received when using a 0dB gain antenna would be (28·7-205·5) = —176·8dBW or $2{\cdot}1 \times 10^{-18}$W.

As an example it is assumed that a dish type receiving antenna would be used, the gain of which may be derived from the formula:

$$G = \left(\frac{\pi d}{\lambda}\right)^2 \times \eta \qquad (1)$$

where d is the dish diameter, λ the wavelength and η the antenna efficiency which would normally be between 50 and 60 per cent. Using this expression for a 1m dish and assuming 50 per cent efficiency, the gain at the receive frequency of 11·786GHz is 38·8dB. The beamwidth of such an antenna would be about 1·8°, and assuming a misalignment error of half a degree, a signal degradation of 1dB would be produced. Thus the received signal level at the antenna output would be (—176·8 + 38·8 − 1) = −137dBW.

The noise power in the receiver may be calculated from the equation:

$$N = KTB \text{ watts} \qquad (2)$$

where K is Boltzmanns constant $1{\cdot}38 \times 10^{-23}$ J/K, T is the equivalent receiver noise temperature in degrees Kelvin and B is the receiver noise bandwidth in hertz. It is quite common for the noise performance to be given as a noise figure rather

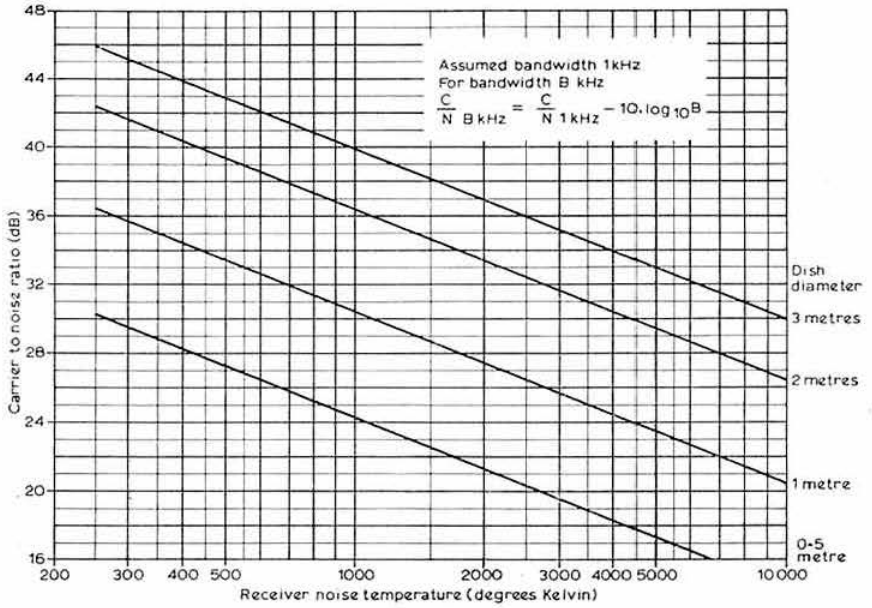

Fig 2. Received carrier-to-noise density ratio (c/n) for various values of receiver sensitivity

than a noise temperature, but one may be calculated from the other using the relationship:

$$T = (F - 1) \times Ta \qquad (3)$$

where T is the equivalent noise temperature, F the noise figure expressed as a ratio and Ta is the ambient temperature. For example, a receiver with a noise figure of 6·5dB and a noise bandwidth of 1kHz has an equivalent noise temperature calculated from equation (3) of 1,005°K at an ambient temperature of 17°C (290°K), so the noise power in a 1kHz bandwidth may be obtained from equation (2) as:

$$N = 1{\cdot}38 \times 10^{-23} \times 1{,}005 \times 1{,}000$$
$$= 1{\cdot}38 \times 10^{-15}\text{W (or } -168{\cdot}6\text{dBW)}$$

It has been shown above that the signal level received from the satellite under clear sky conditions would be −137dBW, assuming a 1m receiving antenna. Thus the ratio of signal power to noise power is $-137 - (-168{\cdot}6) = 31{\cdot}6$dB. Fig 2 shows the clear sky carrier-to-noise ratio that would be obtained with different combinations of receiver noise temperature and antenna diameter. The values are based on a receiver noise bandwidth of 1kHz; for any other value the carrier to noise ratio should be reduced by an amount 10 $\log_{10}$ B dB, where B is the receiver noise bandwidth in kilohertz.

With equipment meeting the type of performance outlined above it should be possible to measure the relative signal strength for greater than 99·9 per cent of the time. A block schematic is given in Fig 3 outlining the basic requirements. Obviously, the more sensitive the equipment the deeper the fades that can be recorded and thus the greater the percentage of time for which measurements can be made.

Various possibilities exist for recording the data, but a chart recorder would seem to be the most appropriate; an important consideration is that the response time should be short enough to allow recording of rapid fades. It would also be useful to record the weather conditions at the time of observation, eg rainfall rate, temperature and perhaps barometric pressure. This would allow any correlation between the propagation effects and weather conditions to be identified.

Down-link polarization isolation

If greater resources are available than those described above for the fading experiment, it may be possible to estimate the effect of the atmosphere on the polarization properties of the radio signals. It is well known that during heavy rainstorms

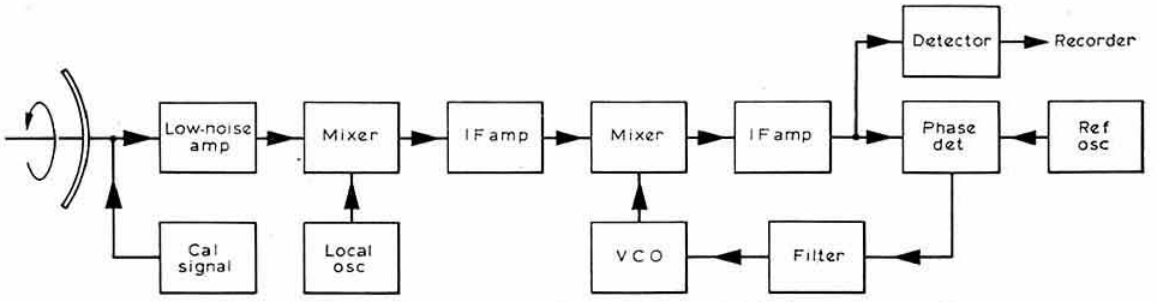

Fig 3. Block schematic of receiving equipment for down-link fading measurements

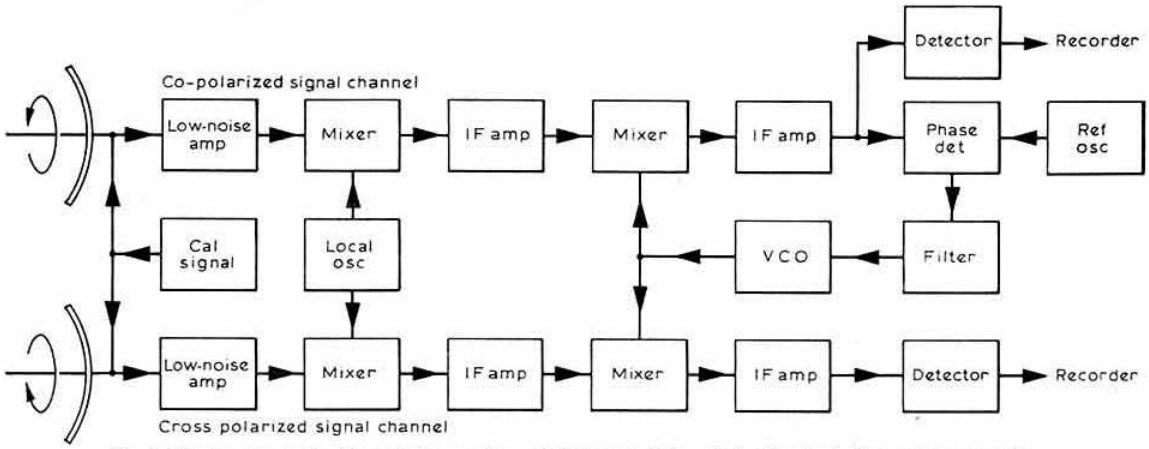

Fig 4. Block schematic of receiving equipment for down-link polarization isolation measurements

the polarization of a signal received from a satellite is modified. In fact the received signal may contain components of many different polarizations. It is important to know the degree to which the polarization purity of a signal is degraded since this determines whether or not a radio frequency may be re-used by transmitting on the orthogonal (opposite) sense of polarization.

In order to make such measurements it would be necessary to receive the normal signal (ie the co-polar signal) as described above. Simultaneously the de-polarized (ie cross-polarized) component of the signal would be received on an antenna designed to receive right-hand circular polarization. Instead of using two separate antennas, it would be possible to use a single antenna with a dual-polarization feed. In either case it is an essential requirement that the cross-polar rejection should be as high as possible (of the order of 40dB or better) especially in the region close to the beam centre. The most appropriate method of receiving both signals would be to use phase locked receivers using the stronger signal to control the vco frequency. The basic equipment requirements are given in schematic form in Fig 4. Two separate antennas of 2 to 3m diameter, or a single dual-polarization antenna will be required in order to enable meaningful measurements to be carried out. Data recording could be by the method described in the previous section.

Experiment co-ordination

In order to gain maximum advantage from the results obtained from the experiments outlined above it is essential that all results are made available to ESA. In the UK the Post Office is acting as the co-ordinating agency for all ots experiments. To avoid unnecessary duplication of effort it seems desirable that all results obtained by amateurs should be passed directly to the RSGB for collation and subsequent transmission to the Post Office.

In the first instance it would be useful for anyone interested in participating in the experiments to contact the RSGB and indicate their particular interest.

Licensing

Since the frequencies to be used for the experiments do not lie within allocated amateur bands the reception of the satellite transmissions is not covered by an amateur licence. On this occasion the Home Office has authorized the Society to conduct this exercise, therefore participating amateurs need not apply for authority to do so.

Conclusion

This article has outlined two of the ots propagation experiments with a view to generating interest and, hopefully, participation by amateurs. The extent to which individuals or groups may take part in the experiment will depend on the resources that are available. However, it is hoped that support will be given to this project which could demonstrate the capability and usefulness of the amateur service, which is all the more important on the eve of the 1979 WARC.

Acknowledgement

The author wishes to thank the Director of Radio Technology of the Home Office, for permission to publish this article.

microwaves

Dain Evans, G3RPE*

UK activity

News of happenings on 1·3 and 2·3GHz is conspicuous by its absence, which is to be regretted in that it gives a rather distorted picture of microwave activity in this country. However, on 3·4GHz G8AGN has managed a few contacts with G8HAJ over 70 and 86km paths using simple klystron equipment—and no talk-back. The 3·4GHz beacon GB3-UOS has been heard at a number of sites up to 70km from Sheffield despite its being fed at present via a few metres of UR67 coaxial cable. This has a loss of about 3dB/m, and is to be changed as a matter of urgency.

On 10GHz, we congratulate G4DDK for obtaining Microwave Award No 25. This was for a 155·9km contact from Axe Edge in the Peak district to GW4BRS on the Black Mountain made on 28 May. G4DDK particularly values the help given by GW3PPF and GW4AMV in making it possible. Again, no talk-back was used!

This contact is an example of the long overland paths that are beginning to be worked on this band. Indeed it may be the first time a Microwave Award has been won in this way, although in May 1975 GM3OXX had a similar contact with GM3BKE and GM3DXJ over a virtually complete land path. In getting away from working line-of-sight or super-refracting paths, people are now deliberately investigating obstructed paths and looking to take advantage of openings. For example, on 23 June G3JHM picked up a lift to work GW4BRS comfortably over the 117km path from Walbury to 15km northwest of Newport over what can be a difficult path. On 3 July G8ARO and G8BCO could hear the London beacon G3LBH over the 74km obstructed path from 1km north of Farnham using just a 12in dish as antenna. The signals were 59++ from at least 2 to 5am.

10GHz news from abroad

Following his recent visit to the Winchester Round Table, F1DCZ organized a similar event locally. On 8 May the first "Ile de France" microwave round table was held in Fontainbleau with visitors coming from as far as Calvados. Apparently it was a great success and reflected the great interest developing in France.

I4BER, who both edits the microwave column in *Radio Rivista* and is the Italian microwave co-ordinator, reports that the recent "Alpi-Adria" microwave contest produced a new national record of 230km with a contact between HB9MAW/P and I4BER/4. Other notable contacts were one of 210km between I4AOR/3 and I4CHY/4, and one of 130km between I1BOC and I1NKT. And they have yet to try super-refraction!

Both I4BER and the 2-3/77 issue of the Austrian magazine *QSP* give details of simple 10GHz equipment. In fact it is becoming difficult to find a magazine that does not! It is hoped to summarize the best features of these in the near future. By contrast, DL7QY has sent the writer a copy of his 3W cw/ssb design which, one admits, is a little mind boggling.

10GHz schedules wanted

From 16-28 August, DJ3KM will be holidaying at Cuxhaven-Seaside on the north coast of Germany, and he is most interested in attempting some 10GHz contacts with the UK. It would appear that sites north of Flamborough will be "visible" from Cuxhaven. His equipment consists of either 30mW crystal-controlled on 10,250MHz, or 70mW on 10,350 ±60MHz, feeding a dish having a gain of 34dB. This equipment has ample reserve of course if a reasonable duct presents itself. Anyone interested is asked to contact him directly. His name and address is: Adalbert Kaufman, DJ3KM, Martin-Luther-Strasse 29, D 6507, Ingelheim, Rhine. DJ3KM also reports that there are about 20 other stations active in that area, all operating on 10,350±60MHz, presumably using Microwave Associates "Gunnplexers".

G3JHM will be operating on 10,000-10,150MHz from Alderney from 19 August to 2 September and is looking for schedules. He will have 144·33MHz ssb as talk-back

Winchester Round Table

Another round table has been arranged for 7 August at the IBA Engineering HQ, Crawley Court. This is situated about a mile off the A272 road between Winchester and Stockbridge.

OTS – the orbital test satellite

Attention is drawn to the article by G8CXJ on p608. The ots carries a beacon transmitter intended to allow the fading of signals to be measured over a reasonably wide range, say 30dB, with fairly small but near state-of-the-art equipment, eg a dish 1m in diameter, a receiver having a noise factor of 6·5dB and an i.f. bandwidth of 1kHz.

The capacity to cope with this sort of fading margin also means that the beacon will be audible with rather simpler equipment, and this was indeed in the minds of its designers. Thus it should be heard with equipment typical of current practice; that is, a receiver having a noise factor of about 10dB and an i.f. bandwidth of 100kHz, for which the minimum detectable signal is in the region of −115dBm, together with a dish 2 to 2½ft in diameter.

Several points can be made about receiving the signals. The satellite will be about 30° above the horizon, so it should be "visible" from most QTHs. At least some parts of existing 10GHz equipment should be usable. The performance of wide-band components such as directional couplers and horn feeds for dishes should not be very different at 12GHz compared with 10GHz. However, devices which employ matching screws will almost certainly have to be retuned for the higher frequency. Frequency-sensitive devices made for 10GHz, such as dipole/reflector feeds for dishes, may not be effective at 12GHz.

A new local oscillator will usually be required. One 12GHz version of the G8APP design of Gunn oscillator (*Radio Communication* February 1976, p123) has been constructed and appears to work well. The only modification required was to reduce the length of the cavity designated by *L* from about 19mm to 14·5mm. □

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technical topics

Pat Hawker, G3VA

ONE of the advantages that the radio amateur has over professional communications people is that he can be a designer one day; work on a kitchen-table production line the next; be a communicator the next; choose between antenna rigger, maintenance engineer, propagation observer whenever he so wishes; be his own administrator, and his own accountant in working out how to pay for a new rig. He does not have to worry about "closed-shops", "job assessment" "time and motion study" or "who does what" disputes; how to increase exports; or the key to the executive's loo. He "clocks on" when he wants to and works flexitime hours. The result, as might be expected, is that he usually enjoys what others would undoubtedly regard as work. "Doing your own thing" is already a rather dated cliché: but for amateurs it still has real meaning.

Noise equalization for hf reception

Many articles on high-performance receiver design have stressed that at hf there is little point in providing a low-noise front-end (particularly as these tend to be more susceptible to non-linearity when handling strong signals) in view of the very high atmospheric, man-made and galactic noise at frequencies below about 20MHz. A compromise figure that has been suggested for professional communication receivers is a 10dB noise figure. But this means that such a receiver, unless in an area of very high man-made noise, would be throwing away quite a bit in sensitivity on 21MHz and even more on 28MHz. These bands really need a noise figure of somewhere nearer 5-7dB even when used with a good full-size antenna.

Now there is no difficulty in achieving 5 or 6dB at 30MHz but we would then usually be stuck with this figure on, say, 7MHz where it is not needed (except perhaps with an inefficient "miniature" antenna) and will in all probability make the receiver susceptible to those confounded 250 and 500kW transmitters of *Radio Pekin*, *Radio Tirana* and *Radio Cairo*.

The problem can be thought of as arising from the fact that an hf antenna provides an increasing amount of unwanted "noise" output as we reduce frequency, so that the receiver has to cope with ever-stronger signal levels in order to provide a required signal-to-noise output. And if we reduce the noise output from the antenna at low frequencies we will also, in effect, be allowing the receiver front-end to work with lower signal levels without reducing the signal-to-noise ratio, and so reduce intermodulation and the other problems of non-linearity in receivers of limited dynamic range.

One can do this, of course, with an rf attenuator at the input to the receiver (provided the operator really accepts that he will do better with weaker signals), and this is a refinement very well worth while, particularly with semiconductor front-ends, as recommended many times in *TT*. But why not formalize the situation by building in a frequency-conscious network in the antenna system? This is particularly applicable where distribution amplifiers feed a number of receivers.

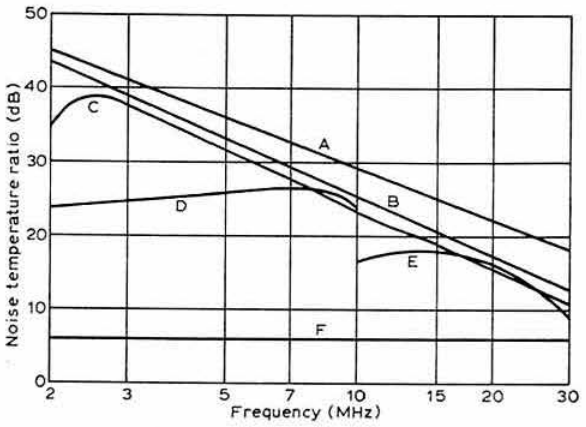

Fig 1. Noise output from antenna feeder under quiet noise conditions. A, CCIR-defined low noise area at quiet times. B, log-periodic wideband array. C, combined high- and low-band rhombics. D, 12m elevated-feed monopole. E, 6m elevated-feed monopole. F, receiver or distribution amplifier input noise level (7dB noise factor)

This is the concept of "noise-equalization" described in considerable detail by D. C. Bunday of GCHQ in *The Radio and Electronic Engineer*, Vol 47, No 5, pp195-206, May 1977. To quote his introduction:

"The 2 to 30MHz spectrum continues to enjoy its long-established popularity as a long-range communications medium with all its well-known advantages and disadvantages. Indeed all the indications are of a steady increase in the number of transmissions with an even greater increase in total power . . . At the same time modern design has resulted in the use of wideband antenna arrays feeding remotely tunable receivers.

"The wideband approach tends to produce its own problems, particularly if active devices . . . are exposed to the full output from a wideband antenna prior to any filtering. The wide range of signal levels almost inevitably leads to the generation of intermodulation products at levels in excess of the noise floor of the system. These ips then inhibit system performance. The design of equipment to accept high signal levels without detectable ips tends to be both complex and expensive. At the same time the relatively high external noise levels have led to the opinion that low noise factors are neither necessary nor desirable in hf receiving systems . . .

"A factor that has not been exploited is the excess of noise at lower frequencies due to increasing external noise levels with reduction in frequency. At the same time the noise due to the active devices remains essentially constant with frequency.

"Noise equalization seeks therefore to exploit this excess noise aspect by reducing input noise levels to provide a more constant noise over-ride across the frequency range at the input to these active devices . . . reducing signal levels to the lowest acceptable values, thereby reducing ips levels by a proportionally greater amount depending on the order of the ips, whilst at the same time retaining virtually the same overall noise performance."

Fig 1 shows how the output noise of various antennas

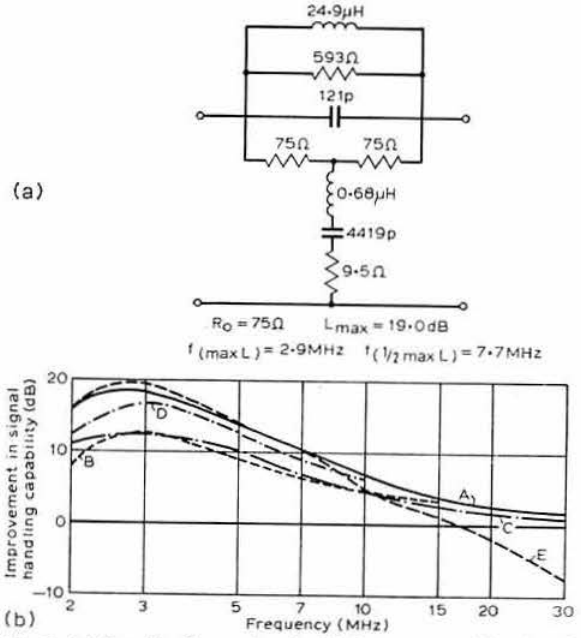

Fig 2. (a) Equalization network. (b) Improvement in signal handling capability levels for noise equalized rhombic antenna system. A, equalization loss of the network shown in (a). B, improvement in signal handling capability for 2nd order (f + f) intermod equals noise at 2f. C, improvement for 3rd order (2f — f) equals noise at f. D, improvement for 3rd order (2f + f) equals noise at 3f. E, equalization loss required to yield 12dB noise over-ride assuming CCIR quiet noise to 7dB noise factor

increases with decreasing frequency, particularly with large, efficient arrays, whereas the input noise level of a typical receiver (or distribution amplifier) remains constant.

Derek Bunday shows that in order to provide roughly equal signal-to-noise ratios for weak signals at all frequencies, when using a receiver with a 7dB noise factor, it would ideally be desirable to introduce an extra 7·5dB *gain* at 30MHz (ie showing that one really needs a noise factor better than 7dB) but about 20dB *attenuation* at 3MHz. A typical noise equalization filter (applied immediately at the output of the antenna) is shown in Fig 2. Where, as in professional installations, there are long feeders (with feeder losses increasing with frequency), the equalization needs to be even more pronounced.

Noise equalization seems a most interesting concept, though we are not suggesting that many amateurs would use it in the form outlined. But it is a further argument in favour of having (and using) an attenuator directly at the input of a receiver, using selective filtering (ie tuned circuits or effective sub-sub-octave filters) rather than wideband front-ends, or possibly using a receiver with a noise figure of 10-12dB but with a low-noise pre-amplifier of wide dynamic range on 21 and 28MHz. It also provides a good reason for the use of "inefficient" receiving antennas on 7MHz and below (eg frame antennas which have the further advantage of providing good null directivity). What has to be realized is that a large number of strong signals reaching the front-end of a receiver produces a "noise spectrum" of intermodulation products that may not even be recognized as such, but wrongly assumed to be the noise floor of the system.

PIN-diode attenuator

Gian Moda, I2SWX, draws attention to a pin-diode attenuator described by Roger S. Viles in *Electronic Design*, 7, 29 March 1977, pp100-102. This could be used in front of a receiver, or similar applications, to provide an attenuation range of 0·3 to 30dB, with constant characteristic impedance, temperature compensation and logarithmic control of attenuation; it is stated to be capable of operation (with better than 1·1 to 1 vswr) up to 120MHz and should prove reasonably satisfactory at 144MHz.

Although one always hesitates before suggesting the introduction of any non-linear device in the signal path of a receiver, it is claimed that pin-diode attenuators produce much less intermodulation distortion than variable-gain transistor stages and have been used in high-performance receivers. Fig 3 shows a working circuit arrangement with all necessary blocking capacitors, rf chokes and low-pass filtering to separate dc and rf paths. Roger Viles of Xerox Research (UK) Ltd concluded his article as follows:

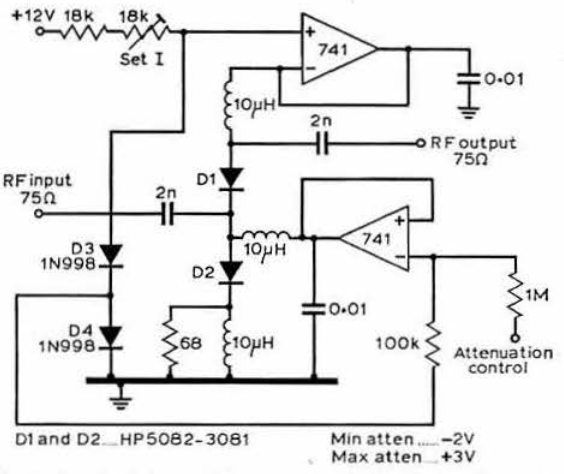

Fig 3. Practical form of the improved pin-diode attenuator providing constant impedance, logarithmic control and temperature compensation

"The circuit is designed as a 75Ω L-pad attenuator with HP5082-3081 low-distortion pin diodes. For these diodes the dc currents I1.I2 needed to attain 75Ω impedance is $(540\mu A)^2$ and the corresponding sum of forward voltages is 1·2V. The 68Ω resistor in the path of D2 differs from the theoretical value of 75Ω because of the residual series resistance of the pin diode.

"Of course, good hf design and lay-out techniques are essential to take advantage of the circuit's ability to achieve a constant impedance over a wide frequency and temperature range. The use of chokes and blocking capacitors with low parasitic reactances is especially important". The design principles are described in the original article.

Micropower cmos Wien-bridge oscillator

Jan Martin Noeding, LA8AK/G5BFV, whose interest in the use of cmos digital circuits for linear applications has been noted in *TT* (October 1976), writes:

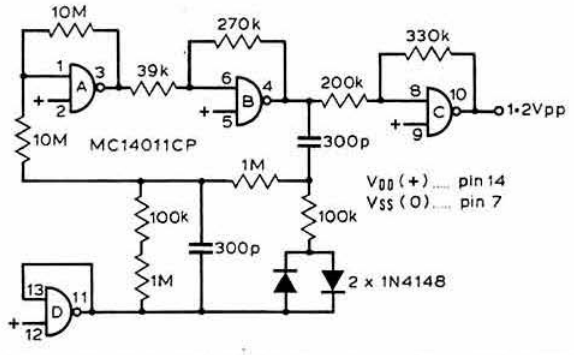

Fig 4. Low-power Wien-bridge oscillator using cmos gates developed by LA8AK

"*TT* of March 1975 included a diode-stabilized Wien-bridge oscillator which I have used successfully for several applications. However, in the course of investigating the use of cmos devices in linear amplifiers I came up with an alternative arrangement: Fig 4.

"It works over the range 3·5-15V, although drift will be lowest if Vcc is between 4·5 and 6V, requiring under 1·5mA.

"Gate D is used as reference amplifier, it has low impedance output and may be determined as ground. Output voltage is 2V p-p and frequency stability within 5 per cent (±2·5 per cent); with the components indicated the frequency is about 1,000Hz: see Fig 5.

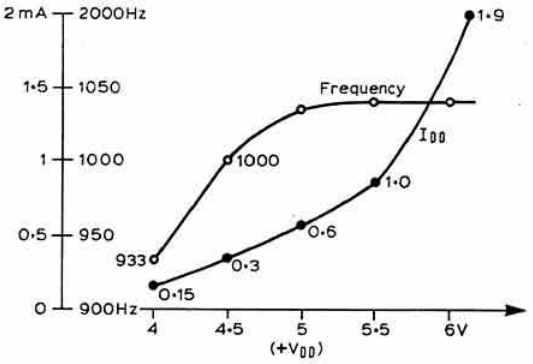

Fig 5. Characteristics of the Wien-bridge cmos oscillator

"Because one was available, a quad NAND gate device was used, although of course a hex inverter device such as the 14069 could be used; but with NAND or NOR gates it is possible to have a mute function connected to another gate input. Because of the very high input-impedance (10M) the oscillator is sensitive to noise pick-up and this should be taken into account during design and construction.

"Incidentally, according to the Swedish journal *Radio & Television* (April 1977), cmos inverters can be used to make hi-fi preamplifiers at very low cost and provide very good transient intermodulation characteristics."

