radio communication

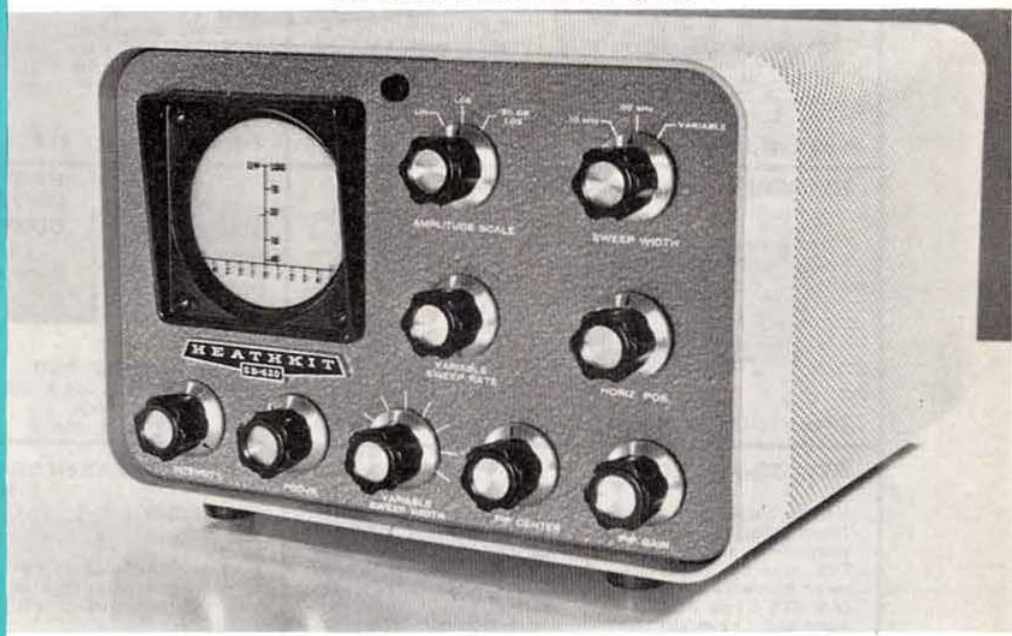
August 1972

Journal of the Radio Society of Great Britain

UNDER REVIEW IN THIS ISSUE

The Heathkit SB620 spectrum analyser—*p. 512*

The Yaesu YC-305 counter—*p. 514*



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Volume 48 No 8 Price 30p

CONTENTS

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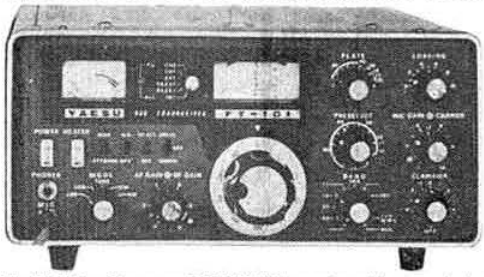
THE SUPERB FT-101 (Ex-Stock) (with 160m., £11 extra).



The FT-101 is a 250w. p.e.p. SSB/AM/CW transceiver with an amazingly sensitive receiver. You'll hear signals which are inaudible on many other equipments. It comes complete with speaker and microphone, AC and DC P.S.U.s built-in. There's nothing to touch it for value!

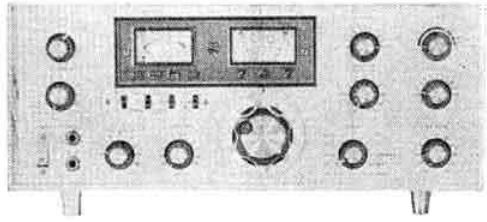
MATCHING FL-2100 LINEAR (Ex-Stock)

The FL-2100 is designed to match the FT-101 and runs 1200w. p.e.p. If it's a linear you require for some other exciter, compare the FL-2100 with 2 fans, AC and HV safety interlock and fully screened input circuitry. You'll not find better value!

YD844 FV200 FT200 FP200

THE FT200 is without doubt one of the "best buys" available. Compare its features with similarly priced units and kits. SPECIFICATION: 250w. p.e.p., I/p. SSB/CW.; 75w. AM. 1 kHz readout on all bands 3·5-4, 7-7·5, 14-14·5, 21-21·5, 28·5-29 MHz. (3 optionals crystals available for 28·28·7, 29-29·5 and 29·5 30 MHz, Stability: 100Hz 30 mins. after warm-up. Sensitivity: 0·5μV 10dBS/S+N. Selectivity: 2·3 kHz (6dB), 4kHz (60dB). Solid state FET VFO with excellent linearity (like all YAESU VFO's). 25/100 Calibrator. VOX/PTT. Separate DC supply available for mobile use. Clarifier ±5 kHz. Break-in CW keying.

FT560



NOW BEAT THIS FOR VALUE! 35p per watt! Even cheap kits cost 88p per watt! The FT560 operates SSB/CW on 10m–80m. at 560W p.e.p. I/p and has the following features: Built-in AC supply, VOX, 25/100kHz crystal calibrators, WWV to check the calibrator, 1kHz read-out on all bands and receiver incremental tuning. A CW filter can be fitted as an extra.

SPECIFICATIONS

Maximum Input Power: 560 W PEP SSB, 500W CW.
Sensitivity: 0·5 Microvolt for 20dB S/N (SSB 14 MC)
Selectivity: 2·3kHz (6dB down) 3·7 kHz (60dB down) six pole crystal filter nominal shape factor 1·6 : 1. Optional 600Hz CW filter is available.
Frequency Range: 3·5 to 4, 7 to 7·5, 10 to 10·5 WWV, 14 to 14·5, 21 to 21·5, 28 to 30 (Megahertz).
Unwanted Side Band Suppression: 55dB down (at 1000Hz).
Carrier Suppression: 50dB down from full output.
Distortion Products: More than 25dB down.
I.F. and Image Ratio: More than 50dB down.
Frequency Stability: Less than 100Hz drift in any 30 minute period after warm-up.
Audio Output: 1·5 watts, 350-2200Hz, 8/600 Ohm impedance.
Power Source: 117 or 234 volts A.C. 50/60 Hz.
Dimensions: 15¼" wide, 6¼" high, 13¼" deep.

NEW YAESU PRICES. *Due to the "Floating £"*) CARRIAGE PAID BY SECURICOR. MANUFACTURER'S 1 YEAR GUARANTEE.

FR-50B Receiver	£63.00	FV-101 Remote VFO	£38.00	FR-400S DX Rcvr. 160-10m, 4m,2m	£160.00	FT-560 Transceiver, 560W	£195.00
FL-50 Transmitter	£72.00	SP-101 Matching spkr.	£10.00	FL-400 Transmitter	£146.00	YC-305 35MHz Counter	£85.00
FV-50 Remotee VFO	£27.50	FL-2100 1200W Linear	£148.00	SP400/401/560 Speakers	£10.00	YD-844 Table Microphone	£5.00
FT-75 Transceiver	£99.00	FT-200 Transceiver	£134.00	FL-2000B Linear, 120W p.e.p.	£148.00	YD-846 Hand Microphone	£12.00
FP-75 AC PSU/SPKR	£22.50	FP-200 AC PSU/spkr	£38.00	FL-2500 Linear, 2KW p.e.p. 160-10m	£122.00	FT-2F 2m 12Ch. FM Transceiver	£84.00
DC-75 DC PSU/SPKR/Mount	£22.50	FV-200 Remote VFO	£38.00			FP-2AC AC PSU/Speaker	£25.00
FT-101 Transceiver, 260W	£249.00	DC-200 DC PSU	£46.50	FT-401 Transceiver, S60W	£230.00	FP-2ACB as above fitted Batts.	£36.00
FT-101 Trans. fitted 160m	£260.00	FR-400DX Receiver 160-10m	£120.00	FV-401 Remote VFO	£38.00	FF-50DX L.P. Filter	£6.60

NEW AND USED EQUIPMENT (Carr. £1 Extra).

Heath SB-303 New, ass'bld + cw.	£238.00	Heath HM-102 New, ass'bld	£18.00	KW Atlanta, New	£210.00	Yaesu FT-400, mint	£160.00
Heath SB-301, v. good	£99.00	Heath HM-102, mint	£14.00	KW 201, excellent	£75.00	Digital 500, New	£225.00
Heath SB-300, excellent	£90.00	Hammarlund, HQ-170A, v. good	£73.00	KW 202, mint	£110.00	Swan 270, mint	£170.00
Heath SB-600, unused	£8.00	Hammarlund, HX-50, v. good	£90.00	KW 2000A, mint	£150.00	Eddystone EC10, excellent	£39.00
Heath GR-78, mint	£60.00	Skywood CX-203, New	£28.50	KW Atlanta, mint	£160.00	Eddystone 680X	£65.00
Heath HP13 DC PSU	£25.00	Trio 9R59DS, New	£57.50	KW Atlanta, v. good	£150.00		
Heath HDP21, mic.	£10.00	Trio 9R59DS, mint	£47.00				

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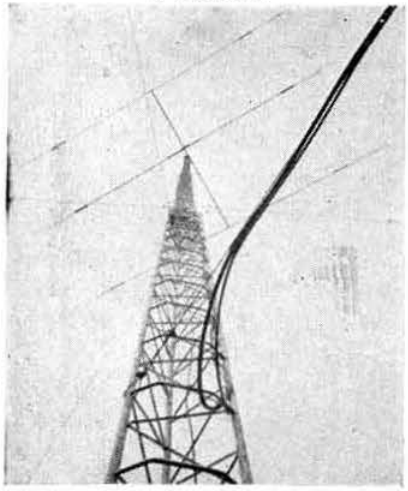
79' TELETOWER



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TOWERS

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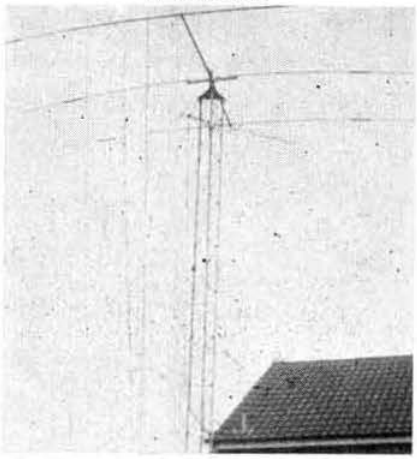

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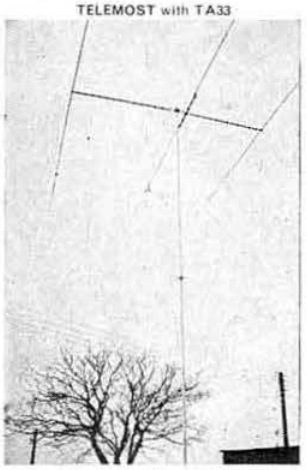

The best in telescopic rotatable masts. Can be erected single-handed in minutes and extends vertically upwards.
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Mast only 30' **£14·40** 40' **£16·50** 50' **£19·50**
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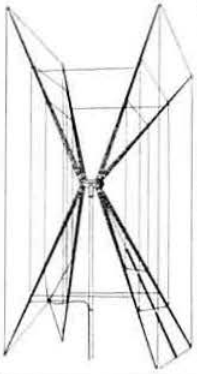
ANTENNAS