Matching without switching

Not long ago I had a note from the owner of one of those trend-setting all-solid-state hf rigs that feature broadband output stages to permit instant QSY. Well at least they do in theory—but not always in practice. For this particular amateur had come up against the problem that, when using his rig mobile with the usual short high-Q loaded whip antenna, almost any attempt to change frequency led to the swr shooting up to a figure not advisable with a solid-state pa. He had to stop the vehicle, get out and adjust the antenna loading in order to make his "instant" QSY. This had quickly taught him the lesson that broadband plus narrowband equals narrowband and he had become a little cynical about the practical value of broadband transmitters, though he appreciated that some techniques for remote tuning of mobile whips had been described in *TT* and elsewhere.

But what about the Royal Navy with its penchant for whip antennas of 7 to 11m (24 to 36ft) length? These have to work anywhere in the hf range with the latest generation of 1kW broadband transmitters. Surely the matelots do not have to go aloft each time they change frequency in order to adjust the matching networks? Well, no, for many years they have had remotely-tuned matching networks, generally based on the pi-network and switching in extra fixed capacitors to widen the effective matching range of the units.

Over the range 1·5 to 30MHz, a 30ft whip looks "capacitive" at low frequencies, passing through $\lambda/4$ resonance around 7MHz and becoming "inductive" up to around 11MHz when it again becomes "capacitive." The equivalent series resistance is about 2·5Ω at 1·5MHz, reaches a maximum of about 500Ω around 11MHz and then falls to about 50Ω at the higher frequencies. It is thus quite a problem to provide a simple matching network that will work over this full range without the switching in and out of additional components but relying only on a practical range of variation that can be achieved with one variable capacitor and one "roller coaster" variable inductor.

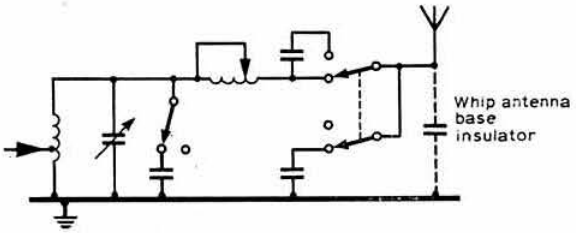

Fig 6. Typical remote-tuned matching network based on pi-network used with standard whip antennas. Switching required to cover all situations

While the "switched" system of Fig 6 was satisfactory for remote manual tuning with only occasional frequency changes, the latest trend is towards fully automatic matching (by means of phase and magnitude detection etc). This has encouraged the return to simple LC matching networks in much the same way as this approach is now more widely used in amateur radio practice.

Fig 7 shows the basic matching network of a Marconi automatic fast-tuning system (H1471) described by J. A. Gould in *Communications & Broadcasting*, Spring 1977 (pp29-33) though no details are given of the 50 to 25Ω wideband step-down transformer. As noted in *TT*, February 1977, it would be very convenient if this could be in the form of a transmission-line transformer, though we suspect that this approach is not used in the Marconi system.

Computer calculations showed that component values needed to provide matching over the full range 1·5 to 30MHz

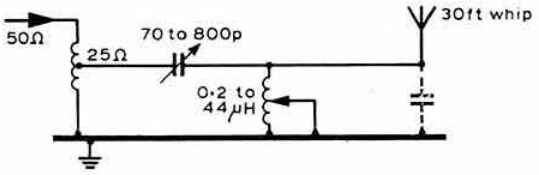

Fig 7. Wide-range matching network as used in the Marconi H1471 fast-tuning matching unit showing component values needed to cover full range of 1·5 to 30MHz

could be achieved without switching. This requires a capacitance range of about 70 to 800pF; inductance range about 0·2 to 44μH. Efficiencies of better than 90 per cent can be achieved above 4MHz, falling to about 40 per cent at 1·5MHz with a coil Q of 400. Cooling fins on the outside of the unit show that energy lost in the unit at low frequencies needs to be dissipated. It should perhaps be noted that this form of network offers less harmonic reduction than either a pi-network or where the positions of L and C are interchanged; however, these days amateurs tend to rely less on transmatch units for harmonic reduction.

The complete auto-tuning system operates within 10-15s (with transmitter output reduced during this period) and represents a quite complex system; these notes are intended only to draw attention to the basic matching approach.

The G4BWE "titfer" antenna

Stephen Price, G4BWE, has come up with a vhf/uhf antenna for use with such rigs as the TR2200G or TR3200 that is not only good fun and convenient to use but also makes sense technically since it minimizes body absorption and body screening as well as putting the radiator as high as possible above ground. It could well start a "fashion" trend.

In essence he uses, see Fig 8, a sturdy leather hat, with "cowboy" brim, adapted to carry a λ/4 whip (19·2in for 144MHz) made from thin coat-hanger wire. This is attached to a wander plug with the join strengthened by sealing the plug top with Araldite and the element made visually less obtrusive by applying a coat of matt black paint. The centre conductor of a light and flexible coaxial feeder (eg UR43) is attached to the plug, and the braid is connected to the ground-plane formed by an aluminium foil lining inside the domed crown of the hat. It is difficult to solder the braid directly to this foil but G4BWE points out that if individual strands of the braid are spread out flat on the surface, a covering of adhesive tape should produce an acceptable join. The ground-plane can be extended as shown by weaving a length of pvc-covered wire through a pattern of small holes around the perimeter of the brim; this wire is of course also connected to the braiding of the coaxial feeder.

A chin strap is useful, and although G4BWE's prototype is for 144MHz it would be even more suitable for 432MHz operation with a need for an element only 6in long. He also points out that if you are a little coy about appearing in public in a cowboy style hat, other styles offer possibilities. We can imagine a fashion parade contest at some future mobile rally complete with toppers, bowlers etc. And taking a leaf from embassy antennas concealed in flag poles—why not an Austrian feather with the radiating element carefully threaded through it?

But do not use this approach for high power! G4BWE suggests a maximum of 3W—and of course avoid putting

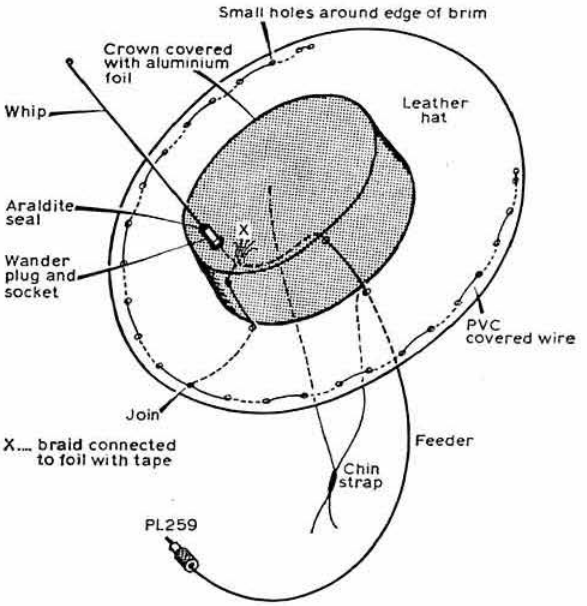

Fig 8. The G4BWE "titfer" or vhf/uhf hat antenna for portable low-power operation

your head down and catching your neighbour in the eye. As shown, the tip of the wire element is bent round.

Keying wave-shape correction

If sometimes one becomes rather critical of current hf transmitter practice when applied to the cw mode (dislike of high duty ratios, sensitivity to mismatched loads, low efficiency etc) it must be admitted that there are some decidedly good features: the excellent frequency stability of many equipments; good clean notes and first-class keying characteristics. The good keying is due partly to the various differential keying circuits, absence of strings of Class C stages following the keyed stage(s) which can re-introduce clicks, and reasonable ht regulation.

In *QST* (May 1977), however, it is suggested that there is still room for better keyed-cw wave-shaping to correct the effects of poor ht regulation. Wave-shaping, it is claimed, is a bit like the weather: "everybody talks about it, but nobody does anything about it". But Robert B. Dome, W2WAM, (a familiar name in the days when phasing-type ssb networks were more popular than they are now) provides a detailed outline of what *can* be done about eliminating keying spikes in high-power transmitters. These spikes and thumps are due to the sudden changes of load on the power supply when a transmitter is keyed: high initial power, as the peak voltage from the filter capacitor flows, but with the ht voltage then reducing exponentially with time.

W2WAM indicates that a passive correction circuit can be applied to the power supply that can take the peaks or dips out of the keyed waveform. In effect this consists of a simple choke/resistor combination; unfortunately, however, (as with the familiar LCR key click filter) the circuit may be simple but it is quite complex to calculate correctly the component values to fit individual cases. W2WAM provides a guide to the necessary mathematics, though it would seem

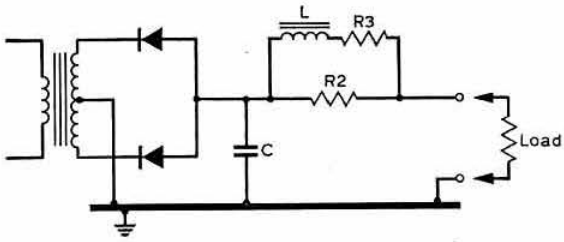

Fig 9. The W2WAM keying wave-shape correction filter (R2 and L/R3) shown with simplified power supply

possible (as with key click filters) to improve the situation by means of trial-and-error techniques.

Fig 9 shows the correction circuit applied to a simple bi-phase rectifier circuit. The additional components are R2 and L/R3 although in practice R3 represents the dc resistance of L. To calculate the correct values one needs to find the "source" resistance of the basic supply and take into account the value of the reservoir capacitor (C), the Q of the reactor (ie L/R3) which can be assumed to be 0·05 at least for initial calculations, and the current and voltage delivered to the load under key-down conditions. The many variables make it necessary to work through a number of formulas, and readers are referred to the W2WAM article for details. However, W2WAM does give a worked example for a 600V, 200mA load with 16μF reservoir capacitor (C). This gave a calculated design of 8·4H choke having 168Ω dc resistance, but since W2WAM then suggests that a 6H, 150Ω choke, with R2 as 620Ω (2W) should be satisfactory, this rather indicates that absolute precision is not called for! He points out that if the waveform is checked as a square-wave on an oscilloscope, should the top of the square-wave show a downward dip the filter capacitance can be increased, and if the top shows an upward peak the capacitor value can be decreased. A word of warning: in the absence of R2 the choke L will introduce some pretty high peak voltages into the system.

Carrier frequencies and ssb

It is a paradox that one of the important factors affecting the intelligibility and overall speech quality of ssb filter-type transmissions is the precise frequency of the carrier—which is generated only to be suppressed! Yet the need precisely to "match" the carrier frequency to the response curve of the crystal (or mechanical) filter seldom seems to receive the attention it deserves. Many of the standard reference books are particularly woolly on this point; often the only practical advice they give is that the carrier should be at the −20dB point of the filter response curve: a figure that may have been near enough correct for filters of the 1950s but is not necessarily correct for modern filters.

There is a further point that is often ignored. The carrier needs to be accurate to within, at the most, a few tens of hertz of the optimum figure—and this demands an order of precision (particularly with filters in the 5 to 10·7MHz range) that cannot be guaranteed simply by plugging in a crystal of nominally correct frequency and hoping for the best. At the higher frequencies, stray capacitances vary crystal "loading" and hence the carrier frequency; so does temperature; so does the type of oscillator circuit used and whether this is intended for the series or parallel resonance of the crystal.

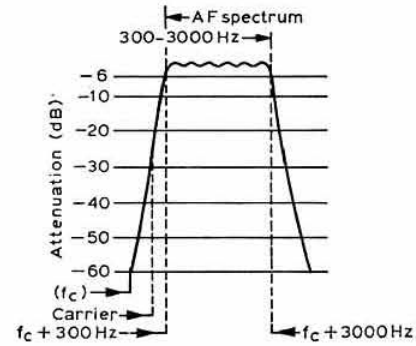

Fig 10. Showing how the carrier frequency dictates the af spectrum of an ssb filter-type transmitter. Any variation of the carrier frequency would change the af spectrum from the optimum 300 to 3,000Hz shown

If one thinks of the basic operation of a filter-type ssb generator, it becomes easy to see why the relationship between carrier frequency and the filter response determines the audio spectrum that is actually transmitted: see Fig 10. Shift the carrier frequency by, say, 400Hz (not much at 9MHz) and we shift by 400Hz the audio pass-band. Suppose the crystal filter has a (−6dB) pass-band of 2·7kHz, then with the "correct" carrier frequency we will nominally transmit a 300 to 3,000Hz span of audio; a 400Hz shift in carrier would change this to either 0-2,600Hz (with no additional carrier suppression) or 700 to 3,400Hz. Neither would sound "right" at the receiving end.

Most authorities agree that 300-3,000Hz or 300-4,000Hz is about optimum for speech intelligibility if we have very steep sided filters, or use an asymmetric-shaped ssb filter with the steep side nearest to carrier frequency. However, quite a lot of amateur ssb filters have a rather narrow "nose" bandwidth (possibly down to about 2·1kHz). In this case the "optimum" af spectrum would be of the order of 400 to 2,500Hz at −6dB. The preferred carrier frequency and its positioning on the filter response curve thus depend on the filter characteristics, and is determined by the required low-frequency roll-off. For any filter with a bandpass of 2·7kHz or more, a roll-off frequency of 300Hz is probably the best choice; for narrower filters, 400Hz can be used. How far down the response curve the carrier "sits" is determined by the filter characteristics; it might be 20 or 25dB; it might even be more than 30dB. Ideally, adjustment calls for precision test equipment, although with care it is possible to make final adjustments by listening to the low-level ssb signals on a good receiver, provided that it is appreciated what one is doing and what one is aiming at. The point to note is that final adjustment requires some form of crystal "trimming" rather than assuming that the carrier frequency must be correct because one is using a crystal supplied by the filter manufacturer or because the rig is factory-built.

The point is perhaps of topical concern in that the ladder crystal filter has encouraged quite a few people to "roll their own". In his excellent articles, "Some experiments with high-frequency ladder crystal filters" (*Radio Communication*, Dec 1976-Feb 1977), J. A. Hardcastle, G3JIR, included a suggested carrier oscillator (February p124, Fig 21) capable of being "pulled" over a range of about 8kHz so allowing it to produce lsb or usb from a filter. In reproducing this

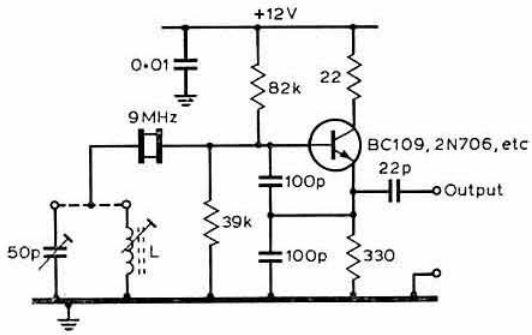

Fig 11. Carrier frequency oscillator arrangement used by F6CER with ladder crystal filters. With series inductance the frequency can be trimmed for usb generation (L 40 turns on 6mm diameter former). With series capacitance it is suitable for lsb generation

circuit in *Radio-REF* (March 1977), G. Ricaud, F6CER, adds an alternative arrangement that he prefers: Fig 11. He claims this will give very much the same performance as the G3JIR circuit, although needing an inductor in series with the crystal in order to lower its frequency for usb generation, or a capacitor in the case of an lsb oscillator (in both cases the carrier crystal would be nominally the same frequency as those used in the ladder filter). Although Fig 11 suggests that it would be easy to make a switched usb/lsb affair, it is advisable to use two separate oscillators, to avoid problems of stray capacitances etc of the switch and associated wiring. If you do want to try a switched oscillator, it would be advisable to use diode switching.

More filter lore

In the March *TT*, in drawing attention again to the absorptive filter approach to reducing harmonic radiation, we re-iterated the view that the published attenuation curves of a low-pass filter do not always give a true idea of how much harmonic frequencies are really likely to be attenuated, but are based on the supposition that the filter is correctly terminated. The point was made that while the matching between the transmitter and the tvi filter may be known with reasonable accuracy at the fundamental, the impedance and hence the filter "termination" may be something very different at the harmonic frequencies.

E. M. Wagner, G3BID, takes this argument a stage further in pointing out that this is true not only of the input terminating impedance of the filter but also on the output side, looking into the feeder to the antenna (or to an antenna tuning unit). In emphasizing that the impedance of the vast majority of radiating systems is not the same on the fundamental and harmonic frequencies, he writes:

"This fundamental difference means that the swr on the fundamental can be (and usually is) vastly different from that on the harmonic frequencies. For instance, many amateur antennas have a driven element a half-wavelength long fed at the centre, including the Yagi, dipole, inverted-V etc, or alternatively a quarter-wave fed against the ground plane. In each of these categories, the feed point is at low impedance. But at the second harmonic the same feed point represents a point of very high impedance.

"Therefore, no matter how low the swr on the feed line on the fundamental, it may be very high on some harmonics, especially the even harmonics. Many amateurs monitor their swr on the fundamental, but I have yet to meet one who attempts to monit · the swr on harmonics. It would be very difficult to produce any antenna and feed system where the swr could be expected to be good both on the fundamental *and* on the harmonics.

"To test low-pass filters in the laboratory they are normally tested into a dummy load; this can have the same purely resistive impedance on fundamental and harmonics and can, therefore, give most misleading results when compared with the performance in an operational situation.

"So the tacit assumption—that where the swr is approaching 1:1, as measured on the fundamental, means that there is no rf on the outer braid of the coaxial feeder—is unlikely to hold good on at least some of the even harmonics. Yet in most low-pass filters *no filtering at all* is applied to the direct connection through the filter box, and to harmonic energy the whole antenna/feeder system may look like a long-wire antenna.

"But surely many people will say that the outer box of the filter is earthed. True, only if the earth lead to real earth is less than about a quarter-wave *on the harmonic frequency(ies)* How many amateurs have low-pass filters that are effectively earthed to real earth by less than a quarter-wavelength on the 2nd or 4th or higher order harmonics?

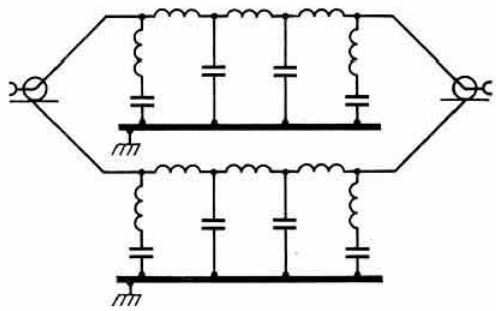

Fig 12. Form of low-pass tvi filter suggested by G3BID to deal with common-mode harmonic energy radiated from the outer-braid of coaxial feeders and antennas

"An answer to this problem is not very difficult. The outer box of the coaxial filter should be insulated from the outer-braid and both the centre conductor and the braid filtered inside the filter box. The low-pass filter becomes in effect a balance arrangement of two low-pass filters as in Fig 12; one side filtering the centre conductor of the coaxial feeder, the other filtering the outer braid (only the purists are likely to be worried at using a balanced system as part of an unbalanced feeder line—*G3VA*).

"It is better still if the unbalanced output from the transmitter is converted into a balanced system by means of a balun, and the balanced feeder fed into the 'double' lpf, with both sides filtered and insulated from the metal case. The values of inductors and capacitors need to be changed to take into account the different form of the filter which now has two identical filters for half the terminating impedances".

The recognized effectiveness of the "braid-breaker" form of receiver tvi filter could well encourage further investigation of G3BID's suggestions, as an alternative to the absorptive filter and to further closing the door on that "unhappy chapter" of tvi filtering. □

4-2-70

Graham Knight, GM8FFX*

Cambridge University expedition to Scotland

Nine members of the Cambridge University Radio Society made an expedition to Scotland between 13 and 22 June. They operated from Green Lowther Hill, Strathclyde (YP42); Mull of Galloway (XO26D); Kilsyth (XQ80G); Berridale, Highland (YS63); Peterhead (ZR41); and the Lammermuir Hills, (YP18F). The last stop on the way home to Cambridge was over the border near Alnwick, Northumberland (ZP52). The callsigns used were GM6UW/P on 144MHz, GM4CIK/P on 70MHz and GM4CDF/P on 432MHz.

The Cambridge group has built a reputation during previous years for picking good weather and radio conditions for its expeditions and this year proved to be no exception. More than 508 stations in 13 countries were worked by the 144MHz station alone. These contacts comprised 279 G, 70 PA0, 53 DL, 31 GM, 16 OZ, 15 ON, 12 GI, 11 SM, 7 GW, 6 LA, 4 F, 3 GD and 1 EI. The best dx was SM3BIU, at a distance of 1,530km to QTH locator HX18J, with whom contact was made via meteor scatter.

On 70MHz GM4CIK/P had to share the prime mover with the 432MHz station and the 70MHz equipment got hardly any use due to the excellent conditions on the higher band. However, some good dx was worked on 70MHz, including G3CO at Colchester which was 625km away from the Peterhead site. During sked with G4CVI from the far north at Berridale, meteor pings were heard but the QSO was incomplete. G6WR at Whitehaven was the most regular 70MHz contact, being worked on nearly every night of the expedition.

On 432MHz GM4CDF/P worked stations in nine countries, mostly on ssb. Outstanding signals on this band were DC1XC, SK6AB, G3LTF, G3LQR and G3ZEZ. Best dx on 432MHz was F1CVU at a distance of 880km from Peterhead. The two days spent at the site just south of Peterhead gave many operators their first contact with ZR square.

The Cambridge group worked several stations via meteor scatter and it is believed theirs was the first expedition to work via ms while portable. All these contacts were pre-arranged on the 14MHz vhf net, successful skeds being set with SM3BIU, SM3GFL, DJ5MS, DK4TG and SM0FFS. The equipment used for the ms contacts was an FT101 and transverter driving a single 4CX250B amplifier running 100W. Frequency checking was by a digital frequency meter, prescaler and a temperature-controlled standard. All the ms contacts were on cw at 80wpm sent by an electronic keyer with memory. Reception was with the aid of two cassette recorders modified for variable speed operation, one for immediate playback and the other as a complete record of the QSO.

QSL cards have already been sent out via the bureau to all 710 contacts. Anyone needing a direct QSL should contact G4CIK, QTHR, for 144MHz and 70MHz contacts, and to G4CDF, Mike Naylor, 9 Layburn Close, Woodley, Reading, for 432MHz. The group would like to receive as many QSL cards as possible as it hopes to claim three FMD certificates.

Frequently *4-2-70* receives letters from groups with great plans for expeditions to Scotland often involving high power and huge antennas. These rarely materialize and it is therefore a great pleasure to report on this year's Cambridge expedition which travelled all over Scotland giving many top dxers their first opportunity to work so many rare Scottish locations on all three bands. All the members of the group are to be congratulated on a very successful and well-organized expedition—roll on next year.

Tropo conditions

Tropo conditions have been very good during the months of June and July with many pipeline type ducts between various parts of Britain and the Continent. On 144MHz the band stayed open for periods of days at a time, with stations like Johannes Baardsen, LA6HL, in Tananger working hundreds of stations. Fred Crisp, G3GZJ, in Devon was his best G dx contact, but huge pile-ups of stations calling LA6HL were monitored at Aberdeen. Johannes is in QTH locator CS80C and is one of the highest-powered Norwegian stations, running 500W from a Nag 144 linear which has a 4CX350F in the final and this no doubt accounts for his very loud signal in Britain.

Ewan Shepherd, GM8LLQ, at Balerno near Edinburgh, found conditions very good to Norway and Sweden on both ssb and fm. He also found the lift interesting as he was able to access several Norwegian repeaters—often more than one at once. Dave Hutchison, GI4FUM, in County Armagh, reports on the high level of GI stations who are active on 144MHz. He has now worked 136 different GI stations, which he says is more than 25 per cent of the GI population. Like many correspondents, Dave remarks on the signals in Northern Ireland from the Cambridge Group operating from the far north of Scotland in YS square. Peter Hallan, GI8KIA, in County Antrim, made full use of the excellent conditions to contact 22 PA0 stations, with ON, DL, F and OZ also worked for good measure.

With the high pressure system centred over the North Sea, conditions did favour the east coast stations, nevertheless G3CHN and G3XCS in Cornwall worked many French and German stations but found signals to Scandanavia to be weaker. Rod Smith, G4DQY, at Tottenham, London, was surprised while operating through GB3PI to hear GM8FFX calling on the repeater output frequency telling him to QSY to a simplex frequency. During the QSO which followed Rod said he was running 10W to a $\lambda/4$ whip and he was most surprised to be heard in GM. Many stations on the inputs of both GB3LO and GB3PI could be monitored in Aberdeen.

Conditions on 432MHz were also good, with the openings often lasting days longer than on 144MHz. Peter Blair, G3LTF, in Essex, was pleased to work LA3WU in CU square as there are not many Norwegian stations on 432MHz. Simon Freeman, G3LQR, in Suffolk, worked many northern G and GM stations but found SK6AB signals to be weaker than in previous openings. Ray Bennett, GW8CFQ, in Wrexham, found the opposite, as he was hearing good signals from SK6UHF and worked SM6CWA in FS square with just 10W.

PA0VV exchanged good television pictures with G8ACN at Saffron Walden, and says more television sets should be modified to tune Channel 16 as conditions are often good

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enough for 432MHz television contacts. PA0VV mentions the loud signals from EI6AS in Co Tyrone (WN65). GI8KIA worked PA0JOZ, PA0WWM, PA0CIS, PA0AXA, PE0MAR and PE0AWY in a spectacular 432MHz opening from County Antrim to the Continent.

Sporadic-E openings

During June there were six separate 144MHz sporadic-E openings which have been described by many as the best since 1965. As the details are of considerable scientific interest to many bodies it is proposed to devote a considerable amount of space to deal with the openings in detail.

The first opening occurred on 8 June when John Hunter, G3IMV, in Milton Keynes, worked YO2RIO in JF square on cw at 1426gmt. The second opening was brief at 1535gmt when Dave Blake, G3MWV, in Cromer, worked an IT9 station in Sicily. The third opening on 14 June was much more widespread with stations from Devon to Tyne and Wear taking part. Between 1625gmt and 1710gmt Viv Hill, GW8FTA, in Gwent, worked IW6BWK (HA42G), I4BAC (GE73E), I4GBZ (FE10F), I4EAP (FA60F), I8TWK (GA13H), YU2CBM (ID33F), and HG8KLP was heard for a short time at 1830gmt. Colin Squires, G3XCS, in Saltash, Cornwall, worked I4EAT (FE38C), I4BAC (GE73C), I4BXN (FE38C) and YU2CBM (ID33F) between 1653gmt and 1732gmt. G3IMV worked I4EAT, YU2CBM, I7ORF, LZ2KBI (LD), LZ2JF (MD), YU1AOP (KF), LZ2QS (MC) and LZ2KAD (MC). Richard Crossley, G4CZP, at Carnforth, worked 2,065km to I7EMG (IA47A) at 1651gmt and to I7UNG at 1733gmt. G4CZP also heard IT9ZWV and IW6MBK. Using a 10-element quad G3MWV worked YU1NPW in KE13J at 1952gmt. Brian Bower, G3COJ, worked YO2IS (KF17E) and LZ2KSQ (MD37A). G8LIC, G8LZM and G4FUT, all in north-east England, worked I4EAT, I6CXD, I7EMG, I0SVS, IW6MBK and YU1NPW. GI8KIA worked I7EMG and IT9JLG in square GY73 at a distance of 2,300km at 1635gmt.

A short fourth opening occurred on 15 June at 1600 when HG5AIR was heard calling CQ on ssb on 144·190MHz by G3ZEM in Cleveland. The fifth opening on 25 June was also very extensive with stations all over Britain taking part. At 0753 G3COJ heard IW6MBK and I5BWE, and later worked HG8CY (KG22F), OE3XUA (HH10B), SP9FG (JJ70B) and towards the end some DL stations. Nigel Roberts, G8JEF, in Merseyside, reports that many stations in the north-west were active for the opening. Nigel himself worked YU1NPW, YU3UKM (IG12F), YU3NOU (JE09F), I3LGP (GF22A), OE3HGA (HI29J), HG5KDQ (JH35C) and OK3KMY (II46G) all on ssb between 1515 and 1630gmt. G3XCS, in Cornwall, worked HG9OC (KH06H) on a.m. at 1522gmt, then continued with HG9KOB (KI74C), OE3RRA, OE5UKL, DK1KO and HG8CY. Brian Llewellyn, G4DEZ, in Didcot, worked six stations in Rome, I0SJC/P/8 in Naples and HG7PR(JH).

Fourteen-year-old G4CGM was operating a station at the Duffield, Derbyshire, carnival day using a TS700 and a six-element beam at 9ft when, bored with fm, he tuned the ssb section and worked four Yugoslav stations—the best being YU1OIA near Belgrade. GW8ELR, in Milford Haven worked IP9GLG at 0955gmt, and went on to work OE3WRA and OE1WEB, both in II72A; HG6NM (JI77G) was a good signal before the band closed at 1630gmt. GW8ELR noticed the opening moved towards DL towards the close. G4FUT in Tyne and Wear worked IT9CV, YU3UPI, YU2CTF, OE6TPK, OE8LPK, I0IG, DJ5DT, 14BXN and HB9QQ. G3WJH in Cumbria worked YU2RD/P/3, OE5UKL, DB1RZ, DC3CM, OE5JFL, OE8PPR/A, and DJ7WI. GM3ZBE, north of Aberdeen, worked HB9MFM, I0STO/P/5, I5ACZ and I4AOE all at 5 and 9 both ways. GM4CXP was testing an IC202 and listening to himself on another receiver when he suddenly heard YU stations calling him; he went on to work HB9I, I4EAT and many YU stations.

REAL DX 1977

70MHz	**G4CVI-GM3ZBE**	**650km**
144MHz	**G3ZEM-UO5BF**	**2,400km**
432MHz	**G3DAH-SM6HYG**	**1,090km**

Most incredible of all the contacts during the 25 June opening was Julian Creedy's experience of having huge pile-ups of Italian and Yugoslav stations wanting to work his 1W input of ssb. GM4FNF's best dx contacts were I0FHZ, I2VRN (FF71J), HB9MFM, HB9MOL/P, and IW2ALM. GM3UU/M, in Aberdeen; GM8AZS/M, in Elgin; and GI3VPK/M, near Belfast, were all able to work Italian stations with just 10W of ssb to a whip antenna.

The best dx worked during the month was in the last opening which occurred on 28 June at 1615gmt when G3ZEM, in Cleveland, worked UO5BF Moldavia in square OF27A. This cw contact was at a distance of more than 2,400km. All the information received will be photo-copied and forwarded to F8SH, the IARU Region 1 sporadic-E co-ordinator, to DL7QY for the DUBUS reports, to Ed Tilton, W1HDQ, for his sun-research project, and to the RSGB Propagation Studies Committee.

Beacons

During June several beacons not normally heard in Britain were audible due to good tropospheric and sporadic-E propagation conditions. HB9HB was monitored at S9 by GM4FNF during the sporadic-E opening and it was noted that this beacon still appears to be slightly low in frequency on 144·123MHz. HB9HB runs 10W erp to a 10-element Yagi which fires NNW from a site 1,600m asl in QTH locator DH66F.

FX0THF, which has been operating on a provisional frequency of 144·741MHz, may soon move to 144·895MHz. It runs 30W erp from an omni-directional big-wheel antenna and is located in QTH locator AI46H with the antenna 274m asl. The fsk cw transmission sends both the callsign and the locator followed by a long dash, with a cycle time of 42s. Facilities are incorporated to keep the beacon running even if the electricity supply fails—transmissions on battery power are suffixed by the letters BB. The beaconkeeper is Paul Delacote, F2UP, 14 Route de Marsauceux, Cherisy 28500, Vernouillet, who would appreciate reports. This beacon is a very useful indicator of propagation conditions to the south and it has already been heard as far north as Cleveland.

Jimmy Bruzon, ZB2BL, passes on the news that he has modified ZB2VHF so that after transmitting the call he can listen for any breakers. The beacon is on 144·145 MHz and is located in the sporadic-E zone. ZB2CF is also now equipped for 70 and 144MHz, and both stations are hoping to work to Britain this year. On hf they can be contacted for skeds and further information on the ex-ZB2 net on the first Saturday in each month at 2100gmt on 3·770MHz.

The much-missed GB3SX is back on the air again after servicing. The frequency is still 70·685MHz, running 16W erp from a halo antenna 168m asl. The locator for GB3SX is AL71D.

Region 1 beacon list

IARU Region 1 is a vast area of the world stretching from JW in the north to ZD9 in the south, and from CT2 in the west to UA9 in the east, and in that region the RSGB co-ordinates all the amateur service beacons above 30MHz having greater than 50W erp. Recently the RSGB data processor has been reprogrammed to keep more comprehensive information on these beacons, and the details the Society is now trying to accumulate on all Region 1 beacons are callsign, frequency to 1kHz, QTH locator, erp, type of antenna, metres asl, antenna beam direction, mode, operational status, and contact man for reports. Most of the 120 beacons on the latest print-out give the frequency and the QTH locator but several have all the information listed. Brian Bower, the Region 1 beacon co-ordinator, has written to all Region 1 member societies and it is hoped that over a period of time all the information will be printed for each beacon. The list (19p from RSGB HQ) now lists the beacons in frequency order and starts at 28·155MHz and finishes at 10,500MHz. If some readers do not know that SK6UHF, one of the most useful beacons, is on 432·925MHz in QTH locator GR61A, runs 6W to an omni-directional big-wheel antenna, and is 75m asl, then perhaps it is time they had a copy of the beacon list—real beacon addicts will want to get a new print-out about every three months, as the information is constantly being updated.

Meteor scatter

Peter Chilcott, G4BBA, sends details of a QSO with LZ2JF in Tirnovo in square MD. LZ2JF is keen to set up skeds with British ms operators; some contacts have already been attempted by G3CCH but these were incomplete. LZ2JF's address is Nickola Pissaroff, Georgi Seminaroff Street 1, Vhod W, 5000 Veliko Tirnovo.

Clive Penna, G3POI, is still on the ms trail every Wednesday with skeds with SM3BIU in HX18J. Clive's all-time country score on 144MHz is now up to 35 countries and 177 QTH squares. He says things are getting a little hard now but frequently meteor scatter contacts provide another new one.

Johnny Stace, G3CCH, at Scunthorpe is another who has a weekly sked with SM3BIU, and he reports a better than 50 per cent record of making a complete QSO. In order to improve results on meteor scatter G3CCH has been experimenting using height diversity reception. The usual antenna is a 10-element at 55ft but recently a 40-element colinear array at a centre height of 30ft has been added to the system. The Yagi, being higher, has quite a different vertical pattern to that of the lower colinear. The results have been interesting—nearly all the bursts and pings are heard on the higher antenna first, followed a very short time later by stronger but shorter bursts on the colinear. John concludes that this proves that height is more important than antenna size—or to have an antenna with a wide vertical polar diagram while at the same time it must include the lowest possible angle. Taking into account, by trigonometry, the angle of take-off, it does seem that to obtain longer bursts the angle must be kept as low as is possible. G3CCH has now made 182 complete contacts via meteor scatter, with many more partial contacts. Doubtless he and the growing number of ms enthusiasts will have more to report in the next *4-2-70* once the August Perseids shower has been evaluated.

PEP TALK

by David Evans, G3OUF, vhf manager

Since taking over as vhf manager earlier this year for the remainder of 1977, I have been very impressed by the large amount of expertise shown by amateurs active on the vhf/uhf bands. On the propagation side the work being done in connection with meteor scatter, aurora, sporadic-E, eme reflection and extended tropo is quite outstanding. Some stations are achieving such consistent long-distance results at vhf that it is clear that many of us have a lot to learn. On the technical side, too, tv, rtty, data, fax, Oscar, beacon and repeater projects utilize many advanced techniques. Anyone involved in such work or any interesting operating activities is asked to report to GM8FFX for *4-2-70*.

In April 1978 the next IARU conference takes place in Hungary. All RSGB committees and affiliated groups with vhf/uhf interests are currently preparing papers for this conference to develop a wide variety of subjects. Committees do not have a monopoly for ideas and members of the Society are invited to contact the VHF Committee if they feel they can contribute in any way. I hope to give a further brief report on this important conference, which paves the way to WARC 79, in a few months' time.

The grapevine

Steven Ruff, GI8EWM, has almost finished the 432MHz beacon GI3URS ... GB3LER has been completed by GM3ZBE thanks to a donation of 200 diodes from GM3YOR. The QTH for GB3LER will be ZU65F—not as is indicated on the large locator map ... Coming on the market soon is a small transistorized unit about the size of a converter which will allow the video output of a television camera to be fed into the 28MHz input on a 432MHz transverter ... G3POI is planning four 16-element antennas for 144MHz ... G3IOR has been asked by the VHF Committee to prepare a paper on band plans for future satellites ... The Cambridge University Group climbed to the top of Ben Nevis with an IC202 but only one GM was heard ... GI3FFF/P used a 9-element wide-spaced 70MHz beam in the July contest—the boom length is 26ft ... G5FKM/MM working many stations from extremely rare QTH locator squares ZQ and ZS ... SD306 transistors were selling very fast at the RSGB Exhibition and now lots of pre-amplifiers are being built with this interesting device.

Late news

During a further sporadic-E opening on 8 July at around noon, GM6XI/M in Kintyre (XP53A) worked several OK and HA stations using just 10W to a whip antenna. On the same day GM8FFX worked to Italy on 145·525MHz fm and to YU on ssb. GM4DGK/P made a short trip to Scotland in July operating from YQ, YS and YT squares—best dx on 144MHz from the Orkney Islands was GW8FKB. It's back to the Winning Post, Twickenham, for the VHF Convention on 25 February 1978. Further details next month.

Finally, thanks to all correspondents for the very detailed reports. Please send your news as soon as possible to PO Box 49, Aberdeen. □

swl news

Bob Treacher, BRS32525 *

THE response to my request last time for a bumper mail certainly seems to have had the desired effect, with 23 reporters putting pen to paper. Congratulations are due first to one of our more regular correspondents, Keith Morrison, who has relinquished A8883 for the brand-new callsign G4GCK. As yet he has no transmitting equipment, but with the help of some locals has had a spell on the air. Dave Sharred, A8312, may also be leaving the listener ranks soon, having taken the RAE in June and the morse test already.

New correspondents

First-timers to *SWL News* this month are Dave Brooks; Kel Kirkland, BRS38560; Ashley Butler, BRS38940; Ian Marshall, A8837; Bill Pantelis, BRS38709; Ken Sketheway, BRS20185; Ronny Whitehouse, A9098; and Neil Langridge, BRS37782.

Dave Brooks has been an swl since 1974 but has only been listening on the amateur bands since Christmas when he persuaded his xyl to buy him a Trio JR500S. Kel Kirkland, of Glasgow, runs an FR50B with 20m long wire. Kel's main interest is 14MHz and to date has heard SM6GBM/4U in Sinai and many JAs.

Ashley Butler, of Farnham in Surrey, uses an FRG-7 and a multiband dipole. He is a friend of the four listeners reported in the June issue who were seeing which pair could hear the most stations during the year. Apparently the five are interested to see whether there would be sufficient interest in forming a Farnham dx club. Anyone who is interested should write to Ashley Butler, 1a Elm Grove, Upper Hale, Farnham, Surrey GU9 0QE.

For the past 13 years Ken Skethaway has been monitoring 144MHz, but with the aid of a borrowed FT101E he is now sampling the delights of the hf bands for the first time. He certainly does not intend to return to 144MHz just yet, his appetite for 14MHz having been whetted by KH6HGP and KL7IEH.

Bill Pantelis submits a very full log extract for inclusion in the countries table. However, the countries table is for countries heard and not individual stations heard. Bill is a student over in G from SV-land. When at home he uses the swl call of SW1ACK and has operated from his club station SV1RC. He passes on the information that from 2100 on 26 June FL8 became J28 with the granting of independence.

The older hands

Many of the regular contributors mention the upsurge of 28MHz due to sporadic-E conditions. Many table scores have surged from nothing to 30, 40, 50 and even 70. There has been much short-skip traffic on 28MHz with the majority of the 60 or so European countries being heard. A large number of dx countries have been audible too, and several

1977 HF Countries Table

Station	10	15	20	40	80	160	Total	Mode
BRS17567	74	161	226	69	117	5	652	ssb
A8312	51	133	173	99	113	40	609	ssb/cw
BRS35454	64	134	191	60	92	13	554	ssb/cw
BRS35608	9	127	164	132	84	33	549	cw
BRS35943	53	116	178	76	100	10	533	ssb
BRS32286	57	140	158	57	109	4	525	ssb
ARS37223	5	140	163	57	83	15	463	ssb
BRS25901	33	84	173	66	76	13	445	ssb
A8841	32	110	195	40	64	0	441	ssb/cw
D. Brooks	33	89	117	34	51	0	324	ssb
BRS37583	27	56	92	37	50	3	265	ssb
BRS37884	24	46	76	36	70	2	254	ssb
BRS37782	19	66	75	24	52	4	240	ssb
A9107	13	26	89	13	29	1	171	ssb
A8837	24	43	74	17	11	0	169	ssb
BRS20185	12	50	78	11	9	0	160	ssb
BRS37587	2	16	32	23	55	4	132	ssb
A9199	13	35	36	17	11	2	114	ssb
BRS38940	2	13	69	2	2	1	89	ssb
A9098	5	10	38	13	16	1	83	ssb
BRS38280	1	4	24	7	18	1	55	ssb

reporters mention openings to the east coast of the USA. Who will hear the first W6 on 28MHz this year?

Crosbie Rodgers, BRS32286, has had little to report of late but he thought that hearing ZS2MI on Marion Island was a good enough reason to write this time. He has also been busy in his capacity of club secretary to the Dumfries group and has recently arranged a visit from the Cumberland group. He has also borrowed a 1·8MHz receiver and improved his antenna set-up, which has improved his all-round listening performance.

Keith Kerr, BRS35943, wrote his letter in the passenger seat of a car while being driven back to the university. The 14MHz band has produced KJ6BZ, FO8EC and KP6PD recently but Keith has little other dx to impress us with this month apart from the occasional opening. The 7 and 3·5MHz bands seem to have succumbed to summer conditions and will not be of any great dx value until the autumnal period arrives.

Keith Morrison, is still maintaining his listener interests and receiving his fair share of swl QSL returns. He mentions that if any swl hears him on 3·5MHz he will gladly answer all reports. Neville Spry, BRS17567, wrote while packing his suitcase for his holiday in the USA. His confirmed countries total now stands at 296.

Stuart Hammond, BRS37583, lives in Solihull, but exam commitments have curtailed his listening habits recently. However, 7MHz has produced 3A0FY/M plus several ZLs at good strength. Robert Maskill also lives in Solihull and has been active of late trying to overtake his friend Dave Sharred. Robert's FR400 has now been overhauled and is again producing the goodies at regular intervals.

Chris Garner, ARS37223, writes to apologize for the strange figures he submitted for the all-time table, the explanation being that he added his 1976 score to his current 1977 score. He has corrected the figures now and we will be seeing them in the next all-time table. H. Squance, BRS 37884, comments on the exceptional hf conditions of June with 14MHz remaining open all night on several occasions. Best dx heard included 5T5ZR, TU2FH and 5X5NK with much dx also audible from the Caribbean area.

Robert Small, A8841, still reports from his QTH at Harwich. He has been very active also, hearing VR8N, VR3AR, FO8DO, P29UC and KM6FC. Conditions to the west coast of the USA were also exceptional during some early mornings

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Continued on p624)

the month on the air

John Allaway, G3FKM*

THE use of the special GE prefix to celebrate HM The Queen's Silver Jubilee produced quite extraordinary results on some of the hf bands. Never before have UK stations with so many overseas callers been heard, and the prefix did a great deal to stimulate interest in our history in other countries.

The severe interference from the Soviet Union has been identified as emanating from hf radar associated with a laser-beam anti-missile defence system.

K2EL (E. Locke, 4 Preston Avenue, Sea Cliff, NY, 11579, USA) would be grateful if anyone contacting "K2EL/1" could obtain his address.

DX news

IARU *Region 1 News* recently listed the new prefixes which were introduced by the Brazilian Ministry of Communications on 6 June 1975. They are as follows: PP1 Espirito Santo, PP2 Goias, PP5 Santa Catarina, PP6 Sergipe, PP7 Alagoas, PP8 Amazonas, PR7 Paraiba, PR8 Maranhao, PS7 Rio Grande de Norte, PS8 Piaui, PT2 Distrito Federal, PU8 Territoria do Amapa, PV8 Territorio do Roraima, PW8 Territorio de Rondonia, PY1 Rio de Janeiro, PY2 Sao Paulo, PY3 Rio Grande do Sul, PY4 Minas Gerais, PY5 Parana, PY6 Bahia, PY7 Pernambuco, PY8 Para, PY9 Mato Grosso, PY0 Atlantic Ocean Is (Fernando de Noronha, St Peter & Paul's Rocks, Trindade, Martin Vaz). When transmitting from other than a home state Brazilian stations use the prefix of the state in which they are located as a suffix—eg PY2BZD/PP2. Suffixes in the WAA-YZZ series are issued to Class C stations/licensee age 14 to 18 years, and the ZAA-ZZZ series to foreign citizens.

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The special USSR stations using the U60 prefix are to be found on the air from 0700 on the seventh of each month until 2100 on the eighth. They are located as follows: U60A—on the cruiser *Aurora* at Leningrad, U60MSK—Moscow, U60ARH—Archangel, U60BAK—Baku, U60BGD—Belgorod, U60WLA—Valdmir, U60KLN—Kalinin, U60MSK—Minsk, U60NKW—Nikolayev, U60RST—Rostov, U60SEW—Sevastopol, U60TLN—Tallinn, U60TKT—Tashkent, and U60UNK—Uljanovsk. They are celebrating the 60th anniversary of the Russian revolution.

Stations in Finland are permitted to use the OF prefix between 1 July and 31 December 1977. This is to celebrate the 60th anniversary of Finnish independence.

I2DMK worked 150 countries and made 1,250 contacts during his visit to Ustica Is as IE9DMK between 31 May and 6 June. He will be going to San Domino, Tremiti Is, and will operate as IL7DMK from 3 to 17 August. He expects to be active around 7,010, 7,050, 14,025 and 14,180/14, 190kHz, and from 1800 to 1900 on vhf/uhf. Italian stations will again be using the IK prefix between 1 September and 30 November, and the Marconi Memorial station II4FGM (ex-I0FGM) is now IY4FGM. Between 23 July and 3 August IJ7EX was due to be active from St Peter Is.

Readers will be very sorry to learn that Sigurd Mansnerus, OH0NI, a very well-known amateur on the air from the Aaland Is, and his 15-year-old son were drowned in a boating accident recently. Dr Glen Eschtruth, a Methodist missionary from the USA, who was using the callsign 9Q5GE, was murdered by soldiers recently.

Some of the group which operated from KA1IWO a few months ago hope to be on the air from Minami-Tori-Shima in mid-August (probably around the 18th).

It appears that the station using the callsign 8Q0A which was on the air last March was genuine and QSLs should be sent to the address in "QTH Corner".

VP8NO expects to be taking part in the RSGB 21/28MHz contest and should have a good signal. Mike reports that VP8PM contacted PY7ARS/1 via Oscar 7 (Mode A) at 2316 on 20 June. This is believed to be the first VP8/PY satellite QSO.

The newly independent Republic of Djibouti is using the J2 prefix in place of its former FL8 French colonial series prefix. J28AC was formerly FH8OM, J28AD was FL8EP, J28AH was FH8YL, and J28AI was FL8KP. J28AC and J28AH were due to return to Mayotte during August for a further two years.

Welcome

The following overseas amateurs joined our Society during June: CT1AX, CT1HY, CT3AY, EA3ALS, I3OPV, LX1BK, OE1TKW, PE0BGB, P29MO, TJ1BB, VE3EVV, VK6GR, VP8PE, K1KWE, WA6RDB, 5B4DT, and 9J2CB.

News from overseas

The Radio Society of Zambia's newsletter indicates that the society is in a very healthy state. There are over 50 licensed members, and four waiting for callsigns to be issued as well as 20 working for morse or RAE passes. Regular nets are well supported and slow-morse classes are being transmitted. The PTC has approved plans for the setting up of a 28MHz beacon and this will be installed at Unzaa, Lusaka. Plans are being made to send a delegate to the IARU Region 1

Conference in Hungary next April—a piece of excellent news for the amateur radio service.

The summer issue of *Fast Camel*, the journal of the Amateur Radio Association of Bahrain, has also been received from A9XBD. It lists the following as believed to be active: A9s XS, XBC, XBE, XBJ, XBK, XCC, SS, XBH and XG. Ready to come on the air are A9XV, A9XBW, A9XBL and Ted Ross (awaiting call). It seems that A9XBB has now left and that A9XBH and A9XS will be leaving soon. A9XT now has no equipment. The remarks in July *MOTA* concerning the part-time only operation of the beacon station A9XC seem to be out of date, as continuous transmission is now taking place and it is using 25W and a $\lambda/2$ dipole running NW-SE. The beacon is operating on 28,245kHz from a new site in Hamala.

Donald Betts, VP8ON, has provided up-to-date details of activity in the VP8 area. Mike, VP8NO, and his wife Heather, VP8OD, have now returned to the Falklands. Sturd, VP8AI, now has his own station (a Heathkit DX100) and is the only cw station active from Falkland. His QSLs may be sent via VP8ON. VP8ON himself hopes to be active as VP8ON/VP8 during high-power field day (3/4 September). He is building a 144MHz and 432MHz converter and would like to arrange skeds to listen to on "moon-bounce" (D. W. Betts, Pebble Is, Falkland Is). VP8AI is also building 144MHz equipment and hopes to operate through OSCAR.

New callsign

In accordance with the provisions of the Radio Regulations the callsign series H6A-H6Z has been allocated provisionally by the ITU to the Solomon Islands as from their accession to independence.

The REF 10m Group

This has been formed to promote the use of the 28MHz band as well as to further the study of propagation phenomena. It is to publish a three-monthly *28MHz Letter* in June, September, December and March, and this may be obtained by sending five IRCs and four saes to S. Faurez, F6EEM, 8 Square E. Souvestre, 35100 Rennes, France. A 28MHz contest was held on 27 June and another will take place on 20 November; full details may be obtained from F6EEM (sae and irc, please).

World Dental Congress

This will be held in Toronto from 22 to 28 October and special station VE3DDS will be on the air on 3·5 and 14MHz. Hotel reservation forms and full information may be obtained from the 1977 FDI/CDA Organizing Committee, PO Box 6423, Station A, Toronto, Ont, M5W 1X3, Canada. (A few registration forms are available from G3FKM).

Contests

The Scandinavian Activity Contest

1500 17 September to 1800 18 September (cw).
1500 24 September to 1800 25 September (phone).
3·5 to 28MHz. Contact Scandinavian stations; the same station may be worked on each band. Prefixes to be worked include LA, LB, LG, LJ, JW, JX, OF, OG, OH, OI, OH0, OJ0, OX, OY, OZ, SJ, SK, SL and SM. Entries may be single-operator, multi-operator single- or multi-transmitter. Exchanges consist of RS/T plus serial number of QSO (from 001). For European entrants each contact counts one point and the multipliers are the call areas (LA1, LB1 and LJ1 are all the same). Portable stations in LA or OZ count as the tenth call area. Total score is QSO points multiplied by the sums of the multipliers from all bands. Logs should indicate date, time, callsign, numbers sent and received, if multiplier, and points claimed. Separate logs for each band and a signed declaration that rules have been obeyed should be posted before 15 October to NRRL Contest Manager, LA5QK, N-4052 Royneberg, Norway.

In the 1976 event **G3SXW** (8,325 points) and G3TXF (8,096 points) were 5th and 6th non-Scandinavians in the cw section. Other UK entrants were G4FAM (5,420), **GM3CFS** (4,940), G4ALG (4,466), G3ESF (4,095), GM3YOR (1,674), G3PCW (403), G4DBW (320) and G8QZ (216). In the phone section **GW3SLA** (1,599) led the UK entry, others were **GM4DZX** (1,313), **G4CVZ** (1,040), G3UAS (945), G4DBW (704) and G4ALG (522).

Bornholm Island 80m Contest

1200 to 2400 3 September.
Any mode, exchange RS/T plus QSO number. QSOs count two points, with Bornholm eight. Multiplier is WAE countries plus OZ, SM, LA, OH, TF, OY, OX, JW and JX call areas. The contest celebrates the 650th anniversary of Reonne and a special award is being made available to participants. Logs should be posted before 15 September to: OZ4QQ, Egon Soerensen, Skanoervey 2, 3700 Roenne, Denmark.

The 2nd Albatross SSTV Contest

1500-2200 12 September (part 1).
0700-1400 13 September (part 2).
All bands 3·5 to 28MHz and Oscar. Recommended frequencies 3,754, 7,040, 14,230, 21,340 and 28,670kHz. Exchanges consist of pictures with callsign, report, serial number (from 001). Each 14MHz contact counts one point, on the other bands five points. Multipliers are five for each DXCC country (W and VE call areas also count), and 10 for each continent (maximum 60). There are sections for transmitting and receiving video, and for receiving video only. Logs must reach Prof Franco Fanti, Via Dallolio n 19, Bologna, Italy, by 30 October. The over-all winner will receive a television camera (less lens). Entrants should include $1 or equivalent. The sponsors are BATC and AEC (Italy). In the 1976 event G3WW was 6th with 12,032 points, and G4CVZ 11th with 4,464.

Awards

Worked Berlin West Diploma

For contacts with different postal delivery districts of W Berlin since 1 January 1970. Three classes for 10, 20 and 30 districts, and the award is issued for all cw or mixed modes contacts. The highest class is free, but the other two cost 10 IRCs and endorsements two IRCs. Send certified list to WBW Manager Hans-Georg Schmidt, DJ2VT, Haubachstr 32, 1000 Berlin 10, W Germany. (The PDD is the number following Berlin in the address—eg DJ2VT is in PDD 10).

Grand Prix Award Monza

For contacts made during September of each year. All phone but no crossband or mixed, stations may be worked on each band. Send log details of the five contacts with Monza stations with 10 IRCs before 31 October to ARI Club, Box 1 20052 Monza, Italy.

The Bromsgrove Silver Jubilee Award

Please note that applicants for this award should apply to J. K. Harvey, G8KLO, 22 Elm Grove, Bromsgrove, B61 0EH. Contacts with GE3VGG and 24 other GE stations (not necessarily including one with a member of the club as stated previously) are required. The sponsors ask for patience over delivery of the certificates as the demand has been very great.

WALA (Worked All LA/LB)

For contacts with LA/LB stations made after 1 January 1950. Twenty different must have been worked, at least six of which must have been located north of the Arctic Circle (QTH must be clearly indicated on the QSLs). Any mode may be used but minimum reports of RST338 or RS33 are required. JW and JX stations count and are north of the Arctic Circle. A list, certified by the awards manager of a national society (giving date, time, station worked, reports and locations), should be sent to: NRRL Award Manager, Hans E. Kinck, LA4YF, N-3800 Bo I Telemark, Norway. The fee is 10 IRCS.

RSGB awards

Awards manager G5GH wishes to point out to applicants for the Society's hf awards that *QSL cards and proof of Society membership* are required for each and every one. It is also necessary to provide proof of membership when applying for the WAC award.

Band reports

Conditions have been excellent on the hf bands during the past month. Solar flux levels have been in the eighties on many days, and quite clearly the new sunspot cycle is well on its way.

Apologies to readers who sent in last-minute items for this issue of *MOTA*—the deadline had to be brought forward by two days due to the writer's personal circumstances; however, everything received by 7 July has been included.

Many thanks to all correspondents and specially to the following for supplying material for this section of *MOTA*: G2WS, G2HKU, G4RZ, G5JL, G6GH, GM3LYY, G3RCA, G3RZI, G4DSE, G4EAN, G4EHQ, BRS17567, BRS38709, BRS38876 and A8961.

Stations listed in italics were using cw.

1·8MHz. 0000 *LU1DZ, LU8DQ, PY1RO.*

3·5MHz. 0000 PY, 0100 K4JY, VE, VO1GR, ZP5ZZ, 4Z4DX.

7MHz. 0200 LU, PY. 0400 YV, *ZL.* 0500 *CM, ZL, HI7JM.* 0600 *CM-2VG, OA4AHO, VK, ZL.* 2300 *ZS1XR.*

14MHz. 0000 FP0DE, ZL4BX. 0100 K4SQT/SU, VP1DK, ZF1AK (Box 1029, Grand Cayman). 0200 VU2HI. 0300 HC8RG. 0600 FO8EX, FR7ZB, KP6AC, W6/W7, ZK1DR. 0700 FO0RS, *FP0DE* (QSL to WB8NGT), J28AC, KH6, KL7, XF3B. 0800 FO8EC (BP 2610, Papeetee), *HZ1SH,* JA, KJ6BZ, KP6BD, KX6DC, GW4DWN/VE8, VR3AK, VR6TC. 1000 C21AA, C21NI. 1100 5T5BH. 1500 VK6, S79R, 9K2EP (QSL SM0DJR), *9M8HG.* 1600 FR7AT, W6/W7. 1700 AP5HQ, HS1WR, P29JS, YB2SV. 1800 KH6, KP6AL, KP6BD. 1900 J28AI. 2000 TT8SM, 9U5CA (QSL WA2QNW). 2100 FG0DDV/FS7 (QSL to W2QM), TR8MG. 2200 HH2MC, JY1/JY25.