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Hy-tower, 10-80m.	(self-sup.)	**£99.50**	Hy-Quad, 10-20m. 2 ele...	..	**£62.50**
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12AVQ, 10-20m. vert.	(self-sup.)	**£16.50**	204BA, 20m. 4 ele. beam	..	**£80.00**
14AVQ, 10-40m. vert.	(self-sup.)	**£18.50**	203BA, 20m. 3 ele. beam	..	**£67.50**
18AVT, 10-80m. vert.	(self-sup.)	**£33.00**	153BA, 15m. 3 ele. beam	..	**£33.00**
LC8OQ, 80m. coil for 14AVQ ..		**£6.70**	103BA, 10m. 3 ele. beam	..	**£26.50**
TH6DXX, 10-20m. 6 ele. beam		**£88.00**	18TD, Reeltape portable dipole		**£41.00**
TH3MK3, 10-20m. 3 ele. 2 kW ..		**£69.50**	LA1 Lightning arrestor ..	..	**£14.50**
TH3 Jnr., 10-20m. 3 ele. 600w.		**£48.00**	LA2 Lightning arrestor ..	..	**£2.50**

MOSLEY (Carriage paid) (Ex-Stock from us for fast service)

Mustang, 10-20m. 3 ele.	**£41.50**	TA33 Jnr.,10-20m.	**£34.50**	TA32 Jnr. 'E' (2" mast)	**£25.00**	SWL Listener's dipole	**10.90**
TA33 Jnr. 'E' for 2" mast	**£35.00**	TA32 Jnr. 1-20m. 2 ele.	**£24.50**	TA31 Jnr. Rotary dipole	**£15.40**		

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70/¼, 70 MHz, ¼ wave	**£3.00**	BGA, 144 MHz, ¼ wave	**£6.15**	Magnetic mount ..	**£4.95**	Note. Deduct 50p from price of aerial if base is not required.
144/¼, 144 MHz, ¼ wave	**£2.75**	B5, 144 MHz, ⅝ wave ..	**£4.35**	All aerials complete with base.		

WESTERN ELECTRONICS QUAD (boomless) 10-20m. **£27.00** (carr. paid).

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MAIN DISTRIBUTORS FOR YAESU MUSEN EQUIPMENT

The new Yaesu FT–75 meets the need for a very small mobile rig with fixed station potential. It is beautifully made and the performance is everything one has come to expect from Yaesu. It is crystal controlled on all bands with VXO, it is all transistor except 12BY7A driver and 12DQ6B P.A., the filter is top-notch and all in all it is yet another Yaesu winner.

Bands: 80, 40, 20, 15 and 10m. The following frequencies are fitted as standard, but others (up to a total of 3 per band) may be ordered: 3·565, 7·085, 21·400, 28·550.

VXO range: 80 and 20m. 3kHz, 40m. 6kHz, 15m. 20kHz, 10m. 12kHz.

Power: The transformers in both A.C. and D.C. p.s.u's. are tapped and on the highest A.C. p.s.u. tapping we obtained a measured output of at least 30W on all bands (35W on 10!). This corresponds to an approximate input of 60W or more which is very comfortably within the capabilities of the 12DQ6B.

The receiver has a sensitivity of ½ microvolt for 10 dB S/N and the crystal filter (5173·9kHz) has a nose bandwidth of 2·3kHz and 6:60 dB shape factor better than 2-1. All this in a compact 8" × 3" × 12" deep.
Quite clearly a great deal of thought has gone into the design of the FT–75 and there are several very nice touches which appeal to us. The Rx not only has its own r.f. coils, but its own mixer coils as well. The dual gate F.E.T. r.f. amp. has excellent signal handling with amplified a.g.c. applied to one of the gates. Separate receiver and transmitter. I.F. strips, a ring diode detector, etc. allied to a low price and small size make this rig very attractive to anyone owning a car.
As an optional extra there is the FV50C Remote VFO at **£26**. Note though, that there is no r.f. peaking control on the FT–75 and that the P.A. tune is pre-set, so the frequency excursion is rather limited by r.f. bandwidth from 75kHz or so on 80 up to about 450kHz on 10m. before acceptable performance is lost, In spite of this, it is a little cracker and for mobile I'm not so sure that xtal control isn't a bad idea.

New Yaesu Equipment:

FT–101 Transceiver, **£240**
FT–101 Fitted 160m., **£255**
FT–101 Fitted 160 and new PA coil, **£255**
SP–101 Matching speaker, **£10**
FV–101 Remote VFO, **£38**
FT–101 Mobile Mount, **£5**
FL2100 Linear, **£135**
FRdx400 Super de Luxe Receiver **£160**
FLdx400 Transmitter, **£140**
SP–400 Speaker, **£10**
FL2000B Linear, **£135**
FT–2F 2m. Transceiver, **£84**
FR–50B Receiver, **£59**

FT–2 Auto, **£129**
FT–200 Transceiver, **£134**
FP–200 A.C. p.s.u./speaker, **£38**
FV–200 Remote VFO, **£38**
DC–200 Mobile p.s.u., **£45**
FTdx401 Transceiver. **£215**
FV–401 Remote VFO, **£38**
SP–401 Speaker **£10**
YC–305 Counter, **£79.50**
FT–75 Transceiver, **£99**
FP–75 A.C. p.s.u., **£22.50**
DC–75 D.C. mobile p.s.u., **£22.50**

The above equipment is ex stock and apart from sundry spares which go first class mail, we send all equipment by Securicor, who almost invariably deliver within 24 hours and more important, treat the gear gently. There is no extra charge for this service, nor for the fact that all equipment is thoroughly checked before despatch. Plus of course our unbeatable 12 month guarantee and our money-back guarantee.

While the Yaesu Musen FRdx400 receiver is just about the best you can get in the Amateur Band line, the price of **£160** is beyond a lot of pockets, so to cater for the lower-priced field, we very proudly introduce the Yaesu Musen FR-50B at a very incredible **£59.** In spite of this rock-bottom price, the FR-50B is a very good Amateur Band receiver indeed and provides a high degree of sensitivity and stability.

Basically, it is a double conversion receiver covering 80 to 10m with a VFO for the first oscillator and a crystal controlled second oscillator. Being double conversion (5173·9kHz and 455kHz) explains the incredibly good image rejection figure of better than 50 dB.

When it comes to sensitivity, the 6BZ6 r.f. amplifier ensures 0·5 microvolt for 10 dB S/N ratio.

Selectivity is achieved by two ceramic transducer filter elements which give a nose bandwidth of 3·6kHz at 6 dB and a skir bandwidth of 10kHz at 50 dB. These figures are extremely good for equipment in this price class (even for equipment costing much more!). A high order of stability is achieved by a stabilized transistor VFO and VFO buffer amplifier. Other niceties of design are:

1. 100kHz calibrator circuitry built in and only needs 100kHz crystal plugging in.
2. Built-in speaker.
3. Tuneable BFO.
4. I.F. trap in r.f. circuit.
5. Nice geared drive to the VFO—50kHz per turn of the tuning knob, readout to better than 1kHz. This is the same drive as on the well known earlier (and much more expensive) FR-100B.
6. Triode first mixer for low noise.
7. "S" meter fitted.
8. Noise limiter fitted.
9. Gold bonded IS1007 for AM detection.
10. Product detector (6BE6) for SSB/CW.
11. Built-in muting and monitor circuit for use with companion FL-50B transmitter.

Frequency range:	80m	3·5—3·8MHz	20m	14·0—14·5MHz	10m	28·0—29·2MHz
	40m	7·0—7·5	15m	21·0—21·5	WWV	10·0—10·5
Sensitivity:	Better than ½ microvolt for 10 dB S/N ratio in the SSB mode.					
Selectivity:	3·6kHz—6 dB 10kHz—50 dB.					
Image rejection:	50 dB or more.					
Audio:	1·5W 4/600 ohm output. Built-in speaker.					
Power:	240v. A.C.					
Size:	13" wide, 6" high, 10¼" deep.					
Weight:	17½ lb.					
Controls:	BFO, monitor agc slow/fast/off, noise limited on/off, calibrator on/off, mode switch, AF gain, RF gain band switch tuning, preselector, zero set (for calibration). "S" meter zero (on rear panel).					

Valves:	12AT7	Crystal calibrator	6CB6	1st IF amp./2nd mixer	6BE6	Product detector
	6BZ6	r.f. amp.	2SC372	2nd oscillator	IS1941	Noise limiter
	12AT7	first mixer	6BA6	2nd IF amp.	6BA6	BFO
	2SC373	VFO	6BA6	3rd IF amp.	6BM8	Audio
	2SC372	VFO buffer	IS1007	Am detector		

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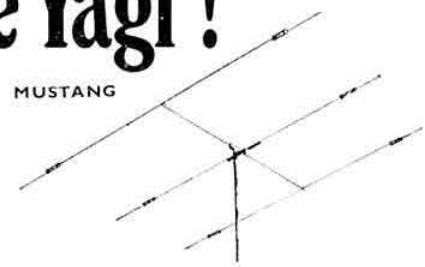

MOSLEY of England Antennae

Mustang. 3 band 3 elements
Elan. 2 band 3 elements
TA-33 Jr. 3 band 3 elements
TA-32 Jr. 3 band 2 elements
TA-31 Jr. 3 band dipole
V-3 Jr. 3 band vertical
A-310. 10 metre 3 elements
A-315. 15 metre 3 elements
Atlas. 4 band vertical
TD-3 Jr. 3 band trap dipole
RD-5. SWL amateur bands
SWL-7. SWL broadcast bands
D-4BCa. Base loading coil for ATLAS for 80 metres
TW-3X Jr. 20, 40 and 80 metre vertical
VTD-3 Jr. 3 band vertical for difficult locations

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MCQ-3B. 10, 15 and 20 metre Quad
MCQ-20. 20 metre Quad
Classic-33. 10, 15 and 20 metre 3 elements
Classic-203. 20 metre 3 elements
A-92-S. 2 metre 9 elements
DI-2. 2 metre. Ground plane
Other U.S.A. types to special order.