21MHz. 0500 *SM0FHY/4U.* 0600 9Q5QR. 0700 *VK8AC.* 0800 JA, TR8WR, W4YHK/VQ9. 0900 ST0RK. 1100 D2AFW, EP, JA, VU, 9K2DR. 1200 JA, 1300 JA. 1400 *HB0BEG/P,* YB0ACG. 1500 ST2SA 1600 *FG0DGV/FS7,* JA. 1700 TR8JCV, OE2WSL/YK. 1800 *TU4FOC, VP2MVP,* VP9IF, ZD7SD, *ZD8EW.* 2000 *FO8EX* (QSL F6AUS). 2100 CE3FH, HC, TI.

28MHz. European all day from 0600. 1200 W2, W4. 1300 W1, W2. 1500 *ST2SA.* 1600 *D2AAI.* 1700 *A9XC, EA2OIZ,* EL2A, *5B4CY.* 1800 C31NX, CE6BW, FM7AV, W2. ZP, 5H3KS, 5X5NK. 1900 CE, EL, LU, PY, YV, ZP. 2000 LU, PY, ZP. 2100 HI, HP, KZ, W1-W4, YV 7X2EPM. 2200 KP4, VE3, W1-W4, W8, *DL2GG/YV5.* 2300 HP, TF3BS, W1.

QTH Corner

CG1CR	via VE1ABM, 91 Harbourview Drive, Sydney, NS, B1S 2AB, Canada.
FB8XQ, FB8XR	via F5VU, Jean Brunner, Savigne, F-86400 Civray, France.
FO0PJM	W6FWX, R. J. Alfaro, 1812 Webster St, San Francisco, Cal, 94115, USA.
FO0RS	(op Jim) K6AAR, J. T. Rafferty, 178 Paseo Robles, Anaheim, Cal, 92807, USA.
HI8LC	W2KF, K. K. Miller, 309 Cherry Hill Blvd, Cherry Hill, NJ, 08034, USA.
HZ1TA	(UK QSOs) F. McKeracher, 111 Longlands Way, Heatherside, Camberley, Surrey.
IL7DMK	M. di Marco, Via G Pascoli 60, 20133 Milan, Italy.
J28AC	via DJ1TC, O. Blankenhorn, Sophienstr 178, D-7500 Karlsruhe, W Germany.
J28AD	via I8GN, G. Mauro, Via S Brigida 72, I-80132 Napoli, Italy.
J28AH	via I8GN (see J28AD)
J28AI	via W3HNK, J Arcure Jr, PO Box 73, Edgemont, Pa, 19028. USA.
PJ9MM	W1GNC, 1133 Fienemann Rd, Farmington, Ct, 06032, USA.
TY9ER	BP 1587, Cotonou, Benin.
VP1APC	Airport Camp ARC, PO Box 826, Belize, Belize.
VP8OB	now G4BNQ, P. C. Wait, 87 W Park Drive (East), Leeds LS8 2EE.
VP8PM	PO Box 179, Port Stanley, Falkland Is.
VS6GG	via WB4FJO, S. A. Harrison, Rte 13-Edens View, Kingsport, Tenn, 37664, USA.
3D2WR	via G5RP, E. Wake, College Farm Hse, W Hendred, Wantage, Oxon OX12 8RP.
5A5TA	now GM5APC, J. H. Garrett, Mains of Balqhain, Chapel of Garioch, Inverurie, Aberdeenshire.
8Q0A	Antonio Cavallino, Via Europe, 24050 Orio al Serio, BG, Italy.

RSGB QSL Bureau, G2MI, Bromley, Kent, BR2 7NH

Acknowledgements to the authors of the following for items obtained from their publications: The *29 DX Club Bulletin* (**VK6RV**), *Long Skip* (**VE1AL/3**), the *West Coast DX Bulletin* (**WA6AUD**), *DX'press* (**PA0TO**), *CQ Magazine* (**W1WY**), and the *Ex-G Radio Club Bulletin* (**W3HQO**).

Please send all items for **September** issue **to reach G3FKM** no later than **6 August,** and for **October** by **9 September.** □

SWL news

(Continued from p621)

in June and July. Robert is also delighted that while his father G3ALI was working King Hussein, JY1 and JY25, the king passed his 73 to Robert! He is now waiting to see if he gets a QSL card.

The last word comes from Dave Sharred who is now to be known as BRS38876. Your scribe eyeballed the 1·8MHz marvel at Alexandra Palace and what he does not know about 1·8MHz is not worth knowing. Latest new countries for Dave have resulted from the Trans-Equatorial Tests and are 5Z4LW, LU1DZ and ZP9AY. Latest confirmation was FG0CXV/FST and the latest get away ZE7JX. Keep up the good work, Dave!

Postage rates

Dave Borne, our QSL sub-manager, would like every swl with envelopes at the QSL Bureau to ensure that they send sufficient additional postage stamps to him so that he may continue to send QSLs to them. The incoming cards will no doubt be held for six months and then destroyed if the correct postage is not on the envelopes.

Finale

Letters are acknowledged from A9107, A9098, A8837, A9199. Thank you for a really bumper mail this time . . . keep it up. Send your news, views, table scores etc to reach your scribe by 2 September. □

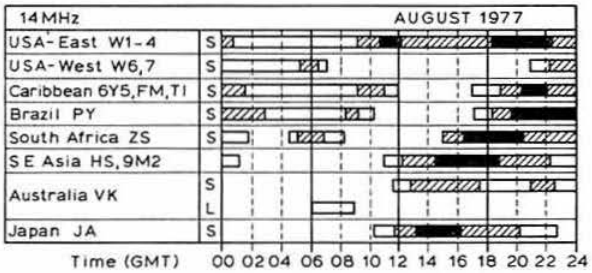
Propagation predictions

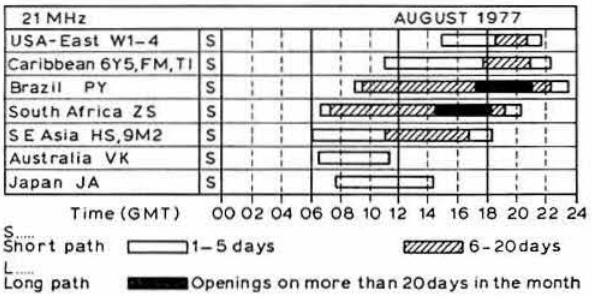
The bad summer-time dx conditions will continue on the hf bands throughout August. During the latter half of September conditions will begin to improve gradually to reach a certain maximum in October and November. As solar activity slowly increases in this present 11-year cycle, now and again there may be an opening of the **28MHz** band to South America (from about 1500 to 2000gmt) and to Africa (from about 1400 to 1800mgt). Traffic with Africa and South America will certainly be possible on **21MHz**, other continents will only be heard very infrequently. Short skip conditions will continue throughout August. This will enliven both **28** and **21MHz**, but will also be the cause of strong European QRM on **14MHz**, which will interfere with dx.

DX conditions at night on **14MHz** will worsen slightly towards the end of the month compared to June and July, as nights slowly lengthen and the night-time frequencies sink more than during the summer. There will also be less possibility of dx via the indirect path because of seasonal changes. However, with the approach of spring in the southern hemisphere the paths to South Africa will remain open longer on both **21** and **14MHz** than in June and July.

On **3·5** and **7MHz** conditions will be the same as given last month. The **3·5MHz** band will be interrupted occasionally by the dead zone during the latter half of the night.

The provisional sunspot numbers for May and June 1977 from the Swiss Federal Observatory were 18·4 and 38·4 respectively. On several days during the second half of June the daily numbers were in the 50-70 region. Predicted smoothed numbers for October, November and December 1977 are 26, 28 and 30 respectively.





Looking ahead

10 September—Scottish Amateur Radio Convention, Adam Smith Centre, Kirkcaldy.

17-18 September—NW Amateur Radio Convention, University of Lancaster.

25 September—Welsh Amateur Radio Convention Oakdale Community College, Blackwood, Gwent.

15-16 October—Jamboree on the Air.

27-29 October—ARRA Exhibition, Granby Halls, Leicester.

2 December—RSGB AGM, IEE, Savoy Place, London WC2.

HF PROPAGATION STUDY

Predicted HPFs (MHz × 10) for August 1977

GMT =	00	02	04	06	08	10	12	14	16	18	20	22	24
Aden	139	131	155	221	249	247	247	243	251	285	188	162	139
Ascension	145	125	116	110	234	253	246	274	258	296	290	192	145
Bahrain	143	128	157	216	242	239	237	230	241	272	190	166	143
Bangkok	130	119	158	200	216	221	215	213	220	188	174	143	130
Barbados	166	139	125	128	143	196	223	223	218	215	244	249	166
Bermuda	164	134	114	111	125	180	205	210	205	205	218	229	164
Bogota	167	135	116	121	143	144	218	216	211	211	235	243	167
Buenos Aires	162	141	133	143	117	192	234	243	238	243	282	249	162
Cape Town	152	124	94	197	248	260	263	281	272	257	194	171	152
Colombo	131	126	161	214	237	235	230	223	237	178	138	130	131
Cyprus	135	121	140	192	223	224	223	215	223	252	225	163	135
Dakar	152	138	140	153	221	247	238	248	244	272	291	227	152
Denver	149	130	112	111	114	115	145	159	167	185	192	186	149
Fairbanks	153	145	147	158	164	168	164	167	167	166	164	161	153
Falklands	147	133	133	136	110	173	237	246	241	253	270	192	147
Gilbraltar	102	88	88	115	147	159	158	155	153	163	181	129	102
Hongkong	114	114	157	191	204	209	206	205	194	168	159	139	114
Honolulu	153	144	140	152	163	163	133	124	145	183	182	162	153
Iceland	100	94	83	106	122	135	139	140	144	147	140	125	100
Jamaica	164	136	115	112	136	139	218	213	206	208	221	235	164
Lagos	144	126	124	185	247	257	251	280	276	304	275	178	144
Las Palmas	144	126	121	143	199	220	215	219	213	224	251	208	144
Lima	166	140	120	129	143	120	227	229	223	219	252	252	166
Los Angeles	150	135	124	121	103	94	124	158	173	191	190	187	150
Malta	114	103	110	149	181	187	186	182	183	204	211	143	114
Mauritius	125	116	155	223	253	253	256	248	272	242	210	161	125
Mexico	152	133	107	107	139	125	171	192	199	199	205	200	152
Moscow	107	96	121	155	169	182	180	176	181	195	177	129	107
Nairobi	122	125	145	219	253	255	261	261	275	267	171	128	122
New Delhi	136	121	159	206	223	227	220	215	228	205	173	152	136
New York	155	134	114	108	119	154	177	199	195	199	205	204	155
Osaka	122	126	154	176	186	192	192	183	162	145	140	147	122
Perth	140	126	161	213	234	234	210	169	161	149	136	122	140
Rio de Janeiro	162	141	133	122	116	244	235	244	241	249	289	244	162
Salisbury	150	126	124	213	255	257	271	274	282	300	239	178	150
Seychelles	128	125	155	221	249	248	251	247	260	234	152	130	128
Singapore	136	121	159	206	223	227	220	215	211	159	163	130	136
Suva (s)	150	145	150	163	173	183	183	158	125	144	174	159	150
Suva (l)	155	139	134	183	161	143	139	136	134	110	218	199	155
Sydney (s)	114	114	157	191	204	196	168	168	155	136	125	139	114
Sydney (l)	164	140	131	134	144	120	112	114	111	107	164	202	164
Teheran	141	126	161	214	237	235	230	223	237	265	196	166	141
Vancouver	153	139	139	143	136	130	139	162	159	163	164	162	153
Wellington (s)	129	126	153	176	186	192	158	141	138	129	168	155	129
Wellington (l)	157	138	134	139	116	108	105	105	105	111	186	200	157

For information on the use of this table, see page 284, *Radio Communication* April 1976. Please send reports to Mr J. Spurling, G4AQI, 15 Tibbs Hill Road, Abbots Langley, Watford, Herts WD5 0EE.

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

[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.

[4] For sstv, recommended operating frequencies are: 3,735, 7,040, 14,230, 21,340, 28,670 —all ± 5kHz.

[5] For beacons, 28·2-28·250MHz is recommended.

[6] For the downlink of amateur satellites, 29·4-29·550MHz is recommended.

The Amateur Radio Observation Service

by D. M. PRATT, G3KEP, honorary organizer*

MOST of the drivers among us will be able to recall at least one occasion when a friend, neighbour or passing motorist has told us that one of our stop lights is not working, or maybe a tyre is looking a bit soft. These friendly warnings are given in our own interests and the reasons for them are two-fold. First and foremost there is the safety aspect; if the fault were not remedied we could be the cause of a serious accident. Second, we could technically be breaking the law, and if we are stopped by the police we could be prosecuted.

There is a parallel to this in amateur radio. Our licence to drive our transmitter requires us to maintain and use the equipment in a bandworthy condition having regard to other band users. We share our crowded roads with commercial vehicles, the essential services and other road users. Likewise, our transmitters may "collide" with other band users if they are not operated correctly. Some of us will have received reports from fellow amateurs that we are overmodulating, our key clicks may be excessive, or our transmission is drifting badly. If we are not so fortunate we may be transmitting out of the band, or our pa may be incorrectly tuned causing the third harmonic of our 3·5MHz transmitter to be heard on 10·5MHz. Such practices, although unintentional, could lead to our licence being suspended or withdrawn.

A little over a year ago a suggestion was made that the RSGB set up a service for UK radio amateurs in an attempt to reduce the number of inconsistences on the amateur bands. When asked for its views the Home Office welcomed the suggestion that radio amateurs be encouraged to put their own house in order. Such a system would save Home Office expenditure and hence help keep the licence fee at a reasonable level. It would also serve as a means of assisting amateurs to correct their trouble without receiving a formal approach from the authorities which could lead to them being closed down.

There is an increasing demand for space on the frequency spectrum by other users. Any opportunity which another radio user can take to criticize the radio amateur could be regarded as a black mark against the amateur service. This could lead to us losing some of the facilities which we are currently able to enjoy, eg, Oscar, repeaters, slow-scan television. Our hope is that we may be allocated additional bands at the World Administrative Radio Conference in 1979. It is not difficult, therefore, to appreciate the importance of our operating practices being above criticism.

An announcement of the Society's intention to establish an observation service was made in "Current Comment" in the June 1976 issue of *Radio Communication*. Following this announcement the Society has been complimented for taking the initiative. During the past year a procedure for the operation of the Amateur Radio Observation Service (AROS) has been worked out and will commence on 1 September 1977. Briefly, it will operate as follows.

The writer has been appointed honorary organizer by Council through the Telecommunications Liaison Committee. Ten observers have also been appointed. The observers are situated in various parts of the British Isles, and are active radio amateurs using the major bands. They have been selected by virtue of their location, experience and good operating practice. It is not the intention that observers specifically monitor the amateur bands, but during their normal operating activity they will take note of any serious breaches of the licence conditions which might result in approaches being made by the Home Office or the Post Office. The honorary organizer will then be notified of these and the radio amateur concerned will be sent details of the irregularity. First-class post will be used so that, hopefully, he will be able to remedy the trouble before any formal approach is received from the Home Office. At this point it must be emphasized that the AROS provides purely a friendly warning and carries no official recognition. The information received will be regarded by the organizer and observers as strictly confidential.

Compared with some of the other radio user services, the operating procedures and practices used by amateurs are of a very high standard. It is not anticipated that the AROS will be sending out dozens of reports each month. On the contrary, the fewer sent the better. If you get one, please receive it in the spirit in which it is sent. And remember, it is sent to help you help the amateur service. To be seen as taking a positive step to improve the present high standards on the amateur bands will be regarded by others as a feather in the cap for the amateur service. □

"No, dear! You're supposed to call 'T'wit t'who!"

*11 Moorleigh Close, Kippax, Leeds LS25 7PB.

50th Annual General Meeting

Minutes of the 50th Annual General Meeting of the Radio Society of Great Britain, held at the Royal Society of Arts, John Adam Street, Adelphi, London WC2, on Friday 3 December 1976, commencing at 6.30pm

Present: Dr E. J. Allaway, G3FKM *President (in the Chair);* Lord Wallace of Coslany, *President-elect;* Mr J. O. Brown, G3DVV, *(treasurer);* Mr G. R. Jessop, G6JP, *secretary;* Mr D. A. Evans, G3OUF, *minutes secretary;* Mr P. A. Miles, G3KDB, *trophies manager;* Messrs R. Broadbent, G3AAJ; R. J. Eckersley, G8LMH, and A. H. Othen, G8FSZ, *(tellers);* and 114 corporate members who signed the attendance book.

The President welcomed members to the 50th Annual General Meeting and announced that according to the attendance book a quorum of 50 corporate members was present.

Notice convening the meeting

The President stated that the notice calling the meeting was set out on page 2 of the Annual Report and Accounts which had been circulated to all members in the November 1976 issue of *Radio Communication*. The Secretary read the first part of the calling notice and proposed agenda items be read as they arose in order to save time. All were in favour of this procedure.

Minutes of the 49th Annual General Meeting

The minutes of the 49th Annual General Meeting had been published in the July 1976 issue of *Radio Communication* and Mr B. Caws, G3BRL, proposed and Mr W. Kempton, G8LN, seconded, that the minutes be confirmed. There were no questions and the proposal was carried unanimously.

Audited accounts of the Society for the year ended 30 June 1976 and the financial report of the Council to the members of the Society for the year ended 30 June 1976

Mr A. O. Milne, G2MI, proposed, and Mr E. Hurle, G3RZN, seconded, that the audited accounts for the financial year ended 30 June 1976 be accepted.

The honorary treasurer read the auditors' report and then invited questions. Mr Packer, G3UUS, asked about bad debts. Mr Brown replied that the majority of bad debts were connected with *Radio Communication* advertising and that although some £200 had already been collected, a further £1,000 was still outstanding. Mr Newnham, G6NZ, asked about the back payment of audit fees. Mr Brown said that the Society had little choice but to pay the auditors' fees. Mr J. Bluff, G3SJE, asked if new accounting changes with regard to inflation would effect the accounts. Mr Brown considered that the new proposals would make no noticeable difference to the Society's accounts. With no further questions the accounts were accepted by 90 votes to nil, with two abstentions.

Members to serve on the Council for the year 1977

The secretary read a letter from the scrutineers and announced that Messrs R. F. Stevens, G2BVN; P. Balestrini, G3BPT; C. H. Parsons, GW8NP, and J. Bazley, G3HCT, had been duly elected.

In the case of Mr C. H. Parsons, who was over 70 years of age, it was necessary for the Annual General Meeting to confirm Mr Parsons' election under the Companies Act. This was put to the meeting and at a vote there was an overwhelming majority in favour of Mr Parsons serving on Council.

The secretary also gave the results of the Zonal elections:

Zone A Mr B. O'Brien, G2AMV, had been elected
Zone B Mr J. Anthony, G3KQF, had been elected
Zone F Mr W. F. McGonigle, GI3GXP, had been elected
Zone G Mr A. M. Allan, GM3ZBE, had been elected

Dr Allway thanked all the unsuccessful candidates in the Council elections.

The President spoke of the death of Sandy Smith, GM3AEL, who had been the Zonal member for Zone G. Dr Allaway said that Sandy had been a great enthusiast who would be greatly missed.

Auditors' remuneration

Mr Brown proposed that Messrs Edward Moore and Sons' be appointed auditors for the current financial year and that Council be appointed to fix their remuneration. Mr C. E. Newton, G2FKZ, seconded this, which was carried overwhelmingly.

Other business

There was no further business and The President closed the AGM at 7.10pm.

After the AGM the President-elect, Lord Wallace of Coslany, chose 20 Lambda debenture stocks for redemption. This was followed by much further informal discussion and the presentation of trophies. Details were reported in the January 1977 issue of *Radio Communication.*

RAE courses 1977-8

Barry. Barry College of Further Education, Colcot Road, Barry. Commencing 20 September, 6.30-9.30pm (1h morse instruction and 2h theory). Enrolment 12-14 September. Fee £5.50 (under 18), £6.50 (over 18). Details from the college.

Beckenham. Beckenham and Penge Adult Education Centre, 28 Beckenham Road, Beckenham. Wednesdays, 7.30-9.30pm, commencing 21 September. Enrolment by post 30 August to 9 September. Personal enrolment 7, 8, 9, 12, 13 and 15 September. Details from the principal at 244 Croydon Road, Beckenham BR3 4DA.

Birkenhead. Birkenhead College of Technology, Borough Road, Birkenhead. Commencing 15 September, 6.45pm. Enrolment 5-9 September. Details from the college.

Blackburn. The College of Technology and Design, Feilden Street, Blackburn. Tutor, Harry Leeming, G3LLL. Details from the principal.

Farnborough. North and West Farnborough Further Education Centre, Cove School, St John's Road, Farnborough. Tutor, John Hardy, G3KND. Commencing 22 September, 7.30pm. There will also be a morse proficiency course commencing 19 September, 7.30pm. Details from J. Brett, principal.

High Wycombe. Buckinghamshire College of Higher Education, Queen Alexandra Road, High Wycombe HP11 2JZ. Enrolment 5-6 September, 9.30am-12.30pm and 2-8pm. Details from R. A. Stringer, School of Engineering.

Liverpool. Riversdale College of Technology, Riversdale Road, Liverpool L19 3QR. Enrolment 12 September, afternoon and evening, and 13-14 September, morning, afternoon and evening. Details from R. Lewis, Department of Electronics and Radio Engineering.

London (Eltham). Eltham Adult Education Institute, Eltham Hill School, Eltham, London SE9. Tuesdays, 7.30-9.30pm, commencing 20 September. Enrolment 12-14 September, 7-9pm.

London (Southgate). Southgate Lower School, Chase Road, London N14. Details from G4AEZ, tel 01-366 7166.

Manchester. North Trafford College, Talbot Road, Stretford, Manchester M32 0XH. A day and evening course is proposed. Details from J. T. Beaumont, tel 061-872 3731, ext 60.

Oxford. Oxford College of Further Education. Commencing 27 September. Details from G4BHR.

Portsmouth. Further Education Centre, Drayton Road, North End, Portsmouth. Tuesdays and Thursdays. Details from the principal or G6NZ.

Romford. Redbridge Technical College, Barley Lane, Little Heath, Romford RM6 4XT. Tuesdays 7-9.15pm, commencing 27 September. There will also be a morse class on Wednesdays, 7-9.15pm, commencing 28 September. Enrolment commences 13 September. Details from the college.

Slough. Langley College of Further Education, Station Road, Langley, Slough SL3 8BY. Mondays. The course includes morse tuition. There will also be an advanced amateur radio course, also on Mondays, for students who have passed the RAE. Enrolment 6-7 September 12.30-2pm. Details from E. C. Palmer, senior lecturer at the college.

Weybridge. Brooklands Technical College, Heath Road, Weybridge. Commences week beginning 18 September. Enrolment 12-14 September. Details from the college.

council proceedings

A brief report of the Council meeting held on 18 June 1977

Present: Lord Wallace (*President, in the Chair*), Dr E. J. Allaway, Messrs D. J. Andrews, J. Anthony, P. Balestrini, J. O. Brown, Dr D. S. Evans, Messrs W. F. McGonigle, B. O'Brien, C. H. Parsons, D. M. Pratt, W. A. Scarr, R. F. Stevens, G. M. C. Stone, C. J. Thomas, *(members of Council)*, G. R. Jessop (*general manager/secretary*), A. W. Hutchinson (*editor*), R. L. Senter (*assistant general manager*), Mrs H. M. Allin (*minutes secretary*).

Apologies for absence were received from Messrs A. M. Allan, J. Bazley and D. M. Thomas.

Financial report

The hon treasurer announced that the eleven-months figures had been completed by the new accountant, Mr Horn, and they would be circulated to Council after the next Finance & Staff Committee meeting.

These figures shows a surplus which was considered most satisfactory. Mr Jessop said that the June figures seemed to be following this trend.

Headquarters report

Mr Jessop reported that regular overtime was being worked on the backlog of the "subs-in" program and subscription reminders. Everything was up-to-date to the end of March and all bankers orders up to June had been entered on the IBM32. New membership cards were also being dispatched as they accumulated.

Mr Stone said he had received many complaints regarding receipt of *Radio Communication*. There was often a considerable difference of time in receipt by members living in the same area.

Mr Jessop confirmed that all copies were posted by the packers on the same day, or occasionally over two days at the most. Therefore, delay was caused not by RSGB as generally thought, but in the routeing and delivery of mail by the Post Office.

Mr Stevens proposed that a demonstration station be installed at HQ. Offers of equipment had been made and it was envisaged that the sum required would be between £600 and £800. This proposal was seconded by Mr Balestrini and agreed by Council.

It was also agreed that the assistant general manager be appointed station manager and that operation would be by special arrangement. Mr Jessop spoke of the possibility of holding several "open weekends" at HQ later in the year.

Society organization

Dr Evans reported on the response the Working Party had received following their invitation for comments and ideas. The response was generally thought to be fair and 18 of the 35 letters had come from clubs.

Considerable discussion followed regarding the scheme of representation and the problem of feeding information to the membership.

Mr Jessop suggested that there should be a seat on Council for a representative of the short-wave listeners.

Dr Evans had produced a summary of the letters received, and it was generally agreed that this showed the response to be encouraging, there being no major complaints but many constructive ideas.

It was agreed that the summary should be published in *Radio Communication*.

RSGB publications

Mr Stevens outlined problems being faced by the Technical & Publications Committee. It was reported that several committees had recently launched into the production of their own publications without prior consultation with the T & P Committee.

After discussion it was unanimously agreed to accept the following resolution from the Technical & Publications Committee:

"Council shall clearly confirm that the publications programme shall remain within the jurisdiction of the Technical & Publications Committee and that *before* any work on books is commenced there shall be complete consultation and co-operation with the committee and the book editor."

Membership and representation

New members for April and May were 195 and 246 respectively.

It was resolved:

(i) to waive the subscriptions of four members;
(ii) to accept reduced subscriptions from 10 members;
(iii) to grant life membership to Messrs C. R. Street, G8BNO, and L. D. Woolf, GJ8AAZ;
(iv) to grant affiliation to: Brunel Technical College Student's Union RC, Bristol; Central Scotland FM Group, Glasgow; Derwent Valley ARS, Matlock, Derbys; Edinburgh & District ARC; George Heriot's School ARC, Edinburgh; Grange School ARS, Stourbridge, West Midlands; Institute of Post Office Electrical Engineers, Tunbridge Wells, Kent; Microwave Associates AR Group, Dunstable, Beds; Nevill Hall RC, Abergavenny, Gwent; NSRA RC, Helsingborg, Sweden; and Teeside Repeater Group, Middlesbrough;
(v) to approve the appointment of Mr F. S. G. Rose, G2DRT, as Regional Representative for Region 6;
(vi) to approve the appointment of the following area representatives: G. L. Adams, G3LEQ, Mid-Cheshire; J. McVicar, GM8GEC, Lothians; I. R. Brothwell, G4EAN, Nottingham M. Coan, G4EDL, Norwich; G. W. Perkins, G3VIJ, Northern Cumbria.

An election was necessary for the Grampian area as two nominations for GM3UKG and GM8KMO, had been received.

VHF convention

Mr Stone stated that this was the first year that a separate vhf convention had not been held since 1954. It was proposed that one be held at the "Winning Post" next year as a seminar, not to include the trade. A provisional booking had been made.

Dr Evans thought insufficient attention was given to advanced levels of vhf techniques and he felt that a specialized seminar could not be incorporated into the framework of a general exhibition.

After considerable discussion it was decided to try a separate vhf convention next year and thereafter analyse the results.

Raynet

Mr Balestrini spoke about the possible allocation of a channel on 70cm for Raynet repeaters. He said there had been a lack of communication between the RWG, VHF Committee and Raynet Committee which had caused confusion.

It was agreed that the general manager should write to the Raynet Committee reminding that committee of the status of the VHF Committee in making allocations.

QSL Bureau

Dr Allaway reported on a visit he had made to G2MI to discuss arrangements for the running of the bureau after Mr Milne's retirement. It was a full-time job and involved the handling of approximately one million cards per year. Mr Milne had made certain recommendations.

After some discussion it was agreed that the Finance & Staff Committee would be asked to investigate the cost of:

(i) present running of the QSL Bureau;
(ii) service if run from HQ.

These figures would be submitted to the next Council meeting.

Committee minutes and recommendations

Council received the minutes of the following committee meetings: VHF Contests (24.2.77 and 28.4.77); IARU Working Group (24.3.77 and 26.6.77); Repeater Working Group (26.3.77 and 16.4.77); Technical & Publications (28.3.77 and 23.5.77); Telecommunications Liaison (7.4.77); VHF (16.4.77); Mobile & Exhibition (19.4.77); Finance & Staff (21.4.77 and 26.5.77); Education (23.4.77); HF Contests (21.4.77)—*Council approved the recommendation that both the G2MI and Braaten trophies be awarded to the appropriate leading all-band entrants;* Membership & Representation (5.5.77)—*Mr O'Brien proposed that an ad hoc committee be set up to consider GB2RS service four possible members having agreed to form such a committee; this was agreed. Mr O'Brien said that the proposed terms of reference for the M & R Committee had been drafted and should now go to the President's Working Party;* VHF (21.5.77)—*A request that* "4-2-70" and "Microwaves" *be given more space in* Radio Communication *was discussed and it was recommended that the size of the journal be increased by 16 pages every other month to allow for the all-round demand for increased space. Mr Brown agreed to investigate the cost of this when the budget was prepared.*

The 1977 President's Working Party

As a result of the President's appeal in April for people to contribute their views on the Society, some 43 letters have so far been received as well as many verbal comments. Some of the letters were simply an indication to contribute at a later date, while others dealt with individual problems. Many contained suggestions which were invalid for various reasons, and some serious suggestions were contradicted by other equally serious suggestions. Nevertheless, the comments received give a useful sort of picture of members' views.

Many constructive suggestions were made, of course, and it was gratifying that in several cases the clearest understanding of the Society came from people at great distances from HQ. The feeling of isolation may be more a lack of effort at trying to communicate rather than a matter of miles.

The following briefly summarizes the main points of letters with a view to stimulate further comments. Where a number of people have made effectively the same point, this number is indicated in brackets.

General
Welcome for Lord Wallace's initiative... An excellent idea... A word of praise for what the Society does for its members...

Council
All Council members to be elected on a zonal basis (2)... This would make it easier for members to contact their representative... RR to attend Council meetings in the absence of the zonal member (2)... All nominees to put forward a manifesto—the present system is reason for apathy about voting (2)... More detailed reports on Council meetings so that members can see who does what (2)... These reports to be circulated via RRs if there is insufficient space in *Radio Communication*... Clarification of responsibilities of zonal members required (2)... The importance of Council members being "seen".

Representative system
Critical comments on representative system... Not enough publicity in *Radio Communication* for RR elections—they are important posts... Clarification of the responsibility of RRs required (2)... RRs, and to a lesser extent ARs, give a fair amount of confidence to ordinary members that they have access to the RSGB... More ARs "on the ground" would help... RRs to be supplied with non-confidential Council minutes and those of committees... RRs should make it their duty to visit societies within their area, to meet members and to sound out their views (2)...

For communicating with HQ, the information path is too long and tortuous—a letter direct to HQ with a copy to the local representative should suffice... More direct contact between members and HQ (6)... Importance of *Radio Communication* as main means of communication between Society and member...

Clubs/Society links
Greater use should be made of clubs to gather opinions... Questions could be raised in *Radio Communication* and answers collected by representatives... Access of members to HQ better via clubs than via ARs and RRs... The RSGB should give more help to clubs... Clubs potentially the most effective way of contacting non-members and listeners (2)...

Member/Society relationships
Easier access to reports and minutes of committees for members who are interested (2)... Is it necessary to delay membership applications for Council approval?... Members should be able to attend committee meetings... Reduced subscriptions for retired people (2)... and "country" members... A qualifying period for automatic life membership... There is a huge reservoir of interested and potential members among UK and overseas listeners... SWLs "second class" citizens who need the equivalent of a call-book... Special subscription rate for SWLs... Membership fee daunting to non-members... Reduced initial rate for subscriptions...

"Provincialization"
Radio Communication posted earlier for those who live in the provinces (2)... Alexandra Palace Exhibition moved to Manchester or Birmingham (2)... AGM rotated around the regions (2)... RRs to attend the AGM and represent members' views... AGM held on a Saturday in Birmingham (2)... Prize winners at present *have* to travel to London. Alternative arrangements?... Move HQ out of London (4)... The Society exists just for the London amateur—nothing ever happens in N Lincolnshire with the help of the RSGB... Suggest "town" and "country" members...

General organization and administration of Society
Possibility of getting a Royal Charter... Articles changed to emphasize scientific (or technical?) nature of the organization rather than leisure aspects... Satisfaction that the RSGB computerizing seems to be working for books etc... Dissatisfaction with system... Suggest statement that summarizes the cost effectiveness of IBM32 after first year... Why is it necessary to send in wrappers?... Special attention be given to future financial planning as costs rise and living standards decline... Change in the legal status of the Society for tax exemption... Society perhaps will have to fight harder for its membership against competitive interests... Difficulties with letters to HQ (7)... RSGB to appoint a technical manager to look after technical committees and technical aspects of *Radio Communication*... Society too vhf/uhf orientated—especially with respect to repeaters. Too many committees involved in making a single decision... An hf committee should be established to safeguard hf interests...

Members' services
Detailed suggestions for HQ station to be sited in the Midlands, for morse, propagation experiments, news broadcasts, RAEN... RSGB to introduce a higher grade of membership (2)... QSL service valued, great asset (3)... Please, no charges... QSL envelopes not filled up... Local versions of news broadcasts... Also on other frequencies... GB2RS used more for club news... Special lectures reproduced in *Radio Communication* or otherwise circulated...

Relationships with outside bodies
Encourage the fostering of strong links with outside bodies—political, military, the media etc... The possibility of G8---s being able to use cw on the hf bands... Stricter policing of vhf bands in particular... WARC: total lack of consultation of members—submission appears satisfactory... Suggest RSGB take over the issuing of GB calls if Home Office cannot cope.

Contests
One person still has to receive his 1973 Jubilee prize... Contestants list for NFD—absence puts small clubs at a disadvantage... Four months delay in processing an award .. QRP working somewhat neglected... ARRL rules for ssb fd... Clashes of contests with other events such as rallies (2)... Contest rule No 3 penalizes small clubs...

Publications
Standardize publications with regard to size and format... Offer all publications in soft-bound paper-back editions... Adverts in *Radio Communication* inserted in middle of magazine in easily removable form... Publish expensive books like the *Handbook* in monthly magazine form with binder... Possibility of putting publications such as the *Examination Manual* and *Revision Notes* on tape for blind people... *Radio Communication* to be sold on bookstalls (3)... RSGB to sell (blank) QSL cards... More encouragement for building "home-brew" equipment... More articles at lower levels for beginners (2)... Commissioning of specific articles, such as a 144MHz fm tx... PCB service... *Radio Communication* appreciated (2)... *Radio Communication* too vhf/uhf—more hf... Sometimes lack of constructional detail... *Radio Communication* too professional—it does little for persons with minimum qualifications... British-built (commercial) equipment should be deliberately publicized.

Letters received from:
G3KQF, Zone B manager (+ 3 reps), letter to G6JP; GM3THI, sec to Ayr ARG; G4EVY, sec to Medway Society; G3ZLX sec? to University of Warwick ARS; G8EDG, sec to Wolverhampton ARS; G3ZYE, sec to Mid-Sussex ARS; G3KQF, Zone B manager; G3SEJ, sec to St Dunstan's ARS; G3ACR, Burton-on-Trent ARS; G8PG, via G2AMV; G2DMR, Sutton & Cheam (chairman); G3HRK, Norfolk Raynet; G3OBZ, member; G3OKA, member; G4BBA, RR + 50

members of the Shefford Club; G4EQF, sec Solihull ARS; D. Eaton, sec to Guernsey ARS; G3MA, AR Gloucester ARS; GM3KMG, AR + Mid-Lanark ARS; G3UOL, AR + 25 members Coventry ARS; G8LT, member; G3DVV, Council member; G4AEZ, sec to Southgate RC; G4BYV, member; G8KIK, AR Teeside; G8ELB, Derby; M. T. Cranyton, East Midland Repeater Group; G3WVO, sec York ARS; P. A. Young, sec Dial House RS; G2CLP, sec, RAIBC; G4EBK, sec Grimsby ARS; GM8BZX, RR12; GM3HAT, member; G8MSO, Worthing & D ARS; G4FGN, member; GW3XIR, member; G3HFO, RR Region 7; G4UZ, RR Region 9; G4COM, Southampton RSGB Group; G4AVV, member; G3MXJ, sec RSGB HF Contests Committee; G3ZKQ, sec Midland ARS; G2AMV, Zone A manager; G3AKG, RR Region 18.

your opinion

GE CALLS
The Editor
Radio Communication
Sir—I would like to express my thanks to the Home Office for issuing the GE prefix, and to the Bromsgrove and District ARC for issuing their jubilee award.

The jubilee week was very enjoyable for me, as I spent a lot of time working station after station, the majority of whom were hunting GE stations to get the jubilee award. I am sure that the whole week will be remembered for the tremendous amount of activity on the bands, particularly 14MHz.

I would be interested to hear how many stations qualified for the Bromsgrove club's award, maybe G8KLO will let the Society know.

Ian R. Brothwell, G4EAN

QSL BUREAU
The Editor
Radio Communication
Sir—Since taking over the G3IAA/3KZZ section of the QSL Bureau a few weeks ago I have received numerous letters expressing sorrow at the death of Len Butler and appreciation of his services to this section of the bureau over many years.

May I therefore be allowed to place on record in the Society's journal the thanks of all who use the section and our sense of loss at his passing.

I can assure everyone that everything was in perfect order when handed over.

Peter Lumb, G3IRM

TELEPHONY AND RTTY
The Editor
Radio Communication
Sir—I would like to draw members' attention to the problems that are being caused by operators who use telephony in the rtty segments of the hf bands. While I acknowledge that adherence to the band plans is not obligatory, a great deal of inconvenience and hard feeling is caused by those who choose to ignore this useful and sensible gentleman's agreement. In particular, the 3·5MHz rtty segment, 3,580-3,600kHz, suffers badly from G stations who, for some reason, find this narrow 20kHz segment irresistible compared to the wide open spaces of the top 200kHz of the band. It is interesting to note that I have never yet heard an amateur rtty station operating above 3,600kHz. Usually the interference comes from A3 stations. A recent example may illustrate the extent of the problem.

On 13 February a pair of stations started a telephony contact on 3,588kHz. One had a defective transmission and could be heard 9kHz each side of his carrier. They were shortly joined by a third station whose netting accuracy secured him a spot 2kHz higher than the other two. Even without the defective transmission, the net was occupying 8kHz, ie nearly half the total rtty allocation! The level of rtty activity was very high and members of the net moaned frequently about the "interference". Eventually one operator sank into a long tirade about "small-minded rtty people" and the net closed down, much to the relief of 18kHz of valuable spectrum.

The solution to these problems is simple. Telephony and rtty do not go well together and telephony tends to come off worst. The problem will not arise if telephony operators stick to their meadow as rigorously as rtty operators stick to their backyard plot.

D. A. Duff, G3VYV

obituaries

The Society records with regret the deaths of the following radio amateurs:

Mr A. G. Cole, GJ3GS
Archie Cole, whose death at the age of 77 was reported briefly last month, was one of Jersey's best-known amateurs. "Three Ginger Sailors" was a founder member of the Jersey ARS, and until his death had been its president for eight years.

Mr C. A. Moody, G8DYO
Charles Moody died on 12 May aged 60. He was a past-president of the Lowestoft & D ARC and was well known on 2m.

We have also been advised of the deaths of:
Mr Henry Ford, G3OMG, on 10 June aged 64; and
Mr Edward (Ted) Mann, G3UJM, in November 1976.

Mobile rallies calendar

7 August	**RSGB National Mobile Rally, Woburn Abbey.**
14 August	Derby Mobile Rally, Lower Bemrose School (Rykneld School), Bedford Street, Derby. Talk-in on 144MHz by G3ERD/A and G2DJ/A. Gates open noon. Free admission and parking. Usual attractions. Grand prize draw (over 40 prizes) 3.30pm. Flea market. Brass band concert. Children's competitions. Details from G3FGY, QTHR.
14 August	Pembroke RSGB Bucket and Spade Party, Regency Hall, Saundersfoot. Details from GW3XJQ.
21 August	Preston ARS Mobile Rally, Walton le Dale County Secondary School, Bamber Bridge, Preston (one mile from junction 29 on the M6). Talk-in on 2m. Trade stands, raffle, bring and buy stall, plenty of parking space. Doors open at 11.30am. Details from G8KTM, QTHR.
28 August	Torbay ARS Mobile Rally, Haldon Racecourse, on A38 near Exeter. Talk-in on 3.774MHz G3NJA/A, 145·00MHz fm S22 G8NJA/A from 9 30am. Usual attractions. Used (not junk) equipment stall. Demonstration by Brixham Coastguard. Details from G3UIQ, QTHR.
18 September	Peterborough Mobile Rally, Walton Secondary School, Mountsteven Avenue, Peterborough. Talk-in station G3DQW on 2m. Details from G3EEL, QTHR, tel Peterborough 62881/65423.
25 September	Harlow & D ARS Rally, Netteswell Comprehensive School, Harlow. Details from G3WUX, G8FRG, G3YDI, QTHR.

Special event stations

17 August-5 September, VE3CNE—Canadian National Exhibition Station
The 99th Canadian National Exhibition will be held in Toronto from 17 August to 5 September, during which VE3CNE will be operated from the Arts, Crafts and Hobbies building by the Metro ARC of Toronto.

Operation will take place on 2, 20, 40 and 75m, and will include a display of sstv. A Heath SB-104 will be used on 20m, and a Heath HW-12 on 75m. A 3-element tri-band beam will be used on 20m, and dipoles on 40 and 75m. Special QSL cards will be issued.

29 August, New Milton Rotary Club Fiesta
A station operated by the Wessex Radio Society at the site of the "Fiesta" at the New Milton Junior School, Old Milton Road, New Milton, Hants, will be on view in the Hobbies Exhibition room. The station will be fully operational, on 3·7, 14 and 144MHz, fm and ssb.

raynet

S.W. Law, G3PAZ *

It is surprising after nearly 25 years of work by many dedicated men (and the fair sex also) to find that the aims of Raynet are often misinterpreted. We are not thinking of the harassed police officer who, on receipt of a telephone call proffering assistance at a current disaster, asks "Who on earth are you lot?" He is a busy man, and it is no fault of his if the local Raynet group is lamentably lax in its liaison to the extent of thinking that the possession of Raynet cards automatically brings it before the eyes of the user services in the district! What is of more concern is the over-enthusiastic types who somehow get the idea that Raynet has obligations far beyond the provision of a system of emergency communications when requested by a user service during a local disaster situation. The object is the relief of human suffering. Just as simple as that. To enlarge on this thorny topic is not the function of this column but we would ask all members to give a little thought to our aims and to keep well clear of divergencies therefrom.

Around the groups

A most interesting newsletter from the Cleveland Raynet gives details of a joint exercise on 6 June with W Yorks Raynet. For record purposes the exercise was entitled Victor and Alpha respectively. A most detailed link map was provided by G8IEA together with a very comprehensive table of overall channels and frequencies used. Obviously a great deal of work was involved and reflects much credit on the groups concerned. The newsletter also carries a rundown on Exercise Uniform of 17 April planned by Pauline, G8MBK. We agree with G8IEA that there is a large area north of Cleveland as far as Glasgow with no Raynet cover. Some enquiries from this blank space on the Raynet map would be welcomed. G8IEA also reports that G8DHQ (not QTHR) has gathered no fewer than 70 members for a new Cheshire group. We hope to hear more of this.

An AGM was held by the Surrey group on 22 June with a view to revising the structure of this once-virile and compact set-up. Members may recollect that the gradual expansion of this group southward resulted in difficulties of administration which eventually led to a state of near-disintegration. However, a few stalwarts have maintained a loose but steady hold on the reins, with the assistance of members from adjacent counties, and the apparent tenuousness has been less than might at first be feared by the existence of a reasonable balance of funds held by the treasurer, Anne Crane, G3GOX, who was unanimously re-elected. The chair was to have been taken by G3XUU, but due to his unavoidable absence the breach was filled by G3OWF, controller of the operative Guildford (Surrey) Group. Fifteen members were present, plus a representative of the Waverley Council whose presence and comments were greatly appreciated. A report was read of the overall position by G8LVB and the possibility of organizers for N, E, W and central Surrey discussed at length. The resignation of G2CPX as secretary was regretfully accepted and Carol Hoare, A7465, was voted in to this post. (We may expect a new callsign after the next RAE?) More news of this group later we trust.

The Farnborough group spent a most interesting time on 2 May when a visit to police HQ gave them a valuable insight into professional communications. A number of other reports received must be held over for lack of space (but see next item).

Raynet on video?

Members who are so well equipped as to read Ceefax BBC or Oracle ITV teletext on their domestic tv will be pleased to hear that there is a possibility of Raynet news items appearing on this service at some future date. Meanwhile remember that Raynet items are included from time to time in the GB2RS News Bulletins on Sundays.

Raynet Committee

The committee met at RSGB HQ on 2 July at 1130. There were a few apologies for absence but the normal amount of business was conducted. Reports will appear at a later date.

* 130 Alexandra Road Croydon, Surrey CRO 6EW.

sstv scene

P. Burnett, G4BLL*

It is interesting to reflect on the growth of sstv since it was first introduced in the 'fifties. The accepted monitor design for that era was, of course, all valve. Modern designs with sophisticated filter and noise immunity circuits are capable of "pulling" a picture out of the most severe QRM.

A number of excellent commercial monitors are available, though regrettably Robot has now ceased manufacture of the 70 range in favour of its Model 400 scan converter to display sstv pictures on a normal tv set. To all intents and purposes the 400 is the only commercially-made scan converter available for amateur use in this country. It is hoped to present a review of the Robot 400 with a comparison of its performance against an 'LVI converter. Venus are reportedly due to release a model shortly but when, or even if, this will be available on the British market is anyone's guess. The DL2RZ converter is in use on the Continent but not in this country as far as is known.

What of the future? Colour is probably the next "logical" step, and transmission is relatively simple with colour wheel techniques. On the reception side a normal fast-scan colour monitor and scan converter with increased memory size will be required. With moving picture transmission becoming a reality on frequencies as low as the 28MHz band and with a bandwidth in the order of several kilohertz only, by use of the "sample dot" system for instance, then transmission of movement within the existing slow-scan limits, perhaps by a random scanning technique, may not be too far off.

Enough of the exotic, now back to earth. With all the talk regarding scan converters and the latest technical developments one is apt to get the impression that the P7 (long persistance tube) monitor is obsolete and somehow "infra dig". This is not true; the P7 monitor will have its place in slow scan for some years to come yet. It is relatively simple to construct and should be attractive to anyone coming in to slow scan for the first time. For anyone wanting to take the middle road, at least two commercial monitor designs are available in kit form, the Venus and MK Products, which would enable one to say with some honesty that the monitor is home-built.

Those already well into the sstv scene with fss, cameras and keyboards available will know how easy it is to get caught up in the technical spiral to the total exclusion of the aesthetic possibilities. For the sake of the future of sstv it is essential that the quality of video content of the majority of transmissions on the bands be radically upgraded. Probably the keyboard has done more harm in this direction than any other piece of sstv equipment. This is not a criticism of the keyboard, only of the way it is generally used. It is a desirable piece of equipment but perhaps should be relegated to second place in favour of the camera. Most of the information which is transmitted by keyboard (or written caption) can be got over a lot quicker and certainly with less effort via the microphone. Why not interface the keyboard with the camera and use it to caption the pictures sent.

The transmission of high-quality sstv pictures is an "art" in itself. Choose original picture content with high contrast and definition (colour or black and white) preferably with matt finish. Glossy pictures are difficult to light to avoid bright spots. Even lighting is absolutely essential; the simplest arrangement being to employ two adjustable lamps placed on each side of the camera.

It is hoped that readers will forgive this first piece being something of a soapbox lecture, but the ball is in their court now—we want to make *their* views known, what *they* are currently doing in sstv, any photographs of *their* equipment and *their* experience of band conditions, new stations and countries worked. In fact anything of interest to *all* sstv enthusiasts.

This is the *readers'* sstv column, together let us all make full use of it. It will next appear in the December issue, so please forward any contributions before the middle of October.

* 319 Leeds Road. Nelson. Lancs BB9 8RW.

contest news

144MHz Portable Contest May 1977 results

Fair weather, variable conditions and an abundance of activity resulted in an excellent contest with many entrants expressing satisfaction. Contributions for committee consideration consist of one request each for, a single-operator section, a power limit, and an eight-hour event.

GW8BHH, the Wulfrun Contest Group, won by a convincing margin, with G6HH runner up. Certificates to both. Congratulations to GM4BWT and G8FIS for very creditable scores, both single-operation stations.

Entries. Stationery requirements are clearly stated in the general rules, however the committee will accept computer logs provided they are cut to approximately A4 size and collated. It will not in future adjudicate "Z" fold entries. Will contestants please destroy stocks of ten-year-old cover sheets and use the present A4-size form.

G5HD

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	GW8BHH	7,152	686	YM44	DC3LZ	965
2	G6HH	5,867	581	AK03	F1DLT	787
3	G3ZIG	5,822	527	AM06	SM7FJE	862
4	GW3OXD	5,301	587	YM54	DF1JC	670
5	GD3FLH	4,904	496	XO67	F1CEC	680
6	G3PIA	4,342	520	ZL33	DC6GL/P	730
7	GW4ALE	3,932	501	YM04	DB4LN	880
8	G8IWD	3,796	424	YK28	DF1JC	650
9	G3YMD	3,304	365	AL76	DC0LT	630
10	GM4BWT	3,174	293	YP44	SM7GUY	1,020
11	G8FIS	3,131	335	ZO55	F1CVE/P	580
12	G3FJE	3,092	454	ZM79	DC6GV/P	613
13	G3XBF	2,990	464	AL21	GM8AZS	645
14	G3OUR	2,881	541	ZL02	GM8GOV/A	577
15	G8KUC	2,878	452	ZL59	GM8GOV/A	637
16	G4DZO	2,504	377	AK11	GD3FLH	481
17	G4ERP	2,491	395	ZL01	DB5KG	573
18	GW4FOX	2,485	315	YL15	ON5GF	560
19	G4CDJ	2,432	421	ZL54	DF2BW	575
20	GM4BYF	2,407	262	YP42	G4ASR	612
21	G3JEQ	2,379	397	ZL77	GM4BWT/P	620
22	G3WIN	2,354	290	YO54	F1KAR/P	575
23	G8ILO	2,325	315	YO78	F1CVE/P	582
24	G3XWZ	2,291	368	ZN62	DJ6EJP	790
25	G4CAR	2,147	358	ZM22	GM8AZS	553
26	G4ATV	2,118	334	YM47	GM8FFX	535
27	GW6YB	2,067	301	YL25	DB6KE	687
28	G3VCP	2,057	364	AL52	GM4BWT	460
29	G3WKS	2,010	382	AL61	F1ECM	445
	G3PFM	2,010	268	YK09	GM4EZJ	542
31	G4DSP	2,009	350	ZM07	PA0OOS	483
32	G3SZV	1,792	238	YO58	F1KAR	600
33	G4CRC	1,791	165	XK74	GM4BYF	580
34	G4FOX	1,765	297	ZM26	PE0AJN	500
35	G4ASR	1,749	168	XJ05	GM4BYF	600
36	G4DAG	1,667	309	ZM24	ON4YZ	465
37	G3OGY	1,636	275	ZL73	G3ZEM	487
38	G3WCB	1,595	307	ZL26	GI4FEE	474
39	G3WUX	1,561	269	AL02	GI8KIA	512
40	G8MXW	1,557	230	YK19	GM4BYF	506
41	GM4EZJ	1,523	168	YP18	SM7XV	950
42	GW8DLX	1,490	210	YM75	OZ5QF	830
43	G4APJ	1,365	209	YN38	ON5UN	501
44	GM8NCM	1,304	159	YQ64	SM7FMX	1,015
45	G3CMH	1,274	195	YK18	EI9V/P	530
46	GW4CCS	1,236	216	YL34	EI9V/P	453
47	G8CDL	1,175	232	ZL08	GM8NCM	502
48	GM8AZS	1,165	91	YR50	SM7DEZ	950
49	G4CBZ	1,142	180	ZK19	F1CYB	440
50	G8CXK	975	171	ZN76	ON5UN	388
51	G8GRF	964	133	YK24	GM4BWT	520
52	GI8LRS	918	72	XO61	F1KAR	655
53	GI4FEE	880	96	XO21	G3XBF	540
54	G8JTT	879	128	YK31	GM4BWT/P	544
55	G4EXO	857	113	ZK35	F1DUZ	365
56	GW6GW	827	140	YL14	ON5UN	478
57	G8NIY	722	201	ZL10	GD3FLH	370
58	G3WOI	675	161	ZL53	G3WIN	360
59	G8MWV	670	152	AL12	GD3FLH	415
60	G4EQD	584	104	ZN49	F1KAR	395
61	G8JXV	533	144	ZL60	GD3FLH	445
62	G5UM	350	66	ZM37	ON5UN	340
63	G8EDG	308	66	YM48	G8MUJ	260
64	G8DDW	301	37	XK27	GM4BWT	520
65	G5DF	287	41	ZO41	PA0VV	537
66	G8LM	254	50	ZM36	PA0NHZ	405
67	G8ABI	189	36	YL72	F1KAR	355
68	G3ZSE	85	29	AL53	GW8BHH	286

Silver Jubilee HF Contests results

These contests proved to be popular, and were somewhat unusual in that they produced a larger entry in the cw section than in the phone. There were 89 acceptable entrants in the former and 83 in the latter—in contrast to the RSGB Diamond Jubilee Contests in 1973 when the numbers were 103 and 133 respectively. In the receiving sections there were only three in the cw and 20 in the phone—a very disappointing response from those listeners who read the morse code.

The results show that during the cw event most G stations found the going on 7MHz very difficult and used the band only for acquiring multipliers. However, at the same time Scottish stations were having more contacts on that band than on 3·5MHz. Matters were very different during the phone test and a number of entrants worked all 20 regions on each band. General activity during the phone contest seems to have been much greater, and there was a higher number of part-time participants who exchanged a few numbers but did not send in a log.

The winners of the special certificates signed by the Society's Patron, HRH Prince Philip, are Mr A. Smith, G3IAS, of Warlingham, Surrey, and Mr F. C. Handscombe, G4BWP, of Henlow, Beds. Top listeners were Mr R. W. Thomas, BRS15822, of London E5, and *Radio Communication* columnist Mr Bob Treacher, BRS32525, of London SE9. It has been decided that all entrants will be sent a certificate of participation to commemorate the contest and it is hoped that these will be despatched in the not too distant future.

Participants were invited to make comments—many chose to do so and these will be of great value to the HF Contests Committee in planning future events. Perhaps the commonest remark made was the suggestion that it would be nice to have a similar contest each year. Some felt that 12 hours was too long, and that it was possible to work all those taking part in less time, and others suggest splitting the period into two sections of six hours, one on Saturday and the other on Sunday of the same week-end. The variable starting number produced the comment that this made it difficult to tell how the opposition was doing. As this was the intention of the rule it had obviously succeeded! The exclusion of club and /A stations from the contests was applauded by many and it has been suggested that it be extended to some other Society contests. However, this did prevent several members who were living away from home at university or for other reasons from taking part and this was unfortunate. The rule was designed to make all entries individual and to try to give those with less elaborate stations a chance to win.

The adoption of the IARU recommendation that contacts should be restricted to certain parts of the bands seems to have been well received and no comments unfavourable to this were recorded. One entrant did feel that the contest was "anti-European".

The many comments concerning the high standard of operating and the friendly and helpful behaviour of those taking part were refreshing. One hears so much about bad operating that this is most encouraging! Several entrants said that this was their first-ever contest but would, hopefully, not be their last. Typical of those who entered just for fun without hope of winning was G3NEO who was running 3W input to his transmitter.

The equipment used by the leading stations was varied and it seems that very elaborate antenna systems were not much in evidence. G3IAS fed the output of his FT101B into a G5RV antenna used as an inverted-V with apex at 50ft, and G4BWP reached his high score with an FL200B, FL1000, and a VS1AA antenna at 30ft. Other antenna systems used by the leading stations included dipoles (some as low as 15ft above ground), trap dipoles, inverted-Vs, long wires, verticals and several W3DZZs.

Strange things happen during contests and G3US mentions that he had to change his atu rf meter during the contest as it had been destroyed by lightning! Finally, a comment from G3YMC—"Told him I was on ssb and he still said 589 . . .!"

The HF Contests Committee would like to thank all who took part, and also those who made kind comments about the committee's work—these were indeed very much appreciated.