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Drake TR-3 Tcvr. with PSU & MS-4 Speaker	£195.00
Heathkit SB-220 Linear Amplifier	£160.00
Collins 516F-2 PSU	£70.00
KW 160m Transmitter	£20.00
Swan 260 Tcvr. built in AC & DC PSU	£130.00
Collins 75S-3C Receiver 10–80m	£350.00
Sommerkamp FLDX500 Transmitter	£95.00
KW 105 SWR & Tuning Meter	£30.00
Yaesu Musen Remote VFO for FT-101 Rcvr.	£30.00
Hammarlund HQ-215 Receiver 10–80m	£125.00
KW Atlanta with PSU	£140.00
Swan 500 Tcvr. with PSU	£175.00
Eddystone 940 General Coverage Receiver	£100.00
Johnson Matchbox ATU 600W PEP 10–80m	£45.00
Collins 312B-4 Console	£95.00
KW 2000A Tcvr. with PSU	£150.00
GEC RC/410 Digital Receiver. 2–32MHz	£350.00
Eddystone EA-12	£150.00
Collins 75S3-B Receiver	£315.00
Swan 270 Tcvr. built in AC & DC Power Supply	£165.00
National NCX-5 with PSU	£175.00
Heathkit SB-300 Receiver 10–80m	£80.00
Trio 9R59DE Receiver	£35.00
KW 204 Transmitter	£105.00
Heathkit DX40U Transmitter and VFO	£25.00
Collins 32S-3 Transmitter	£350.00
Sommerkamp DX2000 Linear Amplifier	£75.00
Heathkit SB-310. Broadcast & some amateur bands Receiver	£95.00
Ten-Tec PM3A CW Tcvr. 40m & 20m	£30.00
Eddystone 770/R & 770U/2 each	£125.00
Now in stock—HW-100 Dial Drive Modification Kits. inc. postage.	£3.50
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QTC AMATEUR RADIO NEWS

Oscar-6

The Ministry of Posts and Telecommunications has agreed to a request by the RSGB that holders of an amateur (sound) licence B may use the translator carried in the satellite provided there is no contravention of the limitations set out in the schedule of the Class B licence.

It is expected the Oscar-6 will be launched during November 1972 and further information will be available nearer that date.

RSGB Dinner Club

Members who attended the meeting of the RSGB Dinner Club at the Kingsley Hotel on 30 June spent a very enjoyable evening together. Twenty-six sat down to dinner and the President of the RSGB welcomed our visitors—K1TCE, EI4DY and W7IKY, who were persuaded to say a few words.

An interesting feature of the evening was the first exhibition in public of a fascinating link with the past. G5CS recounted how he had visited Hill Crest Cottage near Salisbury, the site of Marconi's experiments in 1895 and 1896, and had discovered when talking to the present owner that a copper tube had been dug up in the garden three or four years ago. It proved to be Marconi's earthing spike. G5CS's enthusiasm for museum pieces was infectious and everyone in turn was delighted to handle his latest find.

The next Dinner Club meeting will be at the Kingsley Hotel on Friday 29 September. New members are always welcome, and if you would like to attend contact G3ERO or RSGB headquarters.

Woburn Abbey Rally

Members are reminded that the rally takes place on 6 August. For full details and route map, see the July issue of *Radio Communication*.

Licence figures

The Ministry of Posts and Telecommunications advises that the following numbers of amateur licences were in force at 31 May 1972:

Class A	14,218	Class B/M	668
Class B	3,315	Television	227
Class A/M	2,747		

Astronomer Royal

HM the Queen has appointed Sir Martin Ryle, Professor of Radio Astronomy at the University of Cambridge, as Astronomer Royal. Sir Martin, who is a member of the RSGB and holds the call G3CY, is the first radio astronomer to have this title bestowed upon him. At the present time the world's largest radio telescope, the "five kilometre telescope" is being prepared for operational use by Sir Martin and his team of radio astronomers.

The appointment as Astronomer Royal recognizes the outstanding work of Sir Martin in the field of radio astronomy. On this occasion the Society offers its congratulations for an honour richly deserved.

"Ham Radio Magazine"

The cost of a subscription to *Ham Radio Magazine* will shortly rise to $7 for one year and $14 for three years. However, as a concession to RSGB members, the publishers of *HRM* will continue to accept subscriptions at the existing rates until 31 December 1972. These are £2.30 ($6) for one year and £4.60 ($12) for three years and subscription orders may be placed through the Society.

Can you help?

The Star Short Wave Club of Leeds is to hold a grand junk sale in aid of RAIBC funds in September and urgently needs any surplus equipment that members may care to donate. Contact the club secretary, Mr T. Leeman, G8BUU, 115 Asket Drive, Seacroft, Leeds LS14 1HX.

Mr D. Murray, W4RNP, 1101 Eck Road, Richmond, Virginia, USA 23235, is anxious to obtain the present address of a station licensed as VQ6LQ.

John Telford, WA3DBC, 109 Cort St, West Newton, PA 15089, USA, would like a year's employment in the telecommunications industry so that he and his family can spend some time in England. He is an associate professor at a teacher education college teaching electronics. He holds a General Amateur Licence and a First Class Commercial Radiotelephone Licence in the USA. He has had 14 years' experience of telecommunications and 7 years' teaching.

EEDAM Conference

Dr I. Maddock, CB, OBE, FRS, Chief Scientist, Department of Trade and Industry, is to give the opening address at the conference on "Electronic Equipment Design and Manufacture" (EEDAM) to be held at the David Hume Tower, University of Edinburgh, from 26 to 28 September 1972. The conference is being promoted by the Scottish centres of the IEE (E & C section) and IERE. Co-sponsors include the IMechE, IProdE, IEETE and IEI.

A copy of the provisional programme and registration form can be obtained from: G. K. P. Ayrton, BSc (Eng), CEng, MIEE, Post Office Telecommunications Headquarters Canning House, 19 Canning Street, Edinburgh EH3 8TH.

Worthing news

Members of the RSGB in the Worthing and district area have asked Mr P. Robinson, G6KFH/T, to act as RSGB representative for that area.

As a result of a suggestion by the Worthing & District ARC, the Entertainment & Publicity department of Worthing Borough Council has had special QSL cards printed. These bear a picture of Worthing sea-front, publicity, and space for QSO details and callsigns.

Any amateur in the Worthing area interested in obtaining a small supply should contact Mr G. D. D. Hooper, G8ETL, 12 Bramble Crescent, Durrington, Worthing, who is chairman of the club.

Invitation to Italy

Dr Guido Silva, Viale Casiraghi 125, Sesto S. Giovanni, Milano, Italy, would be pleased to give hospitality during the summer of 1973 to a young British amateur or to the son of a British amateur, preferably Roman Catholic, as a companion for his 17-year-old son and in order to improve their English conversation. Dr Silva's QSL card carries a photograph of his summer residence, complete with aerial arrays, at Bonate Sopra, Bergamo.

ITU

It is announced that the Yemen Arab Republic has acceded to the International Telecommunication Convention. In so doing reservations have been made concerning relations with Israel and the Republic of South Africa.

The People's Republic of China has been recognized as the government providing the only legitimate representatives of China at the ITU. It has been invited to appoint a person to the ITU Council.

The following call sign blocks have been allocated by the ITU: A4A to A4Z Oman (Sultanate of)
S2A to S3Z Bangladesh

IARU Region 1 Award

Consequent upon the increase in membership of the Region 1 Division to 40 societies the following countries should be added to the list appearing on the RSGB Certificates and Awards leaflet: Israel, Romania, South Africa, Zambia.

"From semaphore to satellite"

This is the title of a lavishly produced book published by the International Telecommunication Union in 1965. As implied by its title it traces the story of a hundred years' progress in communications. The price of the 300-page volume has recently been reduced and it may now be obtained for the equivalent of 10 Swiss francs (£1.10) from the Sales Service, ITU, Place des Nations, 1211 Geneva 20, Switzerland.

Osker SWR200

In connection with the review of this equipment which appeared in the July issue, we are advised by Western Electronics (UK) Ltd that recent consignments have not had the faulty thread pitch to which reference was made.

Nylon components

Requests are frequently received for the names of suppliers of nylon components, and we have recently received the catalogue of the Nylonic Engineering Co Ltd of Woodcock Hill, Rickmansworth, Herts; and Coppice Side Industrial Estate, Brownhills, Walsall WS8 7EX.

This catalogue lists screws, nuts, washers, bushes, balls, rope thimbles, net rings, pulleys etc, and should cover most amateur requirements.

New club in Wigan

A temporary committee has been set up to form the Wigan and District Amateur Radio Society. Prospective members are asked to contact the secretary, Mr V. T. Brooks, G8DPE, 8 Sutherland Road, Worsley Mesnes, Wigan, Lancs.

Toptour Ham Club

A group of active amateurs of several nationalities has recently formed a new club in Switzerland, the Toptour Ham Club for International Meeting and Friendship. Its aims include the organization of international get-togethers, assistance in providing reciprocal licences in vacation countries, the establishment and operation of club radio stations which may be used by vacationing amateurs, and assistance in arranging travel programmes.

Full information can be obtained from Toptour Ham Club, PO Box 47, CH-9470 Buchs, Switzerland.

RSGB CALL BOOK

Affiliated Societies Section

Will the secretaries of all RSGB affiliated societies please advise the editor at RSGB headquarters of any omissions from, or any amendments to, the list of affiliated societies in the current edition of the *RSGB Amateur Radio Call Book* for inclusion in the 1973 edition which is now in course of preparation.

First-day covers

Marconi Kemp tests 75th anniversary

On 13 September the Post Office will issue a set of four commemorative stamps, three to commemorate the 50th Anniversary of broadcasting by the BBC, and a 7½p one to commemorate the 75th anniversary of the first wireless transmissions across water. These were the tests conducted by Marconi and Kemp from Lavernock Point near Barry in South Wales, to Flatholm Island in the Bristol Channel and then to Brean Down in Somerset, England.

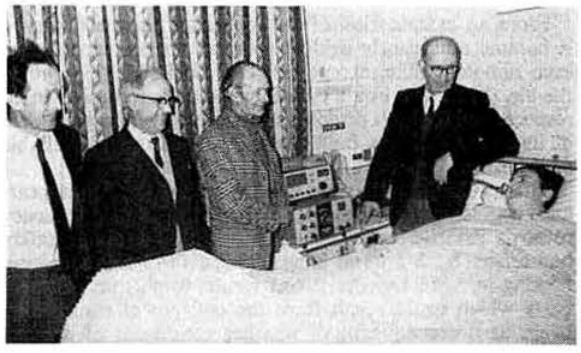
The Barry College of Further Education Radio Society will be issuing a special commemorative envelope bearing the 7½p stamp which will be posted from Flatholm Island on the first day of issue. The envelopes are beautifully designed and printed in magenta and blue and show Flatholm Island in the Bristol Channel, Brean Down and Lavernock Point. The postmark will contain an amateur radio callsign.

The cost of the special commemorative envelope, the 7½p stamp and posting with a Flatholm Island postmark on the first day of issue will be **20p.**

Orders should be sent to: The Secretary, Barry College of Further Education Radio Society, Barry College of Further Education, Colcot Road, Barry, Glamorgan. To arrive not later than 11 September 1972.

Remittance should be made by crossed postal order or cheque payable to Barry College FERS. In order to reduce costs to a minimum no receipt or acknowledgement will be issued.

RAIBC news



RAIBC member Esther Thomas, GW8FYF, with some of those who have helped her to achieve her ambition of obtaining her transmitting licence despite her disabilities. Left to right: Eric Goodwin, Monmouth RS; Randall Jenkins, Hoover RC; Sid Boakes, G3HXN, whose personal interest and generosity have been an inspiration indeed; and her devoted husband and right-hand man, Meirion

Aerial masts and rotation systems

by R. THORNTON, GM3PKV, and W. H. ALLEN, MBE, G2UJ*

Part 1

SOME time ago Mr Rudd Thornton undertook the task of compiling information regarding mast construction and beam rotation systems and to that end produced a questionnaire to which a number of radio amateurs kindly provided replies. Information was also forthcoming from various members of the radio trade concerning aerials and associated equipment.