CW CONTEST, TRANSMITTING

Posn	Callsign	QSOs/Regions per band 7MHz	3·5MHz	Points
1	G3IAS	56/18	160/20	24,358
2	G4FAM	52/18	157/20	23,598
3	G4BWP	48/18	155/20	23,028
4	G3OKA	45/18	160/20	22,610
5	GM3CFS	97/20	101/19	22,454
6	G4ALG	35/18	155/20	21,584
7	G4CNY	34/17	161/20	21,312
8	G3HVX	35/17	157/20	20,720
9	GI3SXG	69/18	110/19	19,869
10	G3TXF	36/19	135/20	19,812
11	G3HZL	40/16	141/20	19,584
12	G3XTJ	27/16	152/20	19,332
13	G3UCQ	59/16	124/19	19,145
14	G4CWH	35/14	142/20	18,054
15	G3SJE	34/15	102/20	17,360
16	GM3OXC	69/16	90/20	17,172
17	G3PDL	38/17	118/19	15,984
	G3UFY	32/16	116/20	15,984
19	GW3MPB	19/12	147/20	15,936
20	G3US	18/11	153/20	15,841
21	G3SJJ	24/12	146/19	15,748
22	G3KKQ	22/10	158/19	15,631
23	G4FLM	31/14	117/20	15,096
24	GM3PIP	74/15	78/18	14,850
25	G3GC	36/13	114/19	14,336
26	G2HDU	21/11	132/20	14,229
27	G4BXT	20/9	148/19	14,112
28	G3JUL	32/12	111/20	13,600
29	G5PQ	16/10	129/20	13,050
30	G3ILO	19/13	117/19	12,992
31	G4BYG	13/9	139/19	12,768
32	G4DKT	20/9	126/20	12,702
33	G4BEZ	22/10	115/20	12,330
34	G2GM	21/16	93/18	12,138
35	G3NKS	32/14	90/18	11,712
36	G3KDB	12/9	122/19	11 256
37	G3FYE	15/8	123/19	11,178
38	G5MY	19/11	101/20	11,160
39	G4ELZ	18/11	106/19	10,980
40	G3FKH	21/13	93/18	10,881
41	G3HGJ	9/7	126/20	10,854
42	G3JKB	7/5	143/19	10,800
43	G3TPJ	25/14	81/18	10,176
44	G3SNN	21/13	83/18	9,889
45	G3AWR	44/15	53/17	9,504
46	G4IP	4/3	132/20	9,384
47	G2HLU	20/11	85/18	9,135
48	G3AUU	14/7	100/19	8,892
49	G3ORH	14/10	85/19	8,613
50	G4DRS	11/6	103/19	8,550
51	G4APL	30/12	69/16	8,260
52	G4DIM	24/10	74/18	8,232
53	G3VDL	26/10	65/19	7,917
54	G3KAA	19/10	70/19	7,743
55	G2QY	6/4	101/20	7,704
56	G4EOF	—	137/20	7,620
57	G3FVC	25/12	64/16	7,476
58	GW4EMH	11/8	88/19	7,128
59	G4BUO	8/7	95/16	7,107
	G3ZDW	4/3	99/20	7,107
61	G3DOT	10/5	87/19	6,693
62	G3TWJ	—	113/19	6,441
63	GW3SB	3/3	99/18	6,426
64	G3SWX	14/8	72/17	6,400
65	G2BRR	—	109/18	5,886
66	G4FUP	14/8	63/17	5,650
67	GW4FRE	2/2	92/18	5,600
68	G4EXV	—	91/20	5,460
69	GM4ELV	24/9	51/15	5,352
70	G3ZLQ	16/8	61/15	5,267
71	G3ZSU	15/7	56/17	5,112
72	G3CVB	10/5	70/16	5,040
73	G3YMC	—	99/16	4,752
74	G2ZR	—	79/20	4,740
75	G3AHS	—	78/18	4,212
76	G3KSH	6/5	54/18	4,140
77	G3LIK	8/6	51/17	4,071
78	G2FNK	19/7	40/15	3,894
79	GW3INW	—	70/18	3,744
80	G6GH	—	61/20	3,660
81	G4EOL	1/1	62/17	3,213
82	G4DBW	2/2	63/14	3,120
83	G3UVS	—	58/18	3,096
84	G3GDW	5/4	47/14	2,808
85	G3NEO	4/3	36/18	2,520
86	G2CIL	—	33/12	1,188
87	G4GG	—	34/11	1,122
88	G3WP	—	30/12	1,080
89	G3SGH	—	31/10	910

The following entry was not accepted: G2QT—General rule 8(f). Check logs were received from G3MCK and G4BXN/A.

CW CONTEST, RECEIVING

BRS15822, 20,520 points; BRS38876, 15,486 points; BRS33923, 12,879 points.

PHONE CONTEST, TRANSMITTING

Posn	Callsign	QSOs/Regions per band 7MHz	3·5MHz	Points
1	G4BWP	81/20	233/20	37,560
2	G4CNY	99/19	211/20	35,802
3	G4ALG	92/20	207/20	35,520
4	GU3YIZ	129/20	139/20	32,160
5	G4ADD	132/18	142/20	31,236
6	G3WTV	73/20	175/20	30,280
7	G4DKT	95/20	157/20	30,160
8	G3ORH	73/20	184/19	29,952
9	G4DSF	84/20	168/20	29,920
	G4FAM	75/20	175/20	29,920
11	G3YMC	63/20	182/20	29,400
12	G4APL	123/20	129/19	29,367
13	G4BXT	50/20	190/20	28,440
14	G3HZL	63/20	172/20	28,200
	G3NLY	60/20	174/20	28,200
16	G4FDL	41/18	190/20	26,220
17	GM3PIP	105/19	125/19	26,106
18	G2HDU	61/19	157/20	25,506
19	G4EBK	57/19	155/20	24,804
20	G3TTJ	77/20	127/20	24,480
21	G4DSE	58/19	158/20	23,985
22	GW4DOO	85/20	112/19	23,049
23	GW3XNS	98/19	96/20	22,698
24	G4ECY	57/19	137/19	22,116
25	G4CLD	62/20	124/19	21,762
26	G3ZNH	60/20	118/20	21,360
27	G3XMV	40/16	154/20	20,988
28	GW3MPB	49/18	133/20	20,748
29	G3XPO	49/19	129/19	20,292
30	G4EMN	35/18	140/20	19,950
31	G4BER	39/20	112/20	19,320
32	G4CEU	36/19	119/19	17,670
	G3JMB	61/20	74/18	17,670
34	GM4CUZ	86/17	80/19	17,604
35	G2HLU	36/18	122/18	17,064
36	G4ERD	44/19	104/19	16,872
37	G3NML	51/18	104/18	16,760
38	G3SAY	73/17	80/19	16,452
39	G2QT	54/18	98/18	16,416
40	G3UXH	64/18	87/18	16,308
41	G4FMZ	41/20	97/18	15,656
42	G3VOI	18/6	181/20	15,522
43	G3SNN	52/19	93/17	15,480
44	G3OBX	47/18	93/17	14,700
45	G4DFN	22/12	130/20	14,592
46	GW3YFD	43/18	87/19	14,430
47	G4ECO	12/9	150/20	14,094
48	G3EBH	40/17	86/20	13.912
49	G4DF	40/16	96/18	13,872
50	G4BYY	53/18	73/16	12,852
51	GW4EVX	51/17	63/20	12,580
52	G3TWJ	39/16	87/16	12,032
53	GM4EHB	71/15	48/18	11,781
54	G3NKS	15/12	95/20	10,560
55	GM3YBQ	44/16	63/16	10,176
56	G8QZ	23/15	69/20	9,660
57	G3OKA	21/12	78/19	9,207
58	G4DYC	41/18	51/15	9,108
59	G3FYE	33/10	74/18	8,988
60	G3NEO	31/18	44/20	8,550
61	G4FVK	16/11	74/19	8,100
62	G4EJA	16/8	80/19	7,776
63	G3IAS	20/12	62/20	7,712
64	G3YFF	8/7	94/18	7,650
65	GD3YUM	19/12	59/19	7,488
66	GM3CIX	83/17	19/12	7,221
67	G3ZZZ	31/17	59/12	6,989
68	G3YHJ	20/11	66/16	6,966
69	G3PHW	19/15	57/15	6,840
70	G3CVB	27/16	50/13	6,699
71	G2QY	7/7	81/19	6,600
72	GM4DZX	28/13	38/18	6,138
73	G4DUM	15/12	56/15	5,751
74	G4DUO	6/5	95/12	5,083
75	G4FB	36/6	73/15	4,977
76	G2ZR	—	81/20	4,820
77	G4FAS	10/8	50/14	3,916
78	GM4BDJ	6/6	48/18	3,888
79	G3XFW	9/8	27/15	3,105
80	G3FWR	15/11	22/12	2,346
81	G4AFJ	—	36/14	1,512
82	G4DMG	—	33/15	1.485
83	G4EZR	—	33/12	1,188

The following entries were accepted as check logs only: GB2SM, G4BLR, G4EOF and G4FGN.

PHONE CONTEST, RECEIVING

Station	Points	Station	Points
BRS32525	37,440	A9144	17,280
BRS33673	27,720	BRS38568	14,385
BRS33823	26,904	BRS37583	14,256
BRS37223	26,080	A9191	11,640
BRS34740	25,155	A9107	11,340
A8547	22,230	BRS38656	6,534
BRS15822	21,432	BRS38213	2,976
A8808	21,294	A9026	1,836
BRS36768	19,188	BRS38531	1,470
A9199	18,924	BRS37636	168

DF Qualifying Event—Slade

Date: 21 August 1977.
Map: OS Sheet 150 (Worcester and The Malverns).
Assembly: 1300bst for start at 1320bst.
Location: Car park Pershore NGR 950 458.

Intending competitors requiring tea are asked to notify John E. Drakeley, 186 Conway Road, Fordbridge, Birmingham B37 5LD, if by telephone before 8 August (021-770 3474), if by post, anytime.

Dartford Heath DF Qualifying Event results

Eighteen teams assembled on Dartford Heath for the start of the second of the season's df qualifying events.

Station "A", manned by G4BWV and his xyl, G8LXK, was located in ShorehamWoods about eight miles south of the start, and station "B", G3YIV, was about 12 miles in a south-easterly direction in the woods at Holly Hill. About half the competitors set off to find station "A", while the other half decided on station "B" first; within four minutes of the second transmission, Colin Merry had located station "A", followed at 1419 by Chris Plummer, Brian Bristow and Peter Lisle all within the minute.

Station "B" was found first by G. Taylor at 1430, followed by Eric Mollart at 1436. It is interesting to note that Brian Bristow and Peter Lisle arrived within half a minute of each other at both stations, and were declared first and second respectively. As neither competitor had previously qualified, subject to RSGB approval, these two gentlemen will be in the Final; congratulations to both.

Posn	Name	Club	Time of arrival Station "A"	Station "B"
1	B. Bristow	Mid-Thames	1419½	1519
2	P. Lisle	Mid-Thames	1420	1519½
3	A. Butcher	Chelmsford	1432½	1527½
4	C. Wells	Mid-Thames	1425	1528
5	C. Plummer	Medway	1419	1528½
6	E. Mollart	Mid-Thames	1529	1436
	M. Hawkins	Chelmsford	1432	1529
8	G. Whenham	Coventry	1533	1444
9	G. Taylor	Ariel RC	1537	1430
10	J. Everist	Dartford Heath	1540	1445
11	P. Homer	Dartford Heath	1541	1456
12	A. Simmons	Mid-Thames	1545	1455
13	D. Newman	Slade	1436	1555
14	A. S. White	Medway	1630	1530
15	C. Merry	Dartford Heath	1404	—
16	B. Newman	Salisbury	—	1522
17	G. Foster	Stratford-on-Avon	1534	—
18	P. Woollett	Dartford Heath	1605	—

Medway DF Qualifying Event results

A good turn out of 18 starters gathered in almost tropical weather at the picnic area by the A2 near Cobham, and with some concern about a local on the "A" station's frequency, and the apparent non-appearance of "B" station, all competitors set off for a determined search.

Both transmitters were virtually on the same heading from the start and it was hoped that teams would be tempted to use the M2 to cross the river Medway, but as circumstances turned out it was fortunate that road works on the M2 were finished, but only a week before the event, thus causing no delays. "A" station G5MW/P, operated by G3WOV, was located in an overgrown orchard 5km from the start, unmarked on the map, and apparently in the middle of Strood on Broom Hill. "B" station G2FJA/P, operated by G4EGH, was located in, if anything, an even more overgrown, part-flooded, quarry abandoned about 40-50 years ago, called Macklands. This was 14km from the start in Lower Rainham. The organizer, Chris Plummer, G8APB, later apologized for the short range of this transmitter, only 5-6km, as the site, which somewhat resembled a mangrove swamp, was difficult enough without this additional hazard. Most competitors found station "A", though some confusion was caused by taking bearings on, or under, a 2-el beam. Only six teams found station "B", four of these seemed to have got unnecessarily wet to varying degrees.

Posn	Name	Club	Time of arrival Station "A"	Station "B"
1	E. Mollart	Mid-Thames	1451	1551
2	I. Butson	Chelmsford	1559	1500
3	M. Hawkins	Chelmsford	1606	1447
4	T. Gage	Mid-Thames	1616	1514
5	J. Everest	Dartford	1439	—
6	M. Easterbrook	Dartford	1458	—
7	C. Merry	Dartford	1511	—
8	P. J. Yeates	Salisbury	1519	—
9	P. Woollett	Dartford	—	1524
10	D. Newman	Slade	1535	—
11	G. Taylor	Aerial	1540	—
12	P. Tyler	Mid-Thames	1541	—
13	G. A. Whenham	Coventry	1542	—
14	B. Poole	Mid-Thames	1543	—
15	C. Wells	Mid-Thames	—	1601
16	P. Lisle	Mid-Thames	1616½	—
17	B. Bristow	Mid-Thames	1617	—
18	P. Homer	Dartford	1619	—

Subject to confirmation, E. Mollart and T. Gage qualify for the National Final.

May 432MHz Open Contest results

The conditions overall were reported as poor to average with no particular signal path. There were once again a number of complaints of bad signals and the practice of tail-ending with jamming was remarked upon. The eight-hour contest was well received.

More portable and less fixed stations entered logs compared with the March Open, with almost total use of ssb. The standard of logs is slowly improving. A log received very late from F1DBE/P, scored in points/km, was useful for checking purposes. Listeners logs from John Fitzgerald, BRS33823, Denis Taylor, 34740, and Stephen Terry, 35669, will go into the swl table.

Certificates go to section winners and runners-up.

G8ACJ

PORTABLE STATIONS

Posn	Callsign	Score	QSOs	QRA	Best dx (km)	Pwr	Antenna
1	G3PMH/A	820	138	AM71	425	400	46-el
2	GW3UBX	798	114	YM44	568	50	2×18-el
3	G3JQA	725	132	ZN61	475	350	2×14-el
4	G8HVY	683	93	YK28	522	400	2×19-el loop
5	G3ULT	624	122	ZL54	456	50	24-el loop
6	G4DDC	421	99	ZL18	385	250	18-el
7	G8LZU	384	88	ZL33	400	10	2×18-el Pb
8	G3XWZ	371	82	ZL62	20	20in	18-el Pb
9	G8GMC	357	75	ZL53	440	10	18-el Pb
10	G3GBU	304	78	YN79	302	10	18-el Pb
11	G3OHM	298	72	YM50	350	10	18-el Pb
12	G3WTP	290	69	ZM68	360	14	48-el
13	G8GCP	278	70	ZK09	360	35	46-el
14	G3BPM	262	81	ZL77	390	10	88-el
15	G3WIR	240	68	ZL26	365	10	18-el
16	G3UES	217	65	ZL48	355	150	68-el
17	G4CAR	205	55	ZN71	302	20	18-el
18	G3OHC	204	46	ZM31	258	10	18-el
19	G4ERP	174	46	ZL01	194	6	2×46-el
20	G4DZO	155	43	AK11	280	10	48-el
21	GM8GEC	136	36	YP42	447	300	88-el
22	G4CBZ	125	43	ZK10	275	4	88-el
23	G8JXK	120	25	YK05	260	10	8/8
24	G4ASR	104	8	XJ05	435	96in	88-el
25	G8BBN	89	30	YK08	250	10	46-el
26	G3PHJ	86	26	ZN05	240	10	8/8
27	G8BFV	73	25	ZL26	—	5	18-el Pb
28	G8FDJ	50	28	ZL70	145	1·5	22-el quad
29	G8MCV	23	11	ZL10	—	10	48-el

FIXED STATIONS

Posn	Callsign	Score	QSOs	QRA	Best dx (km)	Pwr	Antenna
1	G4CVI	532	102	ZL59	505	250	46-el
2	G3OSS	286	87	ZL40	310	40	88-el
3	G8GP	247	64	ZL50	385	25	18-el Yagi
4	GD2HDZ	205	25	XO68	425	300	18-el Pb
5	G8DTQ	196	70	ZL60	380	6	46-el
6	G8DDW	195	53	AL41	330	150	18-el Pb
7	G8BEJ	192	62	ZL57	395	120	2×68-el
8	G5UM	150	45	ZM35	275	12	14-el
9	G4FMD	124	31	ZL22	410	12	18-el Pb
10	G4DSP	92	22	ZM20	285	10	46-el Pb
11	G8FIT	76	26	YM50	145	10	18-el Pb
12	G8CTT	68	24	AL41	230	10	46-el
13	G3HCW	53	17	ZN24	275	40in	18-el Pb
14	G8ITS	51	30	ZL40	220	40	18-el Pb
15	G8BKR	46	14	YL48	185	10	46-el
16	G4BYP	39	17	YN46	—	20	46-el
17	G4EQD	37	9	ZN37	260	20	46-el
18	G8IEM	36	12	ZK15	178	2	13-el Q-loop

Low Power Contest 1977 results

Sixty-eight UK and 25 European QRP stations were active, resulting in the largest entry for many years, and big signals were heard from those using good antennas. The winner, Dave Vizard, G3UKS, used a 3·5MHz dipole at 135ft with a 3·5MHz inverted-V at 88ft, while GM3OXX had a 400ft lw at 130ft; both outstanding signals.

Conditions varied throughout the day, starting well on 3·5MHz but subject to QSB for some stations later on, and a clash with the DIG Contest on 7MHz in the morning made copy difficult. Support from Europe was encouraging, especially DL, but many commented on the scarcity of G Stations on 7MHz. The revised rules came in for mainly favourable comment and it is apparent that 7MHz is the key to the problem of locality favouring certain stations on 3·5MHz, if more stations can be encouraged to use it, and the scoring can still be improved. Thanks are due to all who participated, to the G QRP Club and European societies who helped to publicise the contest.

Subject to the approval of Council, the 1930 Committee Cup will be awarded to G3UKS and certificates of merit to the runner-up and overseas leaders.

UK SECTION

Posn	Callsign	Pwr grp	3·5MHz Points	7MHz	Total	QSOs	Tx
1	G3UKS†	1	11,175	4,800	15,975	96	TF2169*
2	G3NEO†	1	6,825	4,150	10,975	66	EC91
3	G4ALG	1	7,925	2,700	10,625	64	BFY51*
4	G3YMC	1	6,275	3,850	10,125	55	2×ZT2476*
5	G3XWZ	1	8,500	—	8,500	63	2×BFY51*
6	GM30XX/A	1	8,075	—	8,075	63	2N3018
7	G4DDL	5	4,200	2,500	6,700	73	Ten Tec
8	G3ROZ	1	6,525	—	6,525	49	EC91
9	G4CWH	1	6,325	—	6,325	44	TO5*
10	G4AYS	1, 3	5,575	700	6,275	47	BFY51
11	G3UFY	1, 5	4,900	1,350	6,250	46	TT11
12	G3JKY	1	6,075	—	6,075	46	BUY11
13	G3UYM	2	4,775	600	5,375	47	BD123
14	G3AZ	1	4,375	450	4,825	35	6AK5
	G3AIO	2	4,825	—	4,825	50	6AG7
16	G3EUE	1	4,300	—	4,300	30	6C5
17	G3ZLQ	1	3,700	—	3,700	24	BFY51
18	G8PG	1, 2	3,575	100	3 675	27	Valve
19	G4FPA	5	3,325	—	3,325	48	Valve
20	G3DNF	2, 5	2,875	350	3,225	33	BDY61
21	GW3CW	5	3,050	—	3,050	46	ECL82
22	G3KZR	1	2,925	—	2,925	22	BC108
23	G5OJ	2	2,575	—	2,575	23	PV625X
24	G3WRR	1	1,900	—	1,900	11	2×BFY51
25	G3MCK	5	1,675	—	1,675	23	Valve
26	G4CQK	5	1,475	—	1,475	20	HW8
27	G3AWR	5	1,000	—	1,000	12	Vespa
28	G3ILO	5	200	250	450	7	HW8

OVERSEAS SECTION

Posn	Callsign	Pwr grp	3·5MHz Points	7MHz	Total	QSOs	Tx
1	DJ6FO†	2	900	3,000	3,900	26	6DQ6A*
2	DK9TZ	2	—	2,850	2,850	19	—
3	DJ3IW	5	1,125	1,575	2,700	28	SB104(1W O/P)
4	DK6AJ	2	—	2,100	2,100	13	—
5	DF6XP	5	350	1,000	1,350	14	HW8
6	OK1DKW†	2	—	1,150	1,150	6	HB
7	OZ6SF†	5	—	950	950	10	Ten Tec
8	PA3ABA†	5	100	700	800	7	HW8
9	HA5DE	2	—	650	650	6	BFY34
10	DJ1ZB†	5	—	500	500	5	2N3553
	EA2CR†	1	—	500	500	2	Ttx
12	OZ1WN	1	—	400	400	2	Ttx

* Driven by commercial transceiver.
† Certificate winners.
Check logs gratefully acknowledged from G3BY G2CIL, G4BUE, (all QRP) and G3ZDW, G3NKS and G3KKQ (QRO).

May 1,296MHz Open Contest results

From the many comments received it was an enjoyable contest. Despite poor propagation the March & DRAS, G3PMH/A, worked PA0VV from their Hertfordshire location. At Knottingley, W Yorks, G3HCW reports "not hearing anything south of Sheffield on 70cm, let alone 23cm". Activity was quite high, but entries were lower than normal, on checking there were stations who would have had good scores if they had entered. The shorter length of the contest appears to have been successful under the prevailing conditions.

Certificates will be awarded to leading stations G3JXN and G3PMH/A and to runners-up G3FYX and G3ULT/P.

G4BEL

FIXED

Posn	Callsign	Points	QSOs	Pwr out	Ant	Best dx	Km
1	G3JXN	1,046	24	25*	34-el	G3OHM/P	145
2	G3FYX	441	5	120in	27-el	G3AUS	136
3	G3ZYL	335	8	4	Q-loop	G4ERP/P	102
4	G3ZIV	321	9	100in	2 × ql	G8LEP	60
5	G8BQH	223	7	3/15	Q-loop	G8AOD	62
6	G8AYY	210	5	6	Q-loop	GW3ONP/P	95
7	G3SBV	182	5	4	32-el	G3ULT/P	80
8	G3OHC	153	4	10	18-el	G4ERP/P	72
9	G8ACE	139	3	135in	27-el	G3MCS	78
10	G3HCW	136	6	60in	Q-loop	G4FXW	42
11	G8IFT	127	5	5	9-el	G4ERP/P	45
12	G2WS	37	1	20in	33-el	G3FYX	37

PORTABLE

1	G3PMH/A	2,245	26	60*	4ft dish	PA0VV	285
2	G3ULT	1,858	25	3	2 × ql	G3LQR	216
3	G4ERP	1,319	16	4	2 × ql	G4FXW	164
4	GW3ONP	1,216	10	20	Q-loop	G3ULT/P	178
5	G3OHM	1,188	16	10	Q-loop	G3JXN	154
6	G4DDC	310	7	15in	4ft dish	G4ERP/P	96
7	G3WTP	219	4	4	4 × ql	G3OHM/P	100

* SSB used.

April 1977 70MHz Open Contest results

Although conditions on the band were not brilliant, and snow was underfoot in some places, numerous stations were active. It is a pity that a few more did not send in logs. Comments from the 427s: most thought the contest was far too long, others were of the opinion that not enough searching was done over the band. Certificates will go to winners and runners-up.

G4CUT

FIXED STATION

Posn	Callsign	Points	QSOs	QRA	Best dx	Km	Ant
1	G3JYP	257	26	YO38	G3WKF/P	485	5EDL
2	G3LVP	215	45	AL33	GD3FLH/P	440	4/4
3	GD2HDZ	199	21	XO68	G4CVI	420	4E
4	G4APL	180	52	ZL60	G3UUT/P	395	4E
5	G3MXH	179	43	AL22	G3UUT/P	308	4E
6	G3OHC	175	35	ZM31	GD3FLH/P	255	4E
7	G3FIJ	157	27	AL05	G3UUT/P	320	4E
8	G8GP	144	42	ZL50	G3UUT/P	315	3E
9	G4BBA	133	25	ZM39	GD2HDZ	330	4E
10	G5UM	97	25	ZM35	GW3WRA/P	165	3E
11	G3VHH	75	22	AL31	G3UKV/P	220	4E

PORTABLE SECTION

Posn	Callsign	Points	QSOs	QRA	Best dx	Km	Ant
1	G3UUT	589	55	ZO55	G3WKF/P	510	4E
2	GW3WRA	483	71	YL05	G3DAH	302	5EQ
3	GW3WCS	451	63	YM44	G3DAH	323	4/4
4	G3PFM	392	68	YK09	G3JYP	403	5EQ
5	G4ERP	365	71	ZL01	GD3FLH/P	309	8E
6	G3UKV	341	61	YM28	G3WKF/P	295	4E
7	GD3FLH	305	29	XO67	G3DAH	480	6E
8	G3FJE	301	71	ZM79	GD3FLH/P	370	4S
9	G3GQC	259	46	ZN63	G3DAH	260	9E
10	G4DDC	250	58	ZL18	GD3FLH/P	362	4E
11	G2ASF	232	50	ZM63	GD3FLH/P	311	4E
12	G3WKF	225	19	XK57	G3JYP	485	4/4
13	G4BVE	200	32	YN29	G3PFM/P	305	4E
14	G3WMR	196	41	YL10	GD3FLH/P	300	6E
15	G3BTO	136	26	ZL54	G3JYP	380	3E
16	G3UES	91	37	ZL48	G3UUT/P	330	4E
17	G4EQF	87	25	YM50	G3UUT/P	220	2E

144MHz Open Contest rules

1600-1600gmt 3-4 September 1977

All entries and check logs to: VHF Contests Committee, c/o C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Berks OX12 7DQ.

The following general rules, published in the January 1977 issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8, 9a, 10a, 11a, 11b, 12-22.

This contest is timed to coincide with an IARU Region 1 event. As an experiment only, the VHF Contests Committee has decided to suspend the compulsory logging of QTH, only QTH locators need to be logged (amended rule 11c). All contestants are requested to score their logs according to rules 7a and 7b as the committee would like some statistical information regarding our radial ring scoring system. This is for the next IARU Conference in the hope that the radial ring system be adopted throughout Region 1. All logs scored as above will automatically be forwarded to IARU.

The Mitchell Milling Trophy will be awarded to the overall winner.

Listeners Contest: Rules 1-3.

Contests calendar

13-14 August	70MHz Open (trophy) and SWL (Rules in June issue)
14 August	Region 1 (RSGB) VHF (Rules in July issue)
21 August	DF Qualifying Event Slade (Birmingham)
21 August	10GHz Cumulative (Rules in May issue)
3-4 September	SSB FD (Rules in April issue)
3-4 September	144MHz Open (trophy) and SWL (Rules in June issue)
18 September	DF Final South Manchester
18 September	10GHz Cumulative (Rules in May issue)
1-2 October	UHF (432MHz-2·3GHz)
8-9 October	21/28MHz (Rules in June issue)
15-16 October	7MHz Phone (Rules in June issue)
23 October	70MHz Fixed
October–November	432MHz Cumulative
5-6 November	7MHz CW (Rules in June/July issue)
5-6 November	144MHz CW
12-13 November	2nd 1·8MHz
4 December	144MHz Fixed

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The closing date for each issue is the 1st 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 advertisments, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

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FOR SALE

Solartron CD1220 scope, dc-24MHz, with some spare valves, trolley and manual, very good cond, buyer collects, £80 ono. G8JMP, QTHR. Tel Brookwood 3607.

Hygain 14AVQ trap vertical, with LC80Q loading coil, set of portable radials, covers 80-10m, with manual and charts, used few days only, buyer collects, £36. G3RYI, QTHR. Tel Wilmslow 24574 after 7pm.

2200GX, mint cond, fitted S20-S23, R4, R5, all accessories inc nicads, £125. 9R-59DS rx, vgc, plus matching spkr, stabilizer and calibrator fitted, £45 ono. G8LZB. Tel Matlock 4395 after 6pm.

IC22A, 10ch, toneburst, accessories, £130. BC221M, stabilized mains psu, recalibrated 1964 by RAF, charts, £20. 27m UR57 coax, 75Ω ½in dia, £3. Autotransformer, 220/110V 1A, £2. Post extra. G8LRE, QTHR. Tel 01-330 4721 Saturdays 0900-1800.