Unfortunately circumstances prevented Mr Thornton from carrying through his self-imposed task to completion, and rather than waste the mass of material accumulated, Mr W. H. Allen has endeavoured to use as much of the information as possible in the present article in the hope that being a subject of perennial interest to members it will not be unduly out of date. Grateful thanks are extended to all those approached by Mr Thornton for the wealth of information provided. Space does not permit more than a few actual installations being described in detail, but those not mentioned specifically contributed extensively towards the general observations.

AERIALS are a common feature of all installations for radio transmission and reception; each month the amateur radio magazines contain a wealth of information about them, in addition to the numerous books available on the subject. It is, therefore, somewhat surprising that very little has been written about getting the chosen aerial into the air and aiming it in the desired direction.

From an examination of the replies to the questionnaire it became abundantly evident that (a) no two masts were even remotely alike, except that they held something up in the air, (b) no two home brewed rotators were similar in all respects and (c) each device was conceived with a great deal of ingenuity and was built mostly with materials available at the time.

The resulting masts were usually both elegant in appearance and structurally sound, although there was a tendency towards massive construction where doubt about safety had arisen. Such a trend is by no means to be discouraged, bearing in mind the disastrous results to persons and property which could result from the collapse of a mast and beam as a consequence of weather conditions of unusual severity.

In all it may be said that a great deal of sound common sense had been used to fashion systems to suit individual requirements and environment and to overcome mechanical problems in ways avoiding the use of expensive materials or those difficult to obtain, and processes beyond the skill of the non-professional.

Mast erection can be a hazardous proceeding for those concerned unless carried out in a responsible way, and some useful hints were contributed by members and included in later sections of this article.

* "Cobbs" Challock Lees, Ashford, Kent.

Windage

Given good balance and a guarantee of no wind, a very high mast could safely be tied up with string. That this ideal state of affairs does not exist is a pity, but it serves to illustrate that (a) the mast itself must be reasonably rigid and, (b) the first thing to consider is the expected wind force and loading by accumulations of ice and snow in adverse weather conditions.

The accurate calculation of wind resistance is quite difficult —textbooks on aerials avoid the subject like the plague— and the only sure way would be to test a model in a wind-tunnel! This being out of the question and to avoid falling at the first hurdle (or breath of wind) it is necessary to rely on a formula, and the following has been advised by J-Beam Engineering Ltd:

Wind pressure (lb) = 0·0025 × wind velocity squared.

When using this formula, a tube of 2in diameter is counted as a flat surface 2in wide. For example, the force exerted by

TABLE 1
Calculated wind drag at 100mph on tubes and taut wires with the wind perpendicular to the axis of tube or wire

Diameter of tube or wire inches	Drag lb per foot length
2	5·8
1	2·9
0·5	1·47
0·128 (10swg)	0·29
0·08 (14swg)	0·17
0·036 (20swg)	0·07

TABLE 2
Wind pressure on some popular aerials (excluding mast)

Aerial	Wind pressure at 100mph lb
70cm eight over eight	23
2m six over six	50·4
2m 8 element Yagi	34
2m 4 element Yagi	19·6
4m 4 element Yagi	55·5
10m 3 element Yagi (full size)	110 approx.
10, 15 and 20m 3 element trapped beam	135 approx.
20m quad. (*Radio Communication Handbook* Fig 13. 113)	400 approx.

(Note that the EIA specification to which the figures on imported American aerials usually refer is for a wind speed of 80mph).

wind at 100mph on a beam made of a total of 40ft of 1in tubing would be:

$$0{\cdot}0025 \times 100^2 \times \frac{40}{12} = 83{\cdot}3\text{lb}$$

This, of course, assumes that all the tubing and/or wire is normal to the direction of the wind.

Some calculated figures for common tube and wire sizes are given in Table 1. We are indebted to J-Beam Engineering for permission to reproduce data regarding the wind pressure exerted on certain types of their vhf and uhf aerials in Table 2.

It has been standard building practice to design for a maximum wind speed of 80mph, but the speed at a height of, say, 50ft can be much higher than at ground level. A phone call to the meteorological office of a local airfield should enable information to be obtained regarding the strength and direction of the prevailing winds in the area.

The data on windage in the tables apply to the force exerted at the top of a mast and give a guide to the strength required for guys if they are attached at or near the top. If the mast is self-supporting or is held, for instance, by a bracket part of the way up, then the effect of leverage must be considered when working out the strength required from guys or bracket. Fig 1 shows why guy wires greatly reduce the leverage compared with fittings nearer the base of the mast and thus make it possible to use much lighter materials.

In many cases the wind force on the mast or tower will be higher than that on the aerial itself. Again exact calculation is difficult but an approximation may be made on the following lines. Calculate the windage for the top one-third of the mast and add this to the windage figure for the aerial array. Next work out the strength required of the guys as if this combined force was acting at the top of the mast. Using the beam of the previous example atop a tubular mast 50ft high and 2in in diameter would give:

$$\frac{50}{3} \times 100^2 \times 0{\cdot}0025 \times \frac{2}{12}$$

or approximately 70lb for the mast plus 83lb for the beam or a total of 153lb.

If the intended structure is much over 50ft in height then it would be wise to carry out the calculations in more detail. A textbook by R. V. Giles, *Theory and Problems of Fluid Mechanics and Hydraulics*, Schaum Publishing Co, New York 1962, is highly recommended and should be obtainable through the local library. It contains numerous worked examples and tables from which the wind pressure on objects such as corner reflectors or dishes could be calculated. Reference might also be made to the *British Standard Code of Practice* for functional requirements for buildings CP3, 1952, if something really elaborate is contemplated. Suppliers should be able to give windage figures for commercial beam arrays on request.

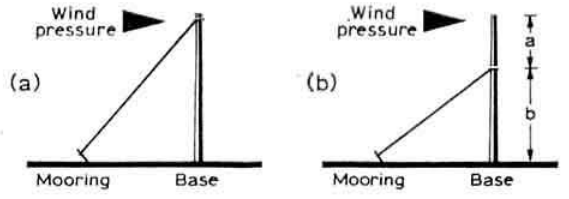


Fig 1. (a) Tension in the guy is $\frac{\text{Wind load} \times \text{length of guy}}{\text{Distance of mooring from base}}$
(b) As the guy is moved down the mast the tension increases by $\frac{a + b}{b}$

Additional guys at a lower level prevent bowing of the mast. All guys may be of equal strength if a breaking strain of six times the calculated tension is assumed

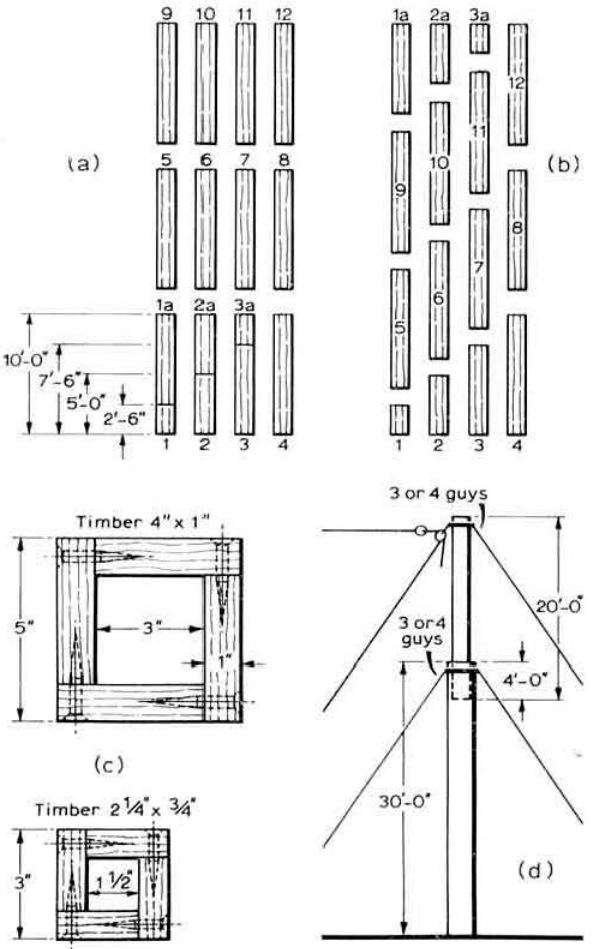


Fig 2. Details of a 46ft box mast. (a) and (b) show how the planks are arranged for assembly for one section: the upper section is assembled in a similar manner. (c) is the cross sections and (d) the elevation of the complete mast

Two final points to bear in mind when considering windage; the effect of snow and ice building up on and between closely spaced elements, and the area of brackets and fixing plates on the aerial; however, in all but extreme weather conditions these should be taken care of by employing guys with a breaking strain of six times the expected working load.

Masts

These certainly come in all sizes and various materials, although the 2in diameter (actually 1 $\frac{19}{32}$in) dural scaffold pole is in most common use.

We were reminded by G6LL of a once quite popular method of construction, the timber "box" mast. This is

still a good proposition for long wire aerials although, with the present high price of good timber, it is no longer the cheapest way of building a tall mast. The general arrangement, taken as a matter of interest from the *second* edition of the *RSGB Amateur Radio Handbook*, p259, is shown in Fig 2 and consists of flat boards assembled into a hollow square with the upper part of the mast (made in the same way) fitting inside the wider lower section. Deal may be used provided it is of good quality, straight and seasoned and free from splits and large knots. Pine or larch would be better, although somewhat heavier. Two widths of board are required in order that the smaller top section may fit inside the outer, overlapping about four feet. By cutting three of the lower lengths of timber, for which the best material should be selected, into the lengths shown in the diagram, staggered joints are produced up the length of the mast. The box sections should be screwed together at two or three foot intervals, clearance and countersunk holes being bored in the outer faces. For maximum durability it is essential that all timber be painted both before and after assembly. G6LL had two such 50ft masts in use for over 25 years. Two sets of three guys fitted, respectively, at the top and at the 30ft level would be the absolute minimum for the 46ft mast depicted, and three sets, each of four guys, would be preferable. With masts of this size and weight erection must be carefully planned and a "tabernacle" or some form of hinge fixed securely to the ground at the base of the mast is essential. Information concerning guying, anchors and erection will be found under another section of this article.

Another form of timber mast, suitable mainly for fixed wire aerials, is the so-called "A" type shown in Fig 3. Five lengths of 16ft by 2in square deal or pine will form a mast 44ft high, about the limit for this form of construction.

An "A" type mast 45ft high, but made from four 20ft lengths of SGB scaffold poles held together by standard scaffold clamps, was described by G8ARC. This mast carried two 18-element beams for 70cm and 8 and 4-element Yagis for 2 and 4m respectively, so the top section was made rotatable. Two 20ft sections were first fixed 2ft 6in apart at the top by using that length of 2in scaffold pole cut from one of the 20ft lengths. Some 8ft lower down, the side members were secured to a further length of tubing 3ft 6in long, and at the bottom of each leg was fixed a 14swg aluminium plate 2ft square. These plates were subsequently buried about 12in deep in the soil. The frame so far constructed was then erected vertically and made secure by means of guy wires—5-ton breaking strain scaffold bands—attached in pairs to the ends of the 2ft 6in and 3ft 6in spacer tubes. It was then possible to reach the top cross member by means of a ladder. A clamp, designed to secure two scaffold tubes at right angles was mounted thereon, spacers being inserted to prevent the clamp gripping the horizontal tube tightly. The remaining 14ft length of tubing was then gripped in the other part of the clamp 10ft from its end and free to rotate about the cross member. The remaining 20ft of tubing was then attached by means of a J-Beam coupler to the 4ft end of the pivoted tube and the various beams fixed in position.

For erection a heavy weight and a rope were fixed to the free end of the mast which was then held upright by a third set of four guys fitted to a plate resting on a collar on the mast just below the lowest aerial array.

The lower end of the mast was supported in a thrust bearing mounted on a thick aluminium plate secured to a pair of tubes clamped across the "A" section. To permit

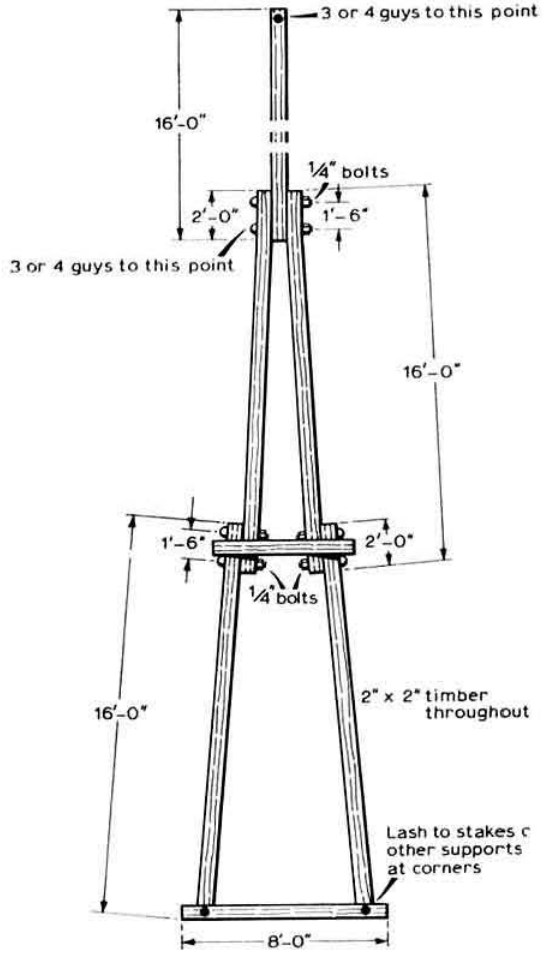


Fig 3. An "A" type timber mast. A minimum of three guys is required at the points indicated. The advantage of having four guys is dealt with in the text

rotation the functions of the clamps on the top cross member were reversed, ie that which, during erection, was loose on the cross bar was tightened and the spacers transferred to the other part of the clamp. Details of the guy anchorages employed will be found under the appropriate section of this article.

As an example of sheer ingenuity overcoming the physical difficulties of a site, G2BHN's installation merits, we feel, a full description.

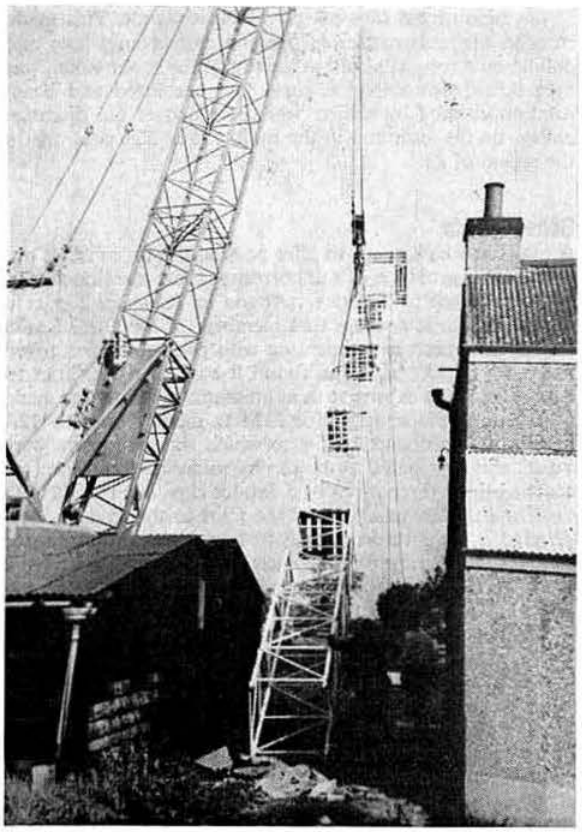
The problem was to erect a rotatable mast in the only possible position—through the roof of the house. This also involved building the mast itself in the roof-space, so it was necessary to fabricate the former in sections.

The slate roof was cut through using a hacksaw blade, having previously drilled and tapped (2BA) the slates in the vicinity to prevent them collapsing. Two such apertures were made, the second being a trapdoor to permit access to the beam. The mast, constructed throughout in 3in by 2in deal, comprised three sections; the top and bottom sections being

single lengths of timber and the centre two lengths bolted one on either side of the others with about 18in overlap. The total length was 25ft with the top of the mast 45ft above ground. Having three sections enabled the structure to be manoeuvred through the roof aperture. The base of the mast rested on a suitable bearing fitted into a timber structure fixed on top of one of the internal brick dividing walls so that no weight was taken by the joists. A further 8in diameter ball race was fitted to the mast just below the slates, mounted on another timber framework secured to the roof timbers.

Waterproofing presented some problems but was effected by means of a sheet of rubberised material secured to the mast and rotating with it, the "skirt" being sealed to the roof. This installation, first put up in 1959 and dismantled for maintenance and a change of aerials in 1965, gave complete satisfaction during that time. Rotation was by rope and pulleys to the radio room immediately below. The problem of providing a pulley of adequate diameter on the mast was solved by screwing eight wooden struts to the bottom section so that their ends crossed and formed a vee in which ran the nylon cord used for rotation.

Further on the subject of waterproofing a mast through a roof, one member solved the problem by using two yoghourt cups (size not stated). One was fitted to the 1¼in diameter mast and the other just below, packed round with roofing felt and cemented to the roof. In this case the feeders for the beams were brought down inside the mast.



The 108ft tower at G3REH being raised into position with the aid of a 35ton crane

A method of guying a mast while making provision for easy raising and lowering of the same was described by G8BJZ/G6RGY/T. This installation comprised a 35ft 2in-diameter dural mast carrying a six over six 2m and an 18-element 70cm Parabeam with the rotator situated just below the aerial arrays. The lower end of the mast was attached to a sleeve sliding on a permanently erected subsidiary pole 20ft high and made of similar material standing on an old car half-shaft driven into the ground, bracketed to the side of the radio room and further supported by three guys near the top. A pulley was mounted just above the guy attachment and a length of ¼in multi-stranded steel cable passed over this to a point on the main mast about 20ft up. The other end of the cable was taken to a winch bolted to the subsidiary mast at a convenient height for operation. When the main mast was hauled upright by the winch it could be raised some two inches on the sleeve and a bracket immediately above the point of attachment of the cable engaged in the top of the fixed pole. The upper guys, all of ¼in multi-strand steel cable, were then made off to their various anchorages.

Back in 1950 G5RI obtained, for £5, an ex-GPO 35ft telephone pole to which he bolted a similar length of scaffolding to make a mast 55ft high forming one support for a 230ft per leg vee beam. The mast has proved a most satisfactory arrangement over the years and is highly recommended should one be able to obtain such a pole these days. The only maintenance required is a yearly dressing of creosote at ground level, and as the pole referred to was dated 1907, there need be no concern as to its lasting properties.

Towers

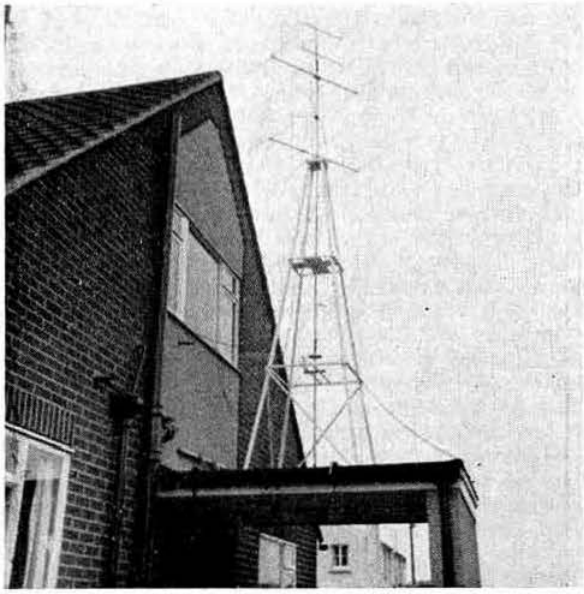
It is felt that some definition is required as to what constitutes a tower, because many structures referred to by their owners as towers are, in fact, lattice masts although, of course, none the worse for that. The true tower would seem to be a triangular or square fabric which is essentially self-supporting, although it may be guyed for additional safety, whereas lattice masts require guying or other forms of support for at least part of their length.

The distinction of having a tower to support one's aerials is regarded by many amateurs as the ultimate luxury but comparatively few manage to achieve this ambition. The reasons are not far to seek. Obtaining planning permission for a really large tower in a residential area is, to put it mildly, unlikely, but out in the country it might be quite a different matter. The cost of one of the excellent professionally built specimens puts them out of court for many, and even if the structure is fabricated by the amateur himself, as many are, the cost of materials and of erection can be substantial. Some of the commercial items are of the "tilt over" variety where the upper section is pivoted at the top of the lower, permanently fixed, part and, by means of a winch or suitable tackle, may be lowered to the ground to enable the aerial array to be fitted or adjusted. Quite a few designs for really ambitious towers and lattice masts have been described in the American radio publications and it may be that permission to erect such structures is easier to obtain in the USA than on this side of the Atlantic.

Certainly the most ambitious tower of which details were supplied was that built by G3REH. Standing 108ft 6in high with a 2in scaffold pole 11ft 6in long fitted to the top, the

vhf and uhf beams were around 120ft in the air although only 128ft asl in the countryside near Spalding, Lincolnshire.

The main structure measured 3ft on each of the four sides and was constructed of 2in square hollow RHS steel members with the horizontal and diagonal struts made from similar one inch material. Access to the gallery at the top was by means of 21ft ladders fixed to alternate sides of the tower. The total weight was some 25cwt and the foundations consisted of a 4ft cube of concrete with other substantial



The neat and effective rotary aerial system at G2WS, Weston-super-Mare

blocks forming the guy anchorages. The original plan was to have four ½in wire rope guys, each of 7·4 tons breaking strain, but the insurance company was only prepared to give cover for the owner's house, in addition to third party, if each of the guys was doubled, so in the end a total of eight guys was fitted, two at each corner of the tower.

As a matter of interest, the cost of the metal for the tower itself was approximately £150. The whole of the metal work was painted with white polyurethane and the galvanized wire ropes dipped in bituminous paint before erection.