Acos SLM3 sound level meter, with calibrator, conforms to BS3489, BS3539, and IEC123, range 50dBa to 120dBA, mint, £55. KW Vanguard tx, 1·8 to 30MHz, rough but working, £10. Mosley TD3JR trap dipole, new, unused kit, 14, 21, 28 MHz, £16. Prefer buyers inspect and collect. *Wanted:* Eddystone S640. Burgis, 11 Morningside Avenue, Portchester, Fareham, Hants.

10GHz waveguides, four port switches, £4 each. QQV06-40A, £2. Camera video board, inc rf mod, £3. 10GHz klystron, 16mW o/p, £2. D13/47 gh oscilloscope tube, £4. Monoscope tube, £5. G8CQE, QTHR. Tel 01-656 5285.

KW2000A tx/rx, mains psu, mint cond, £180. G3RCU, QTHR. Tel 09367 4117 evenings.

KW E-Zee Match atu, £15. KW Match 75Ω swr meter, £5. Barry Lyons, 2 Lorne Street, Helensburgh, Dunbartonshire, Scotland. Tel 0436 71581.

FTDX401, SP401, YD844, manual, exc cond, £260. BC221, charts, mains psu, £18. HQ1 minibeam, £40. AR40 rotator, £35. Buyers collect or carr extra. G3XHC, Seale Arms, Dartmouth, Devon. Tel Dartmouth 2719.

Codar CR70, modified but gain low, wkg, £10. Hi-band Cambridge rx, spares only, £5. R1155 for spares, inc coilpack and main capacitor, £3. Official R1155 handbook, £3. J. Morris, 29 Holly Hill, Winchmore Hill, London N21. Tel 01-360 6438.

Heath GR78 rx, fitted Burns fm detector, works well, £60 ono. G3ZYL, QTHR. Tel Bracknell 22169.

Liner 2, 144·1-144·33, mic, mobile mount, manual, psu, £125. IC22A, R3, R4, R6, R7, RR7, S0, S20-S23, preamp, mic, mobile mount, manual, £140. Trio VOX3 for TS700, £12. G3TCG, QTHR. Tel Fairseat 822043.

TR2200G, S20, S22, S24, R3, R7 fitted, complete with nicads, case, charger, 10W VB2200GX pa, unused. Exchange for IC210 and mic. Hoddy, 87 Mayfield Rd, Derker, Oldham, Lancs.

IC240, £150. IC201, £275. GM4DHJ, QTHR. Tel 041-889 9010.

FR101D, fitted bc bands, vhf converters and fm, matching FL101 tx, £620 the pair. IC22A vhf mobile, fitted 12ch, £135. All in mint cond. G3TEU, 3 Yewtree Drive, Hull. Tel 0482 561116 after 6pm.

Cambridge U10B, uhf fm on RB2/SU8, £30. Pye Bantam high band, fm, on R5, £40. QM70 2m solid state transverter and 10W linear, £48. Pair of Pocketphones on RB2, £30. G3NPZ, QTHR. Tel Tichfield 43894.

Eddystone 940 gc rx, vgc, £90. FT200 plus FP200, as new, £200. Shack clearance, inc converters, components, sae for list. *Wanted:* Barlow Wadley XCR30 mk2. G4AWL, QTHR. Tel Cosham 79153.

Off-air tunable vhf/uhf tv rx, video and audio outputs, £25. 4CX250B, £2 each post paid. Panoramic rx, 210-420MHz, mains, large, £40. Telequipment scope, 6MHz, old, £15. Adamson, Woodend, Victoria Road, Kingsdown, Deal, Kent. Tel Deal (03045) 3788.

Trio TS510 tx/rx. Vanguards and Cambridges, hi-band and lo-band. Pair Pye base stations in cabinet, 2m and 4m. Few transformers, variacs. Any reasonable offers plus carr. G3HVI, QTHR. Tel Blythe Bridge 3349.

Advance OS2100 35MHz scope, main frame in wkg cond, part built timebase and blank Y plug-in, handbook, miscellaneous parts and data, £40. Homebuilt solid state mobile tx/rx, with tunable rx, 2m a.m., £25. G8ALQ. Tel Bedford 768543.

Jaybeam, 2m 5xy, unused, £10 plus carr. HSC morse records 50p plus carr. G4CMU. Tel Burgh Heath 54497.

"QST" 42 years, 1933-75, only offers for lot considered, buyer must collect. Electro-Voice 729 SRD Hi-Z mic hand and stand, ptt, £8.50. G2AK, QTHR. Tel Aldridge 52518.

Crystals: new, surplus to requirements, all HC6U. 0·005% tolerance, suit Pye Cambridge, Vanguard, Westminster etc. 8,033·33 (144·6MHz), 8,055·56 (145·0MHz) for tx; 44·76667 (145·0MHz), 44·93333 (145.5MHz), 45·03333 (145·8MHz) for rx, also 12·7000MHz, £1.50 each. GM3OFT, QTHR. Tel 041-946 0441 evenings.

Belcom linear LA106, with fan, unused, £140. Eddystone 730/4, top cond, with Hamgear preselector and spkr in matching cabinet, £100. G8IRU, QTHR. Tel 044-284 3474.

FT101E, as new and with guarantee until March 1979, nearest offer to £390 will secure. Datong FL1 frequency agile audio filter, mint and little used, £37. G8WS, QTHR. Tel Maidenhead 23239.

Yaesu FRDX400 with ssb, cw, a.m. and fm filters, fm detector, 2m and 4m converters, exc cond, maker's packaging, delivered 50 miles, £170. G3PDL. Tel 06527 335 (South Humberside).

Cooling fan for FT101, £7. G3NMZ, QTHR. Tel Luton (0582) 591749.

Yaesu FRSDX400 rx, all de-luxe options fitted, inc 2m, 4m, four mech filters, mint cond, hardly used, carton, manual, £180 ono. Van Hoffelen, 89 Stockshill Road, Scunthorpe. Tel 4760.

Pye 4m a.m. base tx, on 70·26 with QQV06-40 pa, £20. Microwave Modules 4m converter, 18MHz i.f., £10. Assorted 3cm hardware, state wants. *Wanted:* Eddystone Bug Key, any cond. Pocketphones for SU8. G3KSU, QTHR. Tel Ryde 65551.

Power transistors, vhf, uhf, brand new, full spec: BLY33, BSX61, PT31961, PT31981, 50p each; BFW98G, BLY36, BLY53A, SRF1125, PT2125D, PT2125E, PT3536, PT3537, PT4176C, PT4532, PT4533, PT31962, 2N5589, 2SC703, £1 each; PT4176D, PT31963, PT31983, £1.50 each. Prank, 7 Mill Lane, Shapwick, nr Bridgwater, Somerset.

A/C tx, pair 4X150, 250W, xtal con or for linear circuit, new cond, £20. X-band test set 35/AP, £10. A/C rx xtal con 2MHz-18MHz, £10. G3IUL, QTHR. Tel 01-890 7091.

4m boot Cambridge, £25. Low-band base station, £20. High-band AM10B, £20. 2m fm base tx, £25. Marconi vhf sig gen, type 41, £15. Philips hf VV GM6014, £25. *Which* magazine with *Money, Motoring* sections, '68-'76. £7. Laycock, 47 Treesmill Drive, Maidenhead, Berks.

Versatower, 120ft, galvanized stainless steel, hoisting ropes, two winches, current cost over £900, gift, £550 cif Liverpool. 65 *Bulletins* and *Rad Coms*, 1963-72, £4. 51 *Rad Coms*, 1973-7, £3.50. Post free. GD3TIU, QTHR. Tel Marown (0624) 85442.

FL400, £165. FRDX400, £1.75. QM70 70cm transverter, £65. Pair PF1 on RB2, £30. Lo- and hi-band fm Cambridge, £35 each. Sony radio cassette recorder, £65. SP600, £95. Kodak Retina 11, 35mm. £40. Yashica half-frame, £25. Garrard 35SB, mag pu, £45. Pye PTV, £45. 10GHz waveguide, all types. 10MHz scope, £125. G8HVO, QTHR. Tel Fareham 82208.

Yaesu line-up, mint cond, original packing: FT101B, cw filter; FL2100B; FV101B; YO100; Holdings clipper; £750 or will separate. Sale to finance FT301. Would deliver 50 miles, over—carr at cost. G4CRW, QTHR. Tel 0753 42301.

Yaesu FR50B, £70. Homebrew 4-band ssb exciter, £40. 180W linear, matches above, £40. 14AVQ, £30. TX/RX psu, £10. All in wkg order, buyer inspects and collects. Other accessories. Books. Parts. PW Easybuild organ boards. Some sstv vhf parts. G4DFP, QTHR.

FL2000B linear, handbook, boxed, mint cond, £200. Europa B, 2m, CPS10 psu and all leads, as new, £100. *Wanted:* TS700G. G3GHB, QTHR. Tel Inkberrow 792582 after 6.30pm or weekends.

Precision 300Ω switched audio attenuators, £2.50. HRO slow-motion dial, calibrated 6-9MHz, £1.50. Meters: 1mA, 2½in dia, £1; 2mA, 2½in dia, calibrated 300/600V, 75p. High quality vhf swr element, BNC sockets, Schottky diodes, £2.50. Deac nicad, 150mAh, new, £1.50. G8KDL. Tel 01-203 3138 evenings.

VHF sig gen, £3. R1475, needs attention, £4. 12in monitor, £6. 9in monitor, transistorized, £14. 4CX250 bases, £5. 8mm cine camera, zoom, faulty rachet, £10. Mohican, £25. Calculator, 12 large Nixies, £10. 4 × 12 telephone switchboard, modern type, £10. Tony, tel 452 6724.

Xtals for standards and ladder filter experiments: 5·000MHz HC6U, £1 each; 8·95MHz HC18U, £1 each; four or more 75p each, 10 or more 60p each. Richard Bowell, 16 Margarite Way, Wickford, Essex.

Top-band mobile tx/rx, as my *SWM* article Nov/Dec 1969, with transistor psu, £20. Mercury vapour rectifiers: five RGI-240A (GU-50), £1 each; two 866, 75p each; four high vacuum 1616, 50p each. Post extra. G3EGC, QTHR. Tel 0204 51502.

Heathkit HW7 QRP tx/rx, manual, wkg, £40. G4EYV, QTHR. Tel 01-455 1652.

Callbuoy 14A distress radiotelephone, recently overhauled by manufacturer, £60. G3VGO, QTHR.

Liner 2, perfect, £110 ono. Arac 102 2/10m rx, vfo, ssb/a.m./cw/fm, as new, £80 ono. Scott. Tel Holsworthy (0409) 253550 office hours.

Osker Block rf power meter, £18. TTC model C3005 swr and relative-power meter, £5. Both exc cond. G3SJH. Tel 021-472 8577.

KW1000 linear, as new, £175 ono. Lafayette HA350 rx, perfect, £75 ono. Pye Continental Domestic rx, vhf/lw/mw/sw, exc cond, £50. Coldwell, 120 Highcross Rd, Poulton-le Fylde, Lancs FY6 8BX. Tel 884817.

Liner 2, exc cond, comp with all accessories and preamp, £120. G8IBO, QTHR. Tel 04868 21963.

Trio 9R59DS gen cov communication rx, 550kHz-30MHz, vgc, voltage stabilizer, built-in xtal marker, circuit, manual, £35 ono. GM4EXL. Tel. Penicuik (0968) 72417.

Spacemark sstv monitor, needs attention, cost £80, £25 or exchange for gen cov rx. BRS18612, 19 Hyde Road, Kenilworth, Warks. Tel 54609.

Trio TR2200G, unused, in original packing, selling because going home-brew, £85 ono. G8ICK, 4 Campbell Drive, Swanton Morley, Dereham, Norfolk NR20 4JY.

Trio TR7200G, 7ch plus R6, little used, comp in original packing, with 5⅛8 mobile whip, £135. GM3PFU, QTHR. Tel 041-942 7606.

Collins 75A4 rx, 3·5KHz, 500Hz filters, exc cond, £235. KW204 tx, mint, £185. 12AVQ, used cond, £25. Diamond DP-KB103 80/40m vertical, new cond, £30. Buyers collect or carr extra. G3UEN, QTHR. Tel 0262 850258.

IC21A, mains/battery, 22ch, 10 fitted, toneburst, mic, accessories, handbook, immac cond, 3 months use, no mods, as new, original packing, £150. Now running FDK Multi 2700. G8MGV. Tel 01-590 8791 any time.

Yaesu FV401 vfo, suitable for all FTDX models. *Wanted:* gdo, battery operated, TE15, Eddystone, Grundig, why? Heath xtals: 22·895, 29·895, and 36·895. GM3KCY, QTHR.

Heathkit SB401 tx, SB301 rx, ssb, 180W p.e.p., leads and spkr, wkg order but needs attention, few minor faults, £120 ono. G4ENG, QTHR.

Ken KP202 fm 2m handheld tx/rx, vgc, xtalled for S0, S20, S22, R5, R6, R7, xtal toneburst on R channels, with stubby antenna, quarter-wave whip and handbook, £80 ono. Riddoch, 15 Glebe Place, Kinghorn, Fife KY3 9XP.

Trio TR2200, S20, 21, 22, R6, 7, toneburst, homebrew 18W amp using RCA module, £85. KW 75Ω 100W load, £8. Burgess 90A arc welder, £25. QQV06-40 2m anode lines, silver plated, £2. G4BWW, QTHR, Tel Southport 67397.

Storno Viscount, exc cond. Two Pye Bantams, good cond. All low-band fm, suitable 70MHz, no xtals. Exchange for oscilloscope or antenna rotor with cash adjustment, or best cash offer. GM3TBV. Tel 0250 2520.

TV502 2m transverter for TS520, fitted MM preamp plus extra 145-146·7MHz xtal, manual, cables etc, £100. G4DBE. Tel 051-334 9629.

4-400A with base, £12. 4X-150As, £2 each. QY3-125, £5. 5FP7 sstv tubes, £7. DK1PN ssb board, £10 or £30 with filter and xtals. BNC uhf, 1 pole, 6-way, antenna c/o relay, £5. G8FPT, QTHR. Tel 01-504 4942.

PMB 14/2m Parabeam, £12. TF144G sig gen, up to 27MHz, £12. APT 502 psu, 0-500V, 250mA, £10. 38·666MHz xtal, £1.50. G8KNT, Tel 061-439 5050 ext 573 daytime.

FT101, fan, 160m, manual, little used, £275. G4EJV, 4 Kithurst Close, Worthing. Tel 0903 41192.

9R-59D rx, plus spkr, £50. Storno Viscount 2m tx/rx, ¼ whip, £60. TV tennis game, £30. Codar PR40 preselector, £10. Garex 144-28 converter, £10. All prices ono. *Wanted:* FRG7 rx. TR2200GX tx/rx. Tel 01-455 0953.

Trio JR310, vgc, topband, £60. Microwave Modules converters: 144/28, £15; 432/144, £17. Varactor tripler, as *Rad Com Handbook*, £9. PF1 tx/rx, handbook, offers. G4FUO or G8INX, QTHR. Tel 0234 870775 (Bedford area).

Eddystone 770R vhf rx, £85 ono. Marconi HR22 ssb rx, 2-32MHz, with separate psu, £70 ono. Buyers inspect and collect. Manuals available for both units. G4DQB, QTHR.

Exchange Storno CQM13C 2m tx/rx, mic, control box, mosfet preamp, power lead, for 2m portable or motorbike mobile. Mark, tel Little Clacton 712.

JR310 amateur bands only rx, fitted extra 10AZ mech filter, mint cond, approx 20 hours use, original packing and manual, £90. Not wanted as now going on 2m. A. Murray, 33 Clarence Street, Kidderminster, Worcs DY10 1RS.

Trio TS515, PS515, cw filter, immac cond, £265. Trio 7200G, 12ch, automatic toneburst, £140. Barry Simpson, 5 Guilden Green, Guilden Sutton, Chester. Tel 0244 300897.

Pye Pocketphone 70 (PF2FMB) manufactured for 2m, 2W out, 3ch, fitted R6/S20, ±7·5kHz filter, with mic/spkr, spare battery, leather case and shoulder strap, antenna, xtal toneburst and 50s led, service sheets, £90 plus carr. G8AVR. Tel Temple Combe (Somerset) 587 evenings.

Pye uhf base station, on 70cm, no xtals, £20. BTH 1924 Bijoy crystal set, wkg, exc cond, sensible offers. Morris, tel Deeside (0244) 818252.

Transformers: 800V 0·5A, £3; 2,500V 0·5A, £8. Mains voltage stabilizer, 25A, £15 plus carr. 400V 300mA inverter, £6. 46-el Multibeam for 70cm, £8. G8CXT, c/o 2 Blenheim Ave, Stony Stratford, Milton Keynes.

Clearance offer: six xtals HC6U, three for AM10 8MHz tx, 44MHz rx, S0, S20, S22, new, £1.25 each. NR56 tuneable rx plus two xtals, £25. G8BWI, QTHR.

Atlas 215X, bench console and de luxe mobile mount, all units in mint cond and still under maker's warranty, £530 ono. G3MSL, QTHR. Tel Fleet 21446 after 6pm weekdays, anytime weekends.

HRO coils, gen cov and bandspread. New boxed valves for B40 rx and AR8516L rx, sae for list. Phasing harness PMH/2ML, new £6. BC221 stabilized psu, £9. *Wanted:* 51J4 and 75S3. Mechanical filters 455 and 500kHz, bandwidth 2·1 and 3·1kHz. G3GUU, QTHR.

Sommerkamp FT250, psu, black, vgc, no mods, manual, £230. 10-40m vertical antenna, E-Zee Match, KW dummy antenna, coaxial switch. GM4BQA, QTHR. Tel Aberdeen (0244) 733475.

Telequipment scopes: D51 dual-beam 6MHz, 10MΩ ÷ 10 probe, £100; Serviscope Minor, £20. Jaybeam, 2M/8XY, £8. STC 5800R relays, two-pole, two-way bases, 10p each. Nixie tubes, ZM1080, side viewing type, new, plus connections, 20p each. All above ono, G8FFI, QTHR. Tel Cosham 86184.

FT201 tx/rx, 80-10m, ac/dc PSUs, £275. G3RKH, 19 Ridgeway, Southwell, Notts. Tel 0636 812552.

Heathkit HW100, HP23B psu, £150. Free to whoever will collect: 1131 tx with handbook. 522 rx mod 2m. GEC aircraft vhf tx DET19s. G3JIZ, QTHR. Tel 096 279263.

Panda 150W tx, cw, a.m., £25. Heavy duty rotary relays, 12V, double pole contacts, 2 by 2 by 2½in, £1. Mains cable, 50m, £4. Various under-floor heating cables. Air compressor pump, single cylinder, unused, £20. Tel Kirkburton (048483) 2744.

Pye AM25T 4m Vanguard, home made control box with spkr, no mic, £25. ZVC ssb pcb, with XF9B filter, xtals, assembled, complete, £40. G3VSJ, QTHR. Tel Hodd (09924) 68052 after 6pm or weekends.

18AVT, good cond, with new 180m trap. KW103 power/swr meter, brand new, mint, never been used, 2 months old. KW E-Zee Match in same cond. First reasonable offer secures. Multi-11, brand new, mint, £175, no offers. G4ELH, QTHR.

BAY 96, new, unused, £2.50 each, £2 each for 10 or more. *Wanted:* Sweep generator, approx 150kHz to 15MHz with approx 10kHz deviation for filter passband displays, prefer with provision for ext marker injection. G3RNY, QTHR. Tel 061-477 0315 after 6pm.

Datong FL1 frequency agile filter, mint, £40 post paid. G3RDG, QTHR. Tel 01-455 8831.

Liner 2 fitted with 2m rx preamp and 10m tx preamp, for use with QM70 70cm transverter, QM70 28/432 transverter, 10W output, audio speech processor, plugs, cables, manuals etc as supplied, buyer collects, £170 ono complete. G4FAZ, QTHR. Tel 03057 71053 evenings.

Microwave Modules 432/144 transverter, as new, £130. FT221 all-mode 2m tx/rx, exc cond, £275. Heathkit IM1212 digital multimeter, £40. CI-5 oscilloscope, general purpose pulse type, £40. G8IRJ, QTHR. Tel Steyning 814089.

Pye filter, tuneable 132-174 MHz, £7.50. MD108 mixers, unused, £5.50 each, three for £13.50. Heavy-duty low-loss 75Ω coax, 55ft, £3. Microwave mixer diodes CV2154, 75p each. Mains transformer 0-10, 0-10V at 5A outputs, £3. Postage extra. Prefer buyer collects cable. G8CHE, QTHR. Tel 01-953 2030 9am-5pm.

80m cw HC6U xtals, six different frequencies, 75p each. *SWMs,* 1954 to date, some complete vols, sae list, offers. KW Valiant, 160-10m, PSUs, £20 ono. AM10D single channel, fm, 145·5, sensitive, £30. G4BWP, QTHR.

2m equipment: Pye Vanguard AM25T, modified fm, toneburst, less xtals, £20; Pye F27AM base station, complete, £25; Cossor CC3 low band, hand portable, £10; 5-el 2m quad, £5. G3RHR, QTHR. Tel Harrogate 871365.

FT221, £309. Kokusai MF45510K mechanical filters with sideband xtal, £11. Xtals: 38·666MHz HC18U, £1.90; 34·0MHz HC6U, £1; 1,000kHz (BC221), £1.75; 3·5MHz FT243, 95p; 455kHz (AR88), 95p; 465kHz FT243, 95p; 40·518MHz (FT200/10A), 80p; 6GJ5, £2. All new and plus postage. G2HCV, QTHR. Tel 01-954 2960.

Pye Cambridge, 2m fm/a.m., 6ch fitted, good wkg cond, £50. Pye base 2m fm, with vxo, 25W, £25. G4FPO, 21 Queensway, Pontefract, W Yorks. Tel 704134.

HRO-MX with 11 coils, psu, manual, and spare valves, £20 ono. Pye 2m base station, £15 ono. Mullard E805 scope with spare tube, £15 ono. *Wanted:* KW107 or atu only. G8KRS, QTHR. Tel Luton 27567.

Rtty Creed 7B, 8B, 54, 75, plus covers, auto-transmitters, perforators, reperforators, all very clean and wkg, offers. Pye 4m base station, vxo control, 3-20A final, £8 ono. G4EVZ, QTHR. Tel Romford (Essex) 45733.

YF90F ssb filter, with carrier xtals, unused, £12. 2m converter, 28-30MHz i.f., mosfet front-end, homebrew, £8. G3ZVC tx/rx board, YF90F filter, wkg on 9MHz, £40. Eddystone E898 dial unit, unmarked, £10. G4AZA, QTHR.

FL2100B linear amplifier, 1·2kW p.e.p., few hours use only, £250. Burns TC101 wavemeter, £25. G4DXG, QTHR. Tel 01-679 3215 evenings and weekends.

Liner 2, exc original cond, mic, manual etc, £110. KW E-Zee Match, perfect, £22. KW103 swr and power meter, exc, £11. E-Zee Match and meter for £30. G4GDM (ex-G8LPE), QTHR. Tel 051-334 1819.

BC221, internal power pack, original calibrator charts, two spare sets valves, £20 carr extra. *Wanted:* Pair 572B or equivalent in good cond. G5CP, QTHR. Tel 024-689 253.

KW2000E, exc cond, manual, £270 ono. Bantex magnetic antenna mount, less coax, £2.50. New pair xtals, R7, for C146A, £3. Heathkit RG1 gen cov rx, vgc, £25 ono. G8EPE, G4FJB, QTHR. Tel 021-705 7158.

Trio 7010, exc cond, with unused mobile mount, extra xtals, £145 plus carr. Storno 50W 2m fm base station, aligned, nearly-new cond, with handbook, £35 plus carr. 144·6MHz xtals for Storno, £3. Inspections welcome. G8HCI, QTHR. Tel Bournemouth 763899.

Exchange TR7200G, fitted S0, S18-S24, R3-R7, modified auto toneburst and rit, one year old, complete, vgc, in original packing, for TR7010 or similar 2m ssb rig. G3OUT, QTHR. Tel Leicester 302480.

Transformer, 1,720V 550mA, £12, buyer collects. Transistor, CM40-28, 40W o/p for 6W i/p, 28V on 70cm, data, £15. *Wanted:* Pye fm Westminster 10ch oscillator board. Plessey PR155 vfo module or similar permeability tuned vfo, approx 4-6MHz. Bird Thruline. G4AHT, QTHR. Tel 01-857 7810.

Eddystone 730/4. Quad 1 amplifier. Hartley Turner spkr. Goldring 88 turnable with Decca FFSS cartridge and arm. Offers please. G8ATA, QTHR. Tel 04488 513.

Philips RR263 radio recorder, 7 months old, fm/mw/lw, £35. Alan, 7 Horsley Road, Rochester, Kent. Tel Medway 48932 after 6pm.

FT2FB with preamp, S0, S8, S20, S21, S22, S23, S24, S32, R5, R6 and R7. £120. QM70 2FM70, 2m to 70cm, fm transmit/receive converter, never used, £47. G8BXJ, QTHR. Tel Bristol 695839.

Trio TS520 tx/rx, still under guarantee, £380. (Now have TS820). G4BU, QTHR. Tel 0522 28744 7 to 7.30pm.

FR50B and FL50B in brand-new condition, ideal medium-power hf station, complete with original packing £150. Grundig 431C stereo cassette deck, mains/battery, in perfect cond, £55. Tel Ipswich (0473) 310442 evenings or weekends.

Commercial 2m pa, 1W in, 10W out, 12V, boxed, with relay and connectors, £12. 5FP7A equivalent with suitable deflection assembly, £7. R4T xtal for TR2200G, unused, £2. All plus carr. Robinson via G8JMO, QTHR.

Tri-band hf quad, glass fibre spiders, 8ft boom, £22. G3UKV, 9 Sleapford, Long Lane, Telford, Salop.

2m a.m. tx CTX2, modified front-end, six switched xtals, psu, external modulator psu, 2m converter T. Withers, 28MHz i.f., psu, 6-el Yagi, £15 the lot. Minimitter atu, £5. Buyers collect. G2HKA, QTHR.

Hy-Gain 103BA and 153BA "on the air" indicator. Caslon 601 24 hour clock. Comdel speech processor. Various mics cheap. Master Mobile. Micro Z-match. Master Flex-R. Available soon: BXI 60ft tilt-over tower, winches, ground post, cables, good cond. Offers. Mobile antennas (USA) and coils, cost £200, sae list, £100. Hy-Gain 400 rotator and control, £85. Ham-M indicator meter, new. Seco antenna test meter, as new, £10. Three Wilson beams, 10, 15, 20, offers. Electro Voice 600D mobile mic, £15. G3DAM, QTHR.

Samson ETM2, el-bug, new cond, £8.50. G2YS, QTHR. Tel Rickmansworth 76864.

SRC146A, 2m, 2W, portable with ¼ and ½-wave whip, fitted with S0, S20, S21, S22, R5, 10 nicads, leather case, charger, £80 ono. G3XZR, QTHR.

Hammarlund SP600/JX rx, superb cond and performance, in new Imhoff cabinet, £140 ono. G4EOJ, QTHR. Tel Felixstowe 6667.

Trio TR2200GX, fitted S0, S20, S21, S22, R3, R4, R5, R6, R7, nicads, helical, charger, case, offers. G3ZSQ, tel Brighton (0273) 509771.

Frequency shift keying unit, model FSK2, soiled by long storage but believed complete, manual included, £5 to clear. Army field telephone switchboard, UC-10 line, less cords, £3. Three WW2 German o/p valves, type RL12P35 Telefunken. Buyers collect from Meopham, Kent or Fleet, Hants by arrangement. G3UCT, Tel Fleet (02514) 6998.

Collectors item: RAF aircraft rx type R1082, circa 1935-41, 24 coils, wkg, offers. Pye Cambridge, a.m. 4m, xtalled, no accessories, £12. *Wanted:* American valve t/r switch for hf cw. Unused Electroniques QP166 front end. G3JFC, QTHR. Tel Crayford 522489.

Trio TR2200GX, with small number of mods, £100. MM432/144 transverter, £100. 432/144 Varactor tripler, £12. 432/144 converter, in box, with mains psu, £18. Prices do not include postage. GW8KSF, QTHR.

TS510 tx/rx, recently serviced, £175. Eddystone 750 rx, matching spkr, £40. Both vgc. R1155 rx, faulty psu, £6. Vanguard AM25B, with control box, cable, mic, was on 2, been cannibalized but ideal for spares, £7. Carr extra. GM4DQK QTHR. Tel 031-333 3611.