Getting such a structure upright was, obviously, no easy matter but was carried out by hiring a mobile crane with an 80ft jib and a lifting capacity of 35 tons. For the information of anyone contemplating such an operation it may be said that the crane itself weighed no less than 40 tons, so access to the site might become a problem, and, at that time, cost £7·50 per hour to hire.

At a site 1,300ft asl, G3GEW employed an American Spalding tower of triangular section 32ft high with a 20ft pole extension at the top, only the latter being guyed. The base of the tower was clear of the ground and supported by two railway sleepers set upright in concrete through which passed a ½in steel bar, the bearings on the tower being two ½in steel plates bolted to one side 5ft 6in from the base.

Several towers constructed of steel angle were described, a typical example being that of G8BBB; 32ft in height with a 20ft scaffold pole protruding 12ft from the top with the electrical rotator at its base. The tower was self-supporting and was built from 1½in galvanized angle, 3ft wide at the base tapering to approximately half that width at the top. All horizontal and diagonal struts were of 1in diameter steel pipe held by ⅜in bolts at all joints. A 4ft cube of concrete formed a substantial base to which the structure was secured by 9in Rawlbolts. The cost, some years ago, amounted to £30 for the tower and £5 for the concrete base. Erection occupied two men for 6½ hours. The load carried by this structure consisted of a Parabeam and 8 over 8 for 70cm, a 2m 10-element Skybeam, a four-element Yagi for 4m and a 20 over 20 for 23cm. Maintenance includes keeping all the nuts and bolts well greased.

G5RI's tower measured 40ft high, weighed 15cwt and was erected by means of a mobile crane which held the tower vertical while it was bolted to lengths of angle set into a concrete base. Although essentially self-supporting, three 8swg fencing wire guys were fitted to the top for additional stability. The cost of materials, some years ago, was £100. For protection the metal work received a coat of bitumastic paint every four years.

A more modest, but none the less effective design was built by Bill Scarr, G2WS, in 1965. This consisted of four 12ft lengths of 2in square timber with a dural pole through the centre carrying the vhf and uhf arrays. The form of construction is well shown in the accompanying photograph.

The base of the tower is connected by means of three hinges to the edge of the car-port on which it stands. This made erection a simple matter of pushing with a long pole and pulling on a rope attached to the top of the tower which was then bolted down. Nylon rope guys are fitted and beam rotation effected by similar rope passed over 6in diameter pulleys on the mast and in the radio room. The cost was in the region of £2.

Other masts

A material which seems to offer possibilities for masts is pvc rainwater pipe. None of our correspondents mentioned this, but a reference to its use was found in *Technical Topics* in October 1968. It appears that members of the Otley Radio Society had been experimenting with pvc tubing for guyed masts up to 30ft high and found it easy to work, light to carry and not as expensive as aluminium. Mention was made of a ground plane aerial for 21MHz made from two 12ft lengths of 2in diameter tube to which six conductors were taped, and terminated at the top by soldering to an inverted tin can and at the bottom by a Jubilee clip. The radials were held in a similar manner and the joint to the feeder waterproofed by an upturned polythene bucket. It is interesting to note that the bandwidth of the aerial was similar to that of a solid 2in diameter radiator. Guys were fitted to the top section.

If the pvc pipes available are not provided with preformed joints, these can be made by warming the end of one pipe and pushing the other into it, making a tight joint which may be made and broken as required.

Telescopic masts are well known in the professional field and after the last war there were a few examples to be found on the surplus market. The majority of these were mechanical in operation, the various sections being extended one after another by means of cables and a winch. Other extensible masts operate hydraulically, and some very fine examples form part of PO and BBC equipment.

In March 1963 the *RSGB Bulletin* published a design for a hydraulically operated telescopic mast originated by J. C. Ayling, G3PNA. While space does not permit repeating the whole of the original article, the main points were as follows:

The mast, when fully extended, was 40ft high and comprised a 14ft bottom section of standard dural scaffold pole and two other sections each about 14ft long of galvanized welded electric conduit of 1½in and 1¼in outside diameter respectively. The three tubes were sliding fits one within the other and leather washers fixed to caps brazed to the lower ends of the two upper tubes rendered them watertight. When water was pumped into the base of the lower section by means of a modified tyre pump, the top section was raised, followed by the centre member. Holes were provided near the tops of both the lower and centre elements to allow the water to escape at that point to prevent the tubes from extending too far. Provision was made to clamp the sections when extended or at any point short of full extension. Four guys brought to four common points at the corners of a 14ft square provided the necessary stability, and the mast could be fully raised in 12 minutes or lowered in two minutes. At the time the original article was written the mast had given four years of trouble-free service and had been used for several portable events.

A crank-up telescopic mast was described in the *RSGB Bulletin* in January 1965. It was designed and built by the Rev J. L. R. Crawley, G3LBX, and had been in use for two years carrying a Mosley TR33Jr three-element beam at a height of 50ft at an exposed site on the Northumberland coast, which seemed to provide fair proof of its ruggedness.

The mast was fabricated from three lengths of steel tube each about 18ft long, the lowest section being of 3in diameter and the others approximately 2½ and 2in respectively. The annular space between each tube gave clearance for the cable used to haul it up. At the top of each section three iron rings were welded at 120° intervals to provide anchor points for the three sets of guys made off, on the ground, to steel pipes driven well in. In the case of the bottom and middle sections one of the aforementioned iron rings also carried a sheave pulley block over which the hauling cable passed from a winch at the base of the mast, through a hole in the tube, under a further pulley fixed in the base of the next section and out through a hole on the opposite side of the tube, there to be made fast to another of the rings. Two simple winches were fitted, one raising the middle and the other the top section. The rotator was located at the top of the mast immediately below the beam. The base of the mast was carried on a steel pin passed through two pieces of 3in steel angle set upright in concrete and, to permit the whole mast to be used as a vertical radiator on 80m, the pin was insulated where it passed through the mast. The guys were, of course, also insulated from the mast.

(to be continued)

EQUIPMENT REVIEW

by P. J. HORWOOD, G3FRB

The Heathkit SB620 spectrum analyser

JUST £73 for a spectrum analyser! The mere thought intrigued the reviewer and he was glad of the chance to review it. Bearing in mind that professionally he had recently been concerned with the purchase of analysers costing in excess of £3,500 he was somewhat sceptical of its possible performance and value; but conclusions are deferred to the end of this review.

On receipt of the Heathkit SB620 spectrum analyser the reviewer was momentarily dismayed to find it was indeed a kit, but on consideration decided that it would be a good opportunity to make comment on the ease of assembly and alignment. It is hoped this will interest readers who have not had experience of Heathkit products.

Assembly

The very competently-written manual was followed to the letter in all respects, commencing with checking all components down to the last washer. There was an excess of three washers and two screws, although even a few more would have been welcome—almost everybody drops the odd one or two on the shack floor. It would also have been more helpful if the parts list had check boxes alongside each item for a pencilled tick. Checking took two hours.

Mechanical assembly of chassis and panel, valve-holders, tag strips, mains transformer, i.f. transformers and potentiometers etc required three hours. No problems whatever were experienced; the manual was very explicit.

Electrical assembly and wiring was commenced in a flush of enthusiasm which lasted throughout the process. Provided a constructor is not a complete tyro no problems should be experienced, but obviously the more skill one has, the tidier job it will become. As far as the type of components allowed, the reviewer adopted a Ministry of Defence DEF 5000 style, rather tight to the chassis, so some specified wire lengths were slightly excessive. In the vicinity of the crt horizontal deflection amplifier the component density is rather high, probably exacerbated by the reviewer's tight style.

Wiring and small-part assembly took eighteen and a quarter hours.

The manual describes alignment methods with and without test gear, so the reviewer decided to align at home without equipment (apart from a receiver) and then repeat the process later with all the facilities provided by a laboratory.

The circuit and options

At this point it is desirable to describe briefly how the analyser works and the various options open to the constructor in relation to its operating frequency.

The block diagram is largely self-explanatory, but some explanation of the options in connection with V2 is necessary. Professional (and expensive) analysers have front-end converters so that the instrument can be tuned to any incoming frequency from tens of kilohertz to tens or hundreds of megahertz. The SB620 must be wired to a choice of frequency between 455kHz and 6MHz, the frequency selected would normally be the i.f. of the owner's communication receiver, the receiver thus providing frequency conversion within its coverage. This mode of use allows the analyser to be used as a band-scanner or panoramic adapter, so that part of an amateur-band may be surveyed for signals or unoccupied frequencies. Normally, if a receiver is provided with an i.f. output socket this is connected to the i.f. stage immediately before the demodulator where maximum selectivity is obtained. In the case of band-scanning, the wider the bandwidth, the larger the slice of band that can be surveyed; the Heath manual gives useful details of methods of connecting to the receiver i.f. immediately after the mixer where selectivity is widest. When used as a test instrument V1 becomes a mixer; a general coverage signal generator would be employed as a local oscillator.

The reviewer's receiver has an i.f. of 455kHz, the SB620 was accordingly wired for this frequency. A varicap diode is used to frequency modulate the sweep oscillator V2B, the maximum width of sweep depending on the choice of i.f. This occurs only in the variable sweep-speed position but in the two other positions of the switch the saw-tooth voltage fed to the varicap is preset by two selectable resistors chosen in accordance with the i.f. frequency. Thus the nominal front-panel markings of 10 and 50kHz are maintained. The station receiver was already provided with an i.f. output socket, but as this connected to the end of the i.f. chain the author was unable to fully exploit the maximum band-scanning capability. In addition to this use, several others are potentially possible when connected to a receiver, such as looking at an incoming signal's intermodulation product level. This, of course, would require the other operator to drive his transmitter with a two-tone signal, but one would not expect to see IPs in the middle of a busy dx band.

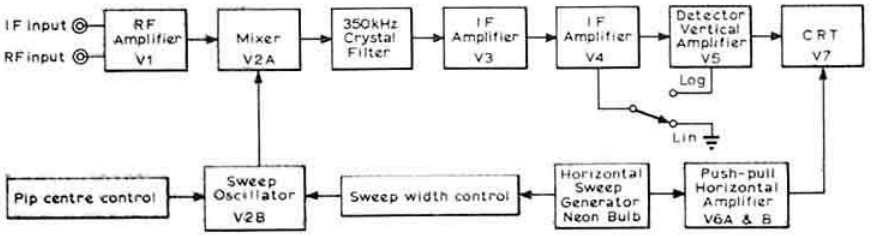


Fig 1. Block diagram

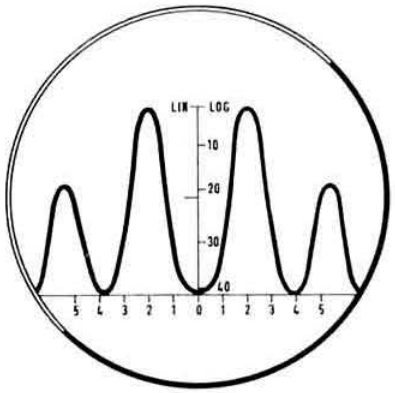


Fig 2. Typical scan of ssb two-tone signal with third order intermodulation products

Using a receiver as a frequency converter rather than a signal generator, it is possible to examine one's own transmitter's signal, but care is required in avoiding the generation of IPS in the receiver itself. Prevention of overload of the receiver's rf stage is essential; this can be a salutary lesson in the intermod capability of your receiver! When VI is used as a mixer with an external signal generator few problems arise; as the sweep oscillator is on the hf side of the i.f. signal the sideband is inverted, but if the signal generator is adjusted to incoming frequency *plus* i.f., normality will be restored.

This also applies to use with a receiver; with a single-conversion superhet with local oscillator on the high frequency side, an incoming usb signal will be correctly displayed on the right of the tube centre line. For more complex receivers a user would have to work out the number of inversions, not that there is any intrinsic reason for avoiding sideband inversion, as long as one knows whether it occurs or not.

Alignment

Surprisingly, no real improvement in performance could be obtained by subsequent alignment with test gear after preliminary adjustment without; that is, with the exception of the internal 350kHz i.f. trap. Test gear did allow accurate measurement of the performance however. All home alignment was carried out with the sole aid of the station receiver. Here a slight divergence from the recommended method of adjustment of the swept oscillator frequency was employed. The signal was picked up on the receiver and "chased down the band" until it centred on a frequency of 455kHz *plus* the internal 350kHz i.f. (805kHz). It was found impossible to adjust to this frequency without adding a further 10pF across the oscillator coil; this may have been caused by a reduction in stray capacitance due to the reviewer's short wiring technique.

It should also be added that while the logarithmic amplifier could be adjusted by the recommended method, the author was more reassured when he was able to check it with an accurate external attenuator. The accuracy was remarkably good, within ± 1dB of the graticule marking.

Performance specification

The typical performance is fully specified in the manual. See the table below for detailed measured performance.

As mentioned above, the vertical calibration was excellent, the horizontal (frequency) calibration was acceptable but non-linear, due no doubt to the very simple neon saw-tooth oscillator and no attempt at linearizing the characteristic of the varicap diode. In practice this was of little consequence.

Two fixed sweep rates are provided, 0·5Hz and 2Hz, plus 5Hz to 15Hz variable. A very useful facility is provided by pushing in the horizontal-position knob; this speeds up the two slow scan rates and allows rapid centring of the trace. Here, the only faulty component was discovered. The push-switch on the potentiometer was not operative but was disassembled and repaired rather than wait for a replacement. The internal double crystal filter had a measured bandwidth of 200Hz and was easily adjusted for a good symmetrical response. This bandwidth establishes the resolution of a spectrum analyser and in this case allowed two or more signals with frequency differences of as little as 1kHz to be viewed. It takes a very expensive instrument indeed to display smaller differences, such as 100Hz hum sidebands.

Measured performance

(With nominal 455kHz input signal)

Sensitivity

Pip gain (vertical gain) at maximum for deflection to 0dB on graticule.

Linear amplification	10kHz scan:	140μV
	50kHz scan:	56μV
Logarithmic amplification	10kHz scan:	1mV
	50kHz scan:	560μV

Variable scan width range

nominal 10kHz	minimum 3kHz	maximum 26·5kHz
nominal 50kHz	minimum 4kHz	maximum 82·5kHz

Range of pip-centring control	—5kHz, + 4kHz
Logarithmic calibration accuracy —20dB desensitisation position	within 2dB accurate at 10kHz scan 24dB at 50kHz scan
Linear calibration accuracy	at —6dB mark, zero error

The SB620 in use

The Japanese long-persistance cathode-ray tube gave a good sharp trace (there are adjustments for focus and astigmatism) and the afterglow was long enough even when using the 0·5Hz scan rate.

When used as a band-scanner a fairly fast rate of scan was used so that the trace was rapidly "updated", but when making measurements as a spectrum analyser the slowest scan was used, for the narrow filter and time constant of the vertical deflection amplifier would otherwise limit the height of scan and cause errors. This is of course common to even the best instruments.

The handbook is very useful in explaining many applications.

A typical trace of a two-tone signal with third order IPS is illustrated above. When examining unwanted sideband and carrier suppression it is useful to switch to the 20dB vertical attenuation position, setting the pip gain so that the tones reach the 0dB mark. By switching back to the normal vertical logarithmic position a total range of 60dB is thus available, enough to display the level of suppression in all but the most perfect transmitters.

Conclusions

Considering the comparative simplicity of the circuitry, performance was remarkable. One can only add that the SB620 proves that valves are far from things of the past. Applying the principle that it takes at least three transistors to replace one valve, it would have been a much more complex instrument had it been solid state, with all the attendant difficulties of obtaining an adequately-high input impedance and providing overload protection. This is a constant hazard with transistorized test-gear required to be used in close proximity to transmitters.

The SB620 would be an extremely useful addition to an amateur station, particularly to the home designer and constructor who really wants to know the truth about his signals; however, it would also be useful for owners of commercial equipment.

Not every amateur can afford the reasonable price of £73 even though it is far from a luxury; the reviewer would recommend every radio club to purchase one without delay.

It is compact and light (Dimensions 6⅝in high, 10in wide, 10½in deep. Weight 10lb) and extremely attractive with the standard Heathkit blue crackle front panel. Initially the reviewer was disappointed to find there was no rear cover to the case, particularly as the tube runs at 1·5kV, but the socket is fully insulated and it is virtually impossible even deliberately to contact any high voltage points.

As a final accolade, at least one radio communications equipment manufacturer is considering the use of these analysers by field service and installation teams at home and overseas.

EQUIPMENT REVIEW

by R. F. STEVENS. G2BVN

The Yaesu YC-305 counter

IN direct contrast to the trend of many commodities and services, the price of frequency counters continues to drop, and the Yaesu unit, despite revaluation of the yen, was the subject of a recent and sizeable cut in cost. While primarily designed for the amateur radio market, the YC-305 will also fulfil the requirements of less complicated applications in the professional field.

The Yaesu YC-305 Counter

Frequency range:	5Hz—30MHz
Dimensions:	8⅛in wide, 3¼in high, 10½in deep
Weight:	8lb
Price:	£79.50
Obtainable from:	Western Electronics, Osborne Road, Totton, Southampton SO4 4DN. Tel: Totton 4930

Electronic features

The YC-305 is a portable instrument designed for the measurement of frequency between 5Hz and 30MHz. Display is by five indicators but a MHz/kHz range switch provides eight-digit accuracy, ie a frequency showing as 12·345MHz with the switch in the MHz position can be further identified as 12·345678MHz by operation of the range switch to kHz. An over-range lamp will flash if the input frequency is greater than 100kHz when operating in the kHz switch position. Input to the counter is by a front panel BNC socket and applied voltage may range between 20mV and 20V peak-peak for continuous working. A front panel switch selects either high (1M Ω) or low (50 Ω) input impedance. An output from the crystal controlled clock oscillator is brought out to a phono socket on the rear apron and provides a 1MHz signal at 5V peak to peak. This also provides the facility of setting the 1mHz oscillator against a standard.

With any frequency measuring counter there are two possible sources of error, ie the random gating error and the error of the reference oscillator. In any digital system where there is a random phase relationship between the gate control waveform and the signal being gated there is an inherent error of plus or minus one count in the final result. The degree of accuracy that can be obtained is determined by the reference oscillator. The specification of the instrument quotes the oscillator stability, since the accuracy will be determined by the setting of the trimmer which must be adjusted to compensate for the ageing qualities of the crystal. In many cases an off-air standard using the Droitwich 200kHz transmission is used to set up the reference oscillator.

An unusual feature of the YC-305 is a built-in dc to dc converter which enables the instrument to be used with a 12V dc supply in addition to the normal range of ac inputs. Power consumption on dc is 1A.

When using an ac supply of either 100-120V or 200-240V the 9·5V power transformer output is rectified, filtered and regulated to supply 5V to the integrated circuits. The 190V winding supplies two 10V for the neons and indicator tubes.

On dc the integrated circuits supply is derived from the 15V input. A 50Hz push-pull drive is provided for the two converter transistors which in turn drive the 9·5V winding to produce ht for the indicator tubes.

Mechanical features

The counter is housed in a lightweight metal case, attractively finished, and with a combined handle and tilt bracket. Function switches are of the push-on/push-off type located on the front panel. Double-sided epoxy circuit board is used throughout to ensure equipment stability. The unit comes

complete with ac and dc power cords, a test lead with BNC connector and a phono connector.

Application

This instrument can be used for direct frequency measurement in the amateur station. It will also prove invaluable for test and servicing purposes. It can be said that most constructors who have access to or own counters would now find it extremely difficult to dispense with this valuable tool.

The use of frequency counters during transmission and reception purposes has already been covered in a previous review to which the reader is referred.[1]

Final comments

The instrument is accompanied by a 13-page instruction book, together with a supplementary booklet containing half-tones and line diagrams. Basic servicing information is provided and integrated circuit substitutes are suggested. No specific guarantee is provided by the manufacturer but faults attributable to defective components or manufacture will be rectified by the UK agents.

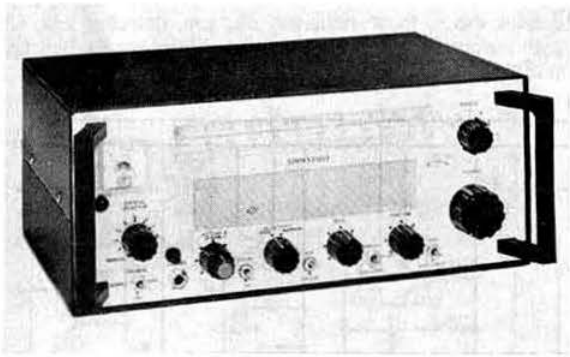
The Yaesu YC-305 is a recent and economical addition to the range of frequency counters suitable for the amateur station.

The review equipment was provided by Western Electronics (UK) Ltd, Osborne Road, Totton, Southampton, SO4 4DN.

Reference

[1] "The RCS type 501 timer/counter", *Radio Communication* April 1972, page 218.

NEW EQUIPMENT



Eddystone 1000 series receivers

Eddystone Radio announce a completely new range of medium price receivers designed on a modular basis to cater for a wide variety of applications. The performance of the 1000 series equipments has been designed to meet the requirements of the professional user while the cost is not out of the reach of the amateur. UK prices range between £200 and £300 according to type.

The five models which have been announced are:

Model 1000 Basic model—general purpose hf/mf communications receiver.

Model 1001 Similar to model 1000, but with up to 10 crystal controlled channels.

Model 1002 High quality broadcast receiver covering hf and mf bands with amplitude modulation, and the vhf band with frequency modulation. Stereo reception is provided in the vhf band.

Model 1004 Receiver designed for maritime applications. Approved as reserve receiver for use on ships.

Model 1005 General purpose receiver designed to provide facsimile reception. Crystal controlled.

A summary of the data for the model 1000 is given below.

Frequency coverage
550kHz to 30MHz in five ranges.

Range 1	18-30MHz	Range 4	1·5-3·8MHz
Range 2	8·5-18MHz	Range 5	550-1,500kHz
Range 3	3·6-8·5MHz		

Intermediate frequency
455kHz. BFO coverage: 455kHz ±3kHz.