Pair Pye Pocketphones, xtal on RB6, with batteries. MM type 2m converter, 28-30. Varian 222A. New unused clock chips: basic (4/6 digit), mini 7-segment display: clock/calendar, sub-min xtal, cmos for battery operation, six 0·3in seven segment LEDs; clock/alarm/snooze/etc. interface, display, pcb, transformer. New, boxed valves: QQV06-40A (3); QQV03-20A (3); QQV3-10 (3). Two sets Pocketphone batteries, two 9V, two 18V. Pye 70cm cavity filter, SEI 10·7 filters, ±3·75, 17·0kHz. Best offer for the lot secures. 15 Chapel Fields, Swinford, Leics LE17 6BS.

Fine QTH, 5 miles Carlisle (A69), 4 beds, dining room, kitchen, large lounge, hall, garage/shack, gardens, access to Lakes and Scotland, offers around £13,550. G8IHU, QTHR or Tiffen, 1 The Crescent, Carlisle.

KW500 linear, £35. Vanguard AM25B, £12. 5el 2m quad, homebrew, £4. Handbooks for Heathgear SW717, HR10B, GR78, HP23, all 50p plus p/p. High-Z mic, DM501, complete, £4.50. GI3YMT, QTHR. Tel Belfast 644688.

FT200B and FP200B, latest black model, hardly used, looks as new, perfect, all 10m xtals, manual, buyer collects please, £270. G3KZU, QTHR.

Mullard vidicon, 1in, type XQ1043, with data. Garrard Transcription chassis AP76. Both above unused in original manufacturers'

packing. VCR138A crt, with screen, base, fixtures. Offers on all above. Cooper, 53 Jepps Avenue, Barton, Preston, Lancs PR3 5AS. Tel 0772 862493.

FT101E, mint, rf processor, 350Hz cw filter, £320. KP202, 2m, handheld, 6ch toneburst, nicads, charger, case, mint, £100. Collins R390/URR, 0·5-32MHz, digital, all filters, manual, £200. R209 portable rx, 1·0 to 20MHz, 12V dc, £12. G3RCE, QTHR.

Digital master organ oscillator, £10. SAJ110 ic dividers set, £15. Swell pedal, £2. 30 pedal contacts, mounted, £10. Long spring delay, £5. Reverb driver, £4. Other organ parts. Yagi, 2m, 14-el, 50/70Ω, £15. Buck. Tel Hungerford (048 86) 3396.

Trio TS700, late model, vgc, fitted reverse repeater facility and 100kHz calibrator, £290 ono. A. J. McCalden, "Grey Squirrels", Leatherhead Road, Oxshott, Surrey. Tel Oxshott 2445 after 7pm or weekends.

Pye Ranger 2002V, xtalled 70·26 and 70·375, plus whip and feeder, used daily, £9.50. BC221, with charts, internal stabilized psu, £18.50. Wide-angle projector, £8. All carr extra. G3UOV, QTHR. Tel Pound Hill 3075.

Drake C-line, TR4C, 34-PNB AC4, RV-4C, MN2000, all brand new, boxed, offer for lot. L4B, exc, £475. Johnson 2kW Matchbox, a real atu, mint, £125. Hy-Gain TH6DXX, new, boxed, £160. EC10, mint, £65. 9R-59DS, exc, £45. Tel Bournemouth 50400.

Exc vhf QTH Derbyshire: two bedroomed, detached, bungalow with full gas central heating, located in small village 10 miles Derby, five miles Ashbourne, over 700ft asl, commanding panoramic views over surrounding countryside, £12,000. Mobile interference suppressors: vhf plug covers, £1.30; most other suppressors available, sae for list. Marconi TF390F sig gen, £10. Linear ht transformer, 3kV at 0·5A, £12. All plus carr. Haseldine, 15 Wheeldon Way, Hulland Ward, Derbyshire. Tel Hulland Ward 530.

Pair Pye PFI Pocketphones, wkg on RB2, comp with rechargeable batteries, tx modified to give 300mW output, vgc, exchange for vhf 2m portable tx/rx, wkg on 2m with batteries. G4ANW QTHR.

B40 rx, 0·6-30MHz, £20. AR88D, £35. *Wanted:* KW Vespa or Viceroy and commercial 2m converter with 4-6MHz i.f. G4FUY, tel Reading 733257.

Collins 51J-4 gen cov rx, 30 waveband, 1kHz readout, 50kHz-30·5MHz, 3 mech filters, handbook, £225. Tel Coatbridge 23153.

Trio TS500 tx/rx, comp, 80-10m, in box, £150 ono. Hallicrafters S27 vhf rx, £30 or exchange for 2m linear amplifier. Copies of 62 set manual available. G8LVM, QTHR. Tel Loughborough (0509) 67309 evenings.

Liner 2 with fitted preamp, £110. G8FXO, QTHR. Tel 061-928 0530.

IRE Journals: 1945-57, bound volumes; 1958-70, unbound; offers for complete set. Waterproof gadget bags/haversacks, approx 12in cubes, ideal for field days, £5.50 plus carr. Sylvania 5CPT 5in CRT, new, £10 plus carr. SAE for details above items. Any other wants? G3ZDO, QTHR.

Lafayette HE30 rx, wkg but tatty. £9. Hanimex Standard-8 projector, vgc, £8. 10kHz, 100kHz B7G glass xtals, one of each, £1 each. Parmeko oil-filled transformer, 450-0-450V 250mA, plus lt windings, £1.75. Buyers collect. G8FHN, QTHR. Tel Medway 63365.

AM10D hi-band spares: all boards except rf, £1 each; coils; relays; transformers etc; sae for list. FM10MC 6-band oscillator/multiplier board, £1. AM25B 25kHz filter, £1. FT243 xtals, any 25kHz from 5,650 to 8,650, £1. All postage extra. G3LHA, QTHR. Tel Coventry 414333.

AR22 rotator and control unit, new unused, £35. TA33JR, £35. Sig gen, £8. FR100B and FL200B, as new, £240 the pair. Cowlgill motor and power pack. £15. G3IPM, QTHR.

Trio JR599CS, 160/10m plus 2m ssb fm, £150. Europa transverter, 28/144, 200W p.e.p., leads FT101, £70. *Wanted:* 2m linear amplifier, 200W p.e.p with power pack. G8MVN. Tel Newbury (0635) 41613 evenings.

ICs: MFC4000B ¼W audio amps, 35p; TBA120/SN76660 fm demodulators, 45p; 10p p&p please. *Wanted:* microcomputer parts: ttl, lsi, paper tape. Why? Limited funds but can collect Birmingham area. G8KGV, QTHR. Tel 021-705 2868 (evenings).

Pye Ranger working on 145MHz a.m., £10. G8AEV 2m converter mk2, i.f. 2-4MHz, £10. Homebrew 160m tx, a.m.-cw, vfo, £10. Buyer collects. *Wanted:* portable 2m fm tx, about 1W. I. K. Harling, 9 Barden Road, Eastbourne, East Sussex, BN22 7EF.

Westminster W2S fm, 30W, 10ch, boot, mint, boxed, never used mobile, all accessories, handbook, 144·48, 144·94, 145·00, 145·50, 145·80, R5, R7, £100. *Wanted:* Datong up-converter or 2m black box, swap above. G4BLJ, QTHR. Tel Brighton 0273 503980.

QM70 transverter 28/144 high power, £70. TA speech processor, £12. Sentinel 2m preamp, £3. *Wanted:* Circuit for transistor noise blanker. Capacitors for Z-match. G3RSJ, tel High Wycombe 446228.

UHF mobile power amp, 45W o/p for 10W i/p, rf sensing, remote switching, £50. Marconi rf power meter TF1152 10W or 25W fsd up to 500MHz, £35. Pye tv monitor 12in 625 line, £15. Tel 0223 66318.

A REMINDER

The flat rate for Members' Ads was increased to 75p for 40 words or less from 2 July 1977

WANTED

Morse key, Marconi Marine or Junkers type. G8MIG, QTHR. Tel Swanley 64486.

TS700G. TS520. TV502. TR7010. FT101E. FT221R. GDO. VHF wavemeter. SWR meter. G2NHO, QTHR. Tel 0202 708405.

Back volumes of *Radio and Television Servicing Manuals* by R. N. Wainwright. Double-beam oscilloscope, 15MHz or better. L. Metcalfe, 1 Park Avenue, Salterforth via Colne, Lancs. Tel. Barnoldswick 813433.

German WW2 military equipment and parts. *QST* March-October 1931 or complete year. *For sale:* pre-WW2 Eddystone components. Odd copies *QST*, 1951 and 1957. *SWMs*, late 50s. G5XB, QTHR. Tel 073-525 2195.

HF tx/rx or matched tx and rx. 50Ω dummy load. Base-loaded or trap vertical. Good-quality straight key. Wavemeter. GDO. Multimeter or why? G4GCD, ex-G8LHK, QTHR. Tel 01-432 3792 or 01-357 2716 daytime.

School club, G4FAF, with limited funds and less space for antenna needs KW107, E-Zee Match, or similar urgently, appearance immaterial but must be ok for 75Ω on 80-10m. All letters acknowledged. Backwell School, Near Bristol.

Creed 7E(B) teleprinter, wkg order, mains motor. Complete years *Bulletin*, *Rad Comm*, *QST*, or *73* mags. Small scope in wkg order. HF mini-beam. Kelman, 61 The Fairway, Oadby, Leicester. Tel 708585.

Ham Radio magazine, good price paid for complete years 1974-6 and 1977 issues to date. Can collect. G3WGN, QTHR. Tel Frodsham (0928) 31594.

Remote vfo for Swan 500C. Electroniques amateur band front-end, valve version. Furness, tel Aberdeen 323808 or leave your number at Aberdeen 53553.

QQZ03-20, YL1130 valves. RF section S27. Circuits for Cossor Commando ITT Starphone, S27, to borrow/buy. All letters answered. GM8MLH, Alt-na-Feadh, Dalmally, Argyll PA33 1AA. Tel 083 82 304.

Yaesu FP200 psu, grey finish, will accept black if no grey one offered within two weeks of publication of this advert. G3GNM, QTHR. Tel 01-907 3733.

CT436 oscilloscope manual, buy or borrow. Griffiths, 10 Church Street, Glentworth, Gainsborough, Lincs.

B2 tank coils L2 and L4. Any B2 parts for spares. B2 tx/rx in any cond for rebuild or break-up for spares. Ross Bradshaw, 4 Russet Grove, Scarborough, N Yorks.

CD436 oscilloscope plug-in mains transformer or dc power pack, pages 64-66 of manual, any other spares. GW2HCJ, QTHR.

Antenna tuning system, model ATS2 by TMC. Rustrak recorder. Antenna multi-distribution units. Waters coaxial switches. *For sale:* Sony TA5060 vertical fet amplifier, brand new, unregistered guarantee, £190. Fletcher, 62 Moorbridge Lane, Stapleford, Nottingham. Tel 0602 397446.

Service manuals for Pye Lynx and Super Lynx cameras, buy or borrow, your price paid. GM3FUU, QTHR. Tel 031-337 3441 daytime.

AR22 or 44 or similar rotator, complete for mast mounting. Tradipper TE15. 1,535kHz xtal. G3JMO, QTHR.

AR88 rx for school radio club. B. S. Wolfe, tel 09964 31539 (home), 0695 21331 (office).

Communication rx, hamband or gen cov. Multiband cw tx, must be good cond. Pair of 2A3 valves. Handbook or information on Collins R278/B rx and TCS12 tx. G3HVI, 46 Golborn Avenue, Meir Heath, Stoke-on-Trent, Staffs.

Hammarlund HX50 tx, preferably one for use as spares. G6RF, QTHR. Tel Liskeard (Cornwall) 45459.

Mechanical filter, Kokusai MF455-15K preferred, but other types with 3kHz bandwidth considered. G3OEI, QTHR.

Drake R4A or R4, top price paid. GI3OTV, QTHR. Tel Dublin (0001) 512436.

Roller coaster complete with rev counter. G3NEP, QTHR. Tel 0246 823347.

Circuit or manual of uhf heterodyne frequency meter type TS323/UR like BC221, buy or borrow for copying. Geof Page, 154 Chiltern Avenue, High Wycombe, Bucks. Tel High Wycombe 38736.

Tri-band 2-el quad, fibreglass spreaders, alloy spiders etc. Peter Jones, 13 Blenheim Close, Hereford. Tel 0432 57651.

500kHz xtal filter for B40 rx, ref L206, cat No AP106124, or, alternatively, complete i.f. assembly. G3YKB, QTHR.

Rigonda VL100 or similar 6in portable **tv,** purchase or exchange for Decca Gypsy 12in mains/battery portable in exc cond, faulty model considered. Cheap floor-standing enclosed 19in rack cabinet. Collection possible. G8IYK, QTHR.

CR100 or similar gen cov rx. G3GSZ, QTHR.

Army gen cov rx R209, preferably later model with i.f. output socket, must be in good wkg cond and unmodified. Ex-USA govt marine tx/rx BC669, preferably unmodified. G3UCT. Tel Fleet (02514) 6998.

"Radio Communication Handbook," 4th edn, in good cond. *RSGB Call Book,* 1976. G. Elliott, "Oatlands", Southend Rd, Howe Green, Chelmsford CM2 7TD.

For wireless museum: very old xtal and valve receivers; spark/valve transmitters; components; books, magazines; catalogues; valves; spkrs; rough sketch and price please. G3KPO, QTHR. Tel 098-386 2586.

Redifon ssb generator/demodulator, audio and i.f. modules for GR410 or GR410/T transceivers. Also handbook and components list for GR410/T to borrow or buy. Connectors for 6212a 12V psu. C. A. Crabb, 41 West Drive, Edgbaston, Birmingham B5 7RR. Tel 021-472 3845.

Manuals or information on Hallicrafters Skyrider Marine, Cossor 1071K scope and 92D, 93D CRTs, buy or pay for loan to copy. Tel Hoddesdon 66821.

CW tx, 80-10m, 150W, in wkg cond. G4EIC, 89 Histon Road, Cottenham, Cambs CB4 4UQ.

Heathkit HW32A ac or dc supply. *For sale:* Trio 9R59D, recently revalved, fitted spkr, £45. GW4DJW, Tel 035-287 877.

7094 valves. G3MCN, QTHR.

Hudson FM208, hi-band or 2m. GU3HKV, QTHR. Tel 0481 47278 6-7pm.

Compact cw tx, mains wkg, low-current keying, stable home-brew acceptable. T4XC, AC4. *For sale:* DX150B, solid state rx, 535kHz-30MHz, matching spkr, 12V dc, 240V ac, good cond, £60. Turvey, 2 Knowles Street, near Park, Wednesbury, W Midlands WS10 9HN.

JR310 or gen cov rx. Manual or circuit for Defense Electronics Inc, USA, vhf rx, model TMR-5A, or any plug-in i.f. or rf units for this rx. All letters answered. Wright, 249 Sandy Lane, Hindley, Wigan. Tel 0942 55948.

BC348, wkg or not wkg but reasonably complete, will pay your price plus packing and carr. G3LYU, QTHR. Tel Leicester 876459.

LF10 preselecter for HRO500. BRS36434, 97 Tong Rd, Little Lever, Bolton.

LG300, good specimens only considered. *For sale:* Pocketphone PF1 tx/rx, 433·2MHz with nicads, £25. Airey, 19 Horseman Drive, Copmanthorpe, York YO2 3SN.

Service manual for Pye FM10B Cambridge or FM10B Marine 12/24V. G3LWA, QTHR.

Redifon GR410 tx/rx (service type SRC14) for scrap, particularly plug-in ssb generator/demodulator unit type 6202A. G3UCT, tel Fleet (02514) 6998.

Early Eddystone components: baseboard valve and coil holders; plug-in coils. 10 stop band-set capacitor. 200μF slow-motion reaction capacitor. Eddystone 3Ω spkr in round diecast case. 'Twenties horn spkrs and parts, Telsen, Lewcos, Colvern. Send price list. Richardson, 2 Edna Rd, Maidstone, Kent.

Ezee-match. LPF, FV50C for FT75. Multi 2000. IC201. IC240. Multi 2. *Ham's Interpreter.* Recent *World Call Book.* Good Belcom, ssb or fm. RSGB *VHF/UHF Manual.* Audio compressor. Verrinder, Woolland, Blandford, Dorset.

Ham in Iraq needs tech assistance. Write via Henryk Kotowski, Box 6036, 16306 Spanga, Sweden.

One preamp 19 to 50MHz in good order. A. E. Insall, 12 Middlebrook Road, High Wycombe, Bucks, HP13 5NJ. Tel 29895.

MEMBERS' AD ORDER FORM

FOR SALE☐ WANTED☐ (Tick as appropriate)

- **See Members' Ads page for conditions of acceptance.**
- **Not more than 40 words, including name, address, etc.**
- **Do not forget 75p remittance plus wrapper.**
- **Please write in block capitals, or type.**
- **Use correct address**

Licensed members are asked to use their callsign and QTHR, meaning that their address in the current call book is correct. BRS and A members will, of course, have to provide their name and address.

I enclose cheque/PO for **75p** to cover the cost of this advertisement.

Signed .....

Date .....

William Munro (Invergordon) Limited

distributors for

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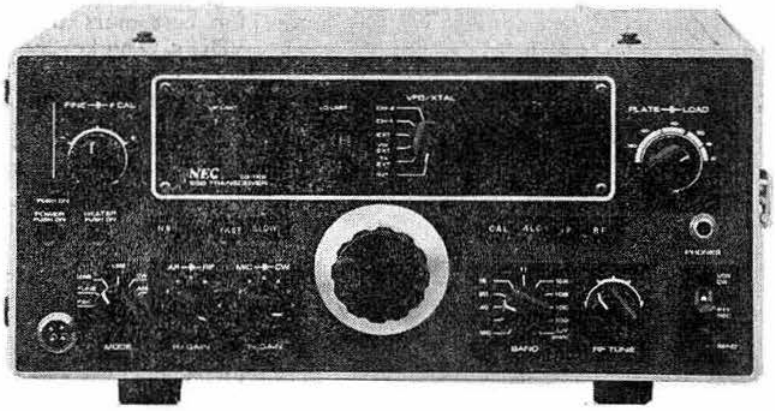
NEC  NEC

CQ110E Transceiver (Ex Stock) £645 plus VAT £80.63, Total £725.63

(Price includes Securicor Delivery)

Frequency Range	10m—15m—20m—40m—80m—160m and 11m and WWV 15MHz on receive only.
Mode	LSB—USB—CW—AM—FSK—FAX/SSTV
Power Requirements	100/110/117/200/220/234 Volts AC or 13.5 Volts DC
Input Power	280 watts PEP (240 watts on 28MHz)

Digital Readout—Separate Crystal Filters for each of LSB, USB, and CW. AC and DC power units are built in. Switched metering for "S" meter, Relative Output, Plate Current, and ALC for setting MIC Gain. The following accessories are supplied with the Transceiver-Microphone, DC Power Cable, AC Power Cable, 5 RCA Plugs, 2 Spare Fuses, 2 Jack Plugs, 2 Allen Keys and a 60 page instruction book. Built-in speaker with 3 watts output.
A hybrid design utilising the best features of valves and semiconductors is used to give a high performance. 7 Valves—49 Transistors—19 FETs—128 Diodes—25 ICs. The use of the RCA low noise beam deflection valve (7360) as receiver mixer gives the CQ110E high sensitivity combined with remarkable crossmodulation characteristics.

CQ 301 2KW Linear Amplifier—10 to 160m with built-in power supply and 2 EIMAC 3-500Z Valves

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Available soon CQ 201 External Digital VFO
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SUMMER HOLIDAY Please note our Service and Sales Departments will be closed from 13th to 27th August for annual holidays, but all queries will be dealt with as far as possible by our office staff.

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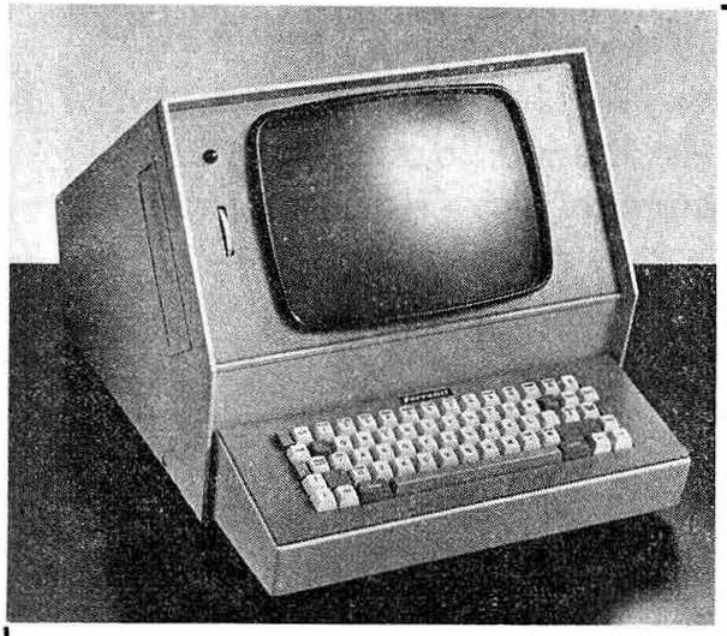

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Designed to work with Argus 400 Computer. These models are ideal for customers building their own VDU's. The keyboard has no direct connexion to display unit and can be removed if required.

Cash Price Only £42.50 + 8% VAT

(NOT AVAILABLE ON CREDIT CARDS DUE TO LOW PRICE)

This unit is being offered at less than the price of keyboad and empty cabinet !!

SPECIAL NOTICE. Available only to personal callers and cannot be collected until after 26 August. Regret no circuit diagrams available.

All above units are sold for their component value. The CDU11 contains scanning amplifier but requires vidio signals from an external source. All tubes have burn marks due to constant use and keyboards do not have character generator circuitry fitted.

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400 EDGWARE RD. PADDINGTON W2. ANNUAL HOLIDAYS—CLOSED UNTIL 26 AUG.

Scots wha hinna !

But would like tae hae the best in Hamgear, free advice, or just an "Eyeball", should call & see fits fit & fas fa, & fas Jocks faither. If you are dazed by the proliferating plethora of equipment, see me. I've been bamboozling longer than most.

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RSGB Publications ★ Bernards ★ World Radio TV Handbook ★ Towers Transistor Selector.

Agent for:

South Midlands Communications ★ Decca/KW ★ Radio Shack ★ Lowe Electronics (sorry no Trio)

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All above prices plus VAT at 12½%.

USED EQUIPMENT

FR101S FB condx, £250.00. KW201 Rx and handbook, complete with external Heathkit "Q" multiplier, £130.00.

AGENTS FOR G2DYM ANTENNAS

Valves for Yaesu, etc., 6BZ6, GU8, 6KD6, 12AX7A, 12BY7A, 12AU7, 6JS6C, 6146, 6HF5, 6LQ6, 6EA8, 6GK6, 6146B, 6KD6, RCA Valves for KW equipment, etc.

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Top Band (Marine Band) to 20 metre converter. If you miss being able to listen on 160 metres this provides the answer. 1·8MHz–2·3MHz in, 14–14·5MHz out. Price **£18.00** + VAT = **£20.25. IN STOCK.**

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Sentinel D. G. Mosfet converters. These provide a performance that cannot be beaten. N.F. 2dB, Gain 30dB. Supply 12V(9-15) 15mA. Size is 2⅜" × 1⅜" × 3¼". IFs: 28–30MHz, 4–6MHz, 2–4MHz. These are also in stock for Marine Band to 28–30MHz and Satellite Band to 20–22MHz. 4 metres to 28–28·7MHz. Price: **£18.00** + VAT = **£20.25. IN STOCK.**

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These must be the most cost-effective items being advertised in these pages.

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Contains an RF operated relay for connecting straight into your transceiving aerial co-ax. Performance: 1dB N.F., 18dB gain from selected FETS. Supply 12V nominal. Price: **£13.00** + VAT = **£14.62.** B/L sockets standard, SO239s **£1.50** + VAT = **£1.69** extra.

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Same circuit as the one above but without the RF switching. Price: **£7.75** + VAT = **£8.72. IN STOCK.**

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Size only about 1 cubic inch to fit inside your transceiver. N.F. 2dB gain 18dB. Price: **£5.57** VAT = **£6.27. IN STOCK.**

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A compact and attractive A.T.U. 80–10 metres tested at 1kW into 50 ohms. Slow motion calibrated dials. Size only 8¾" × 4" × 7½". SO239 and screw terminals for co-ax fed or wire aerials. Balanced or unbalanced. Price: **£28.00** + VAT = **£31.50. IN STOCK.**

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Now includes a relay controlled by the ON/OFF switch for switching the H.F. equipment between the Europa or your H.F. aerial. I.E. NO PLUG CHANGING.

- Receive converter—2dB N.F. 30dB gain with MOSFETS.
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- Spurious output—80dB!
- Size only 9" × 4½" front panel, 4" deep.

Price only **£100** + VAT = **£112.50. IN STOCK.**
Complete to plug into Yaesu equipment.
Complete power supply for Europa **£45.00** + VAT = **£50.62. IN STOCK.**

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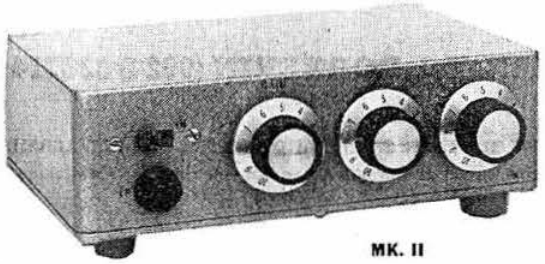

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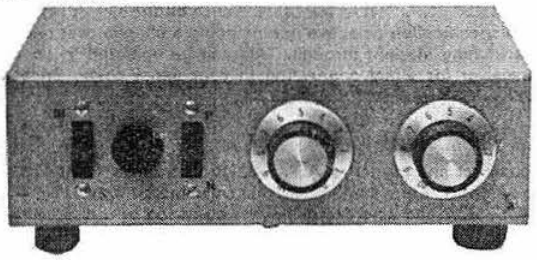
AUDIO COMPRESSOR ★ Suitable for SSB/AM/FM ★ pure compression, no clipping! ★ 24 to 26dBs of compression, with less than 1% distortion ★ fast attack time in the order of 200 microseconds ★ variable decay time, on front panel ★ variable noise gate on front panel prevents ambient noise level tripping vox or being tx in pauses in speech ★ all functions routed to output in "off" position ★ goes between mic and tx no mods involved ★ these compressors have been tested alongside commercial rf clippers, the only difference at the receiving end was superior audio quality, **£22.50** + VAT (12½%)

PRINTED CIRCUIT MODULE A.C.1. Assembled and tested including all pots **£12.50** + 12½% VAT.



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RX BAND PASS FILTER ★ 9 integrated circuits ★ 1 watt o/p stage ★ headphone socket ★ 8 switched positions of filter ★ high pass—2·5kHz-2·00Hz-1·5kHz-200Hz-110Hz-80Hz ★ Bandwidths selected for optimum readability on AM, SSB, FM, CW ★ giving the operator total control over bandwidth and QRM conditions ★ makes the poor RX superb and the superb RX better ★ runs from internal PP9 battery or any supply from 9V to 15V, **£24.50** + VAT (12½%). *(Below, left)*

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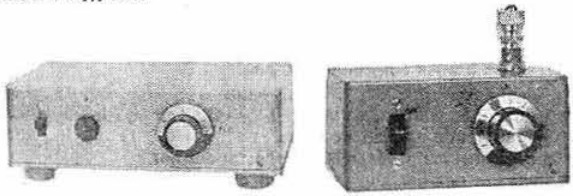

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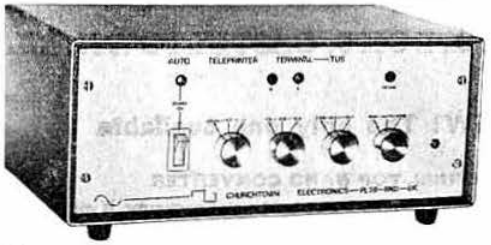

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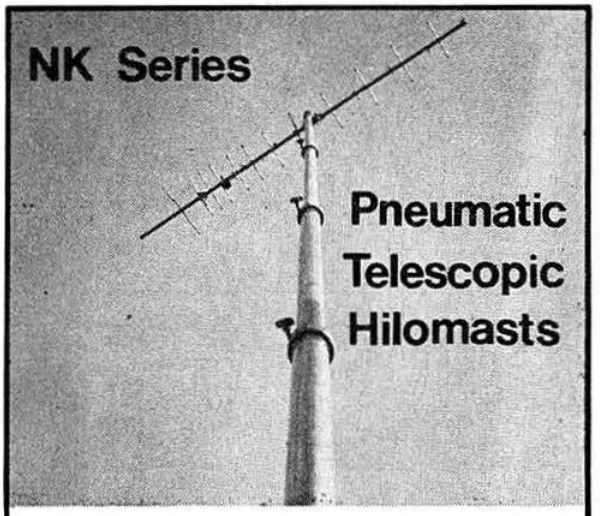

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