Reception modes
A1, A2 and A2H telegraphy. A3, A3A, A3H and A3J telephony with upper sideband or lower sideband selectable in ssb mode.

Scale accuracy
One per cent on all ranges.

Aerial input
75Ω on Ranges 1-4, 400Ω on Range 5.

Power supplies
DC 12V from internal re-chargeable nickel-cadmium battery for short periods of operation, or 12V from external battery of higher capacity. Also available to special order for use with 24V supply in lieu of 12V. Consumption (12V) 38mA quiescent, 230mA at 1W output.
AC 100/125V or 200/250V (40-60Hz). Consumption approximately 12VA.

Dimensions and weight
Height: 137mm (5·375in).
Width: 335mm (13·2in).
Depth (excluding projections): 242mm (9·5in).
Weight (including battery): 8·2kg (18lb).

Controls
Main tuning. Fine tuning. Range switch. Mode switch. Selectivity. I.F. and AF gains. BFO pitch. AGC switch. Meter/dial light switch. Standby switch (desensitizing). Supply switch CHARGE/SUPPLY OFF/ON).

Further information can be obtained from Eddystone Radio Ltd, Alvechurch Road, Birmingham, B31 3PP.

Catalogue received

Electroplan Ltd, a company forming part of the same group as RS Components (formerly Radiospares), has recently distributed copies of its new 20-page catalogue to clubs affiliated to the RSGB. This new company markets instrumentation products and accessories, among which are several products of interest to radio amateurs, including soldering irons, digital multimeter, counting dials, and power supplies. The catalogue is available to club secretaries and may be obtained from Electroplan Ltd, PO Box 19, Orchard Road, Royston, Herts SG8 5HH.

Consumer integrated circuits in amateur design

by J. R. HEY, G3TDZ*

Part 1. A.M. receivers

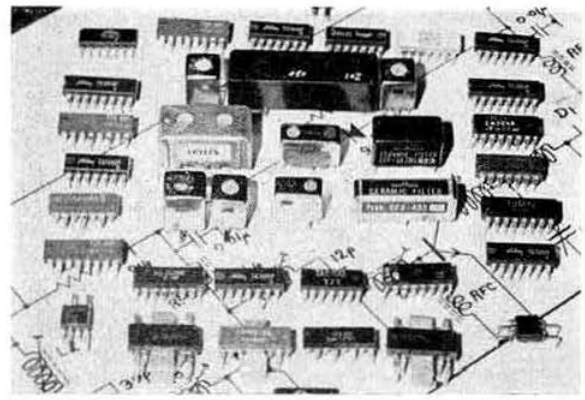
WHETHER individuals like them or not, integrated circuits are here to stay and the amateur radio fraternity is already becoming familiar with this rapidly expanding technique. For portable equipment, the ic has much to offer: its small size and weight have obvious advantages while a high degree of circuit complexity already done takes much of the donkey work out of design.

At first, amateur constructors utilized spin-off devices from the computer business; operational amplifiers and digital ICs have been put to many curious purposes. Since then the most excellent professional communication ranges by Plessey and National Semiconductors have granted to amateurs a chance to ascend into the super class. There is little doubt these new devices answer many problems at a price which the serious constructor will consider justified and gladly afford. However, while discussing the problems involved in designing a new 2m portable transceiver at a club gathering, it became clear that many amateurs distrust their own workmanship sufficiently to risk spending many pounds on a new project, especially with frightening things like ICs.

Not so often brought to light is an ever increasing family of ICs made for the domestic or consumer market and hence down to a much more attractive price. Are these ICs any use for amateur needs and will their performance match what amateurs now expect from their station equipment?

Perhaps the first to make its bow was the Mullard TAD100 and its stable-mate TAD110. These have been adequately described here and elsewhere [1] [2] and many amateurs are now employing them in receivers and tunable IFs. Since these were introduced, other manufacturers have shown their wares, and a representative selection will now be examined one by one. Should any manufacturer feel neglected, information on his products will be greatly appreciated.

* Armley Grange Crescent, Leeds, LS12 3QL.



"On parade". A selection of filters and ICs made for consumer applications

The Mullard TBA570

The TBA570 theoretical circuit shown in Fig 1 indicates just how much is packed into the 16DIL chip. The circuit contains mixer, local oscillator, i.f., a.m. detector, agc, af up to output stage, and a limiting amplifier for feeding an fm discriminator.

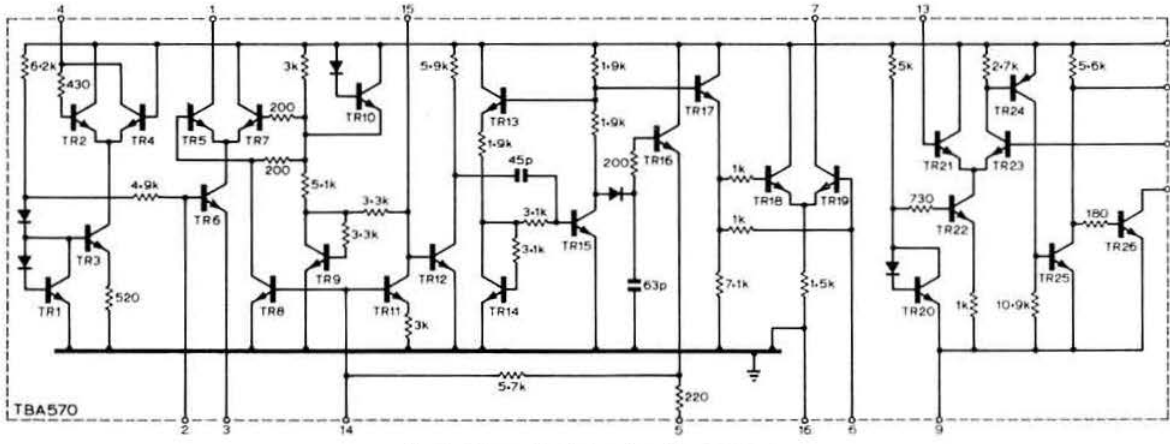


Fig 1. Theoretical circuit of the TBA570

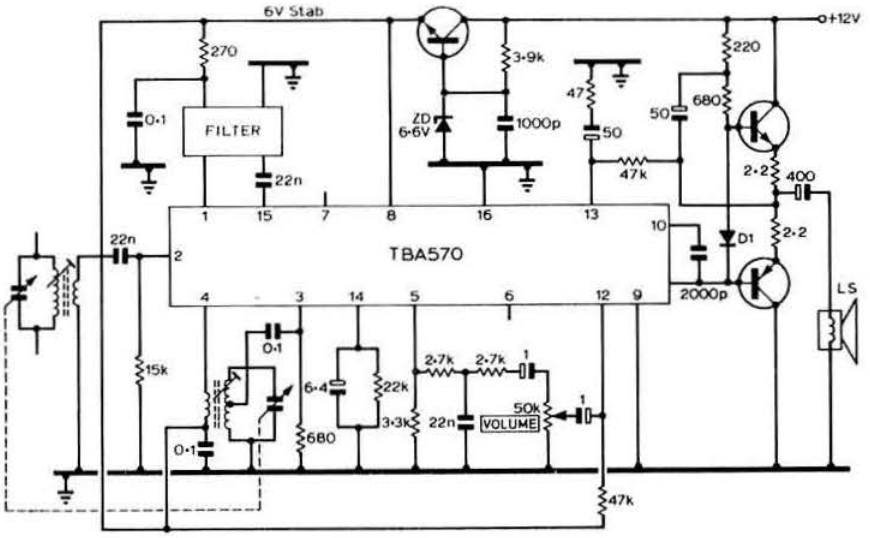


Fig 2. Receiver circuit modified for 12V operation using the TBA570

Mixing takes place in TR6, the i.f. output appearing at pin 1, TR5 collector, one side of a long tail pair. Signal frequencies enter at pin 2, TR6 base, with oscillator injection into its emitter at pin 3.

As the audio drivers are all on the same chip, it is not recommended in view of oscillator stability that the built-in oscillator be used above about Top Band frequencies. A suitable external vfo such as a Vackar or Clapp may be fed into pin 3; pin 4, the internal oscillator collector, being neglected.

A modern ceramic block filter is favoured to shape the i.f. characteristic and is fitted between the mixer outlet at pin 1 and i.f. input at pin 15. No further tuned circuits are required, the i.f. amplifier ending in an active a.m. detector with output at pin 5. This point is also the source of agc of which the makers claim 60dB for a 10dB expansion in audio.

Only TR12 and TR15 produce i.f. amplification, the remainder forming bias supplies. TR8 and TR11 are the agc amplifiers.

An interesting addition is TRs 17, 18, 19 which form a limiting amplifier for feeding an fm discriminator transformer via pin 7, when pin 6 should be decoupled by a suitable capacitor, say 0·022μF.

As many ICs specially made for fm are readily available, and which do not need discriminator transformers, should this mode be desired, to what other purpose could this section be put? Upon inspection, TRs 18, 19 are found to form a long tail pair, and it occurred to the author that these could be put to use as a product detector. Injecting some 200mV from a bfo at pin 6, placing a 2·2kΩ load between pin 7 and supply, with a 0·047μF as rf filter, some success resulted. As the circuit was originally intended as a limiting amplifier, could it be re-linearized? A simple 27kΩ resistor between pin 6 and earth resulted in a beautiful T9 note from the rf signal generator. It must be admitted that much better product detectors exist but the circuit did work quite well.

The remainder of the ic consists of an audio amplifier up to driver level; a pair of germanium transistors and a few components completing the circuit. For the output transistors, AC188/187s are recommended; in the test rig a pair of AC128/176s was utilized successfully.

The audio amplifier follows simple operational amplifier technique with a differential input requiring a centre line reference. In the manufacturer's data a receiver designed for 6V operation is described, requiring fairly careful selection of components as there is little spare voltage to play with, also with careful decoupling necessitating some large value capacitors.

A 12V system was tried as shown in Fig 2, but as the i.f. section is designed for 6V only, a simple zener stabilizer was included which not only fixes the af centre line but is ideal for feeding an external vfo.

By this method the af section is greatly simplified and proved stable on test. A thermistor, pre-set pot, and other odd resistors suggested in the manufacturer's data as bias network for the af output transistors were replaced by a single diode. This is not only temperature sensitive but voltage compensating and cheap. A ready-made diode could be the Newmarket NKT279A, but any germanium pnp transistor, its base and collector strapped and called the cathode, its emitter forming the anode, may be fitted here successfully.

From the foregoing it may be concluded that the TBA570 is a handy little device which could answer a few of our problems. Like its fore-runner, the TAD100, the possibility of an inexpensive tunable i.f. to follow a converter is a very obvious use, but unfortunately with the samples tested the older ic had the edge on gain and noise.

The SGS TBA651

The TBA651 is perhaps one of the most elegant ICs examined so far. It consists of rf amplifier, mixer, oscillator, i.f. and agc, and is shown in Fig 3.

The rf amplifier TR1 has TR2 acting as a variable resistor in its emitter lead controlled by agc voltage.

From a tuned circuit in the rf stage collector, the signal is taken to the mixer at pin 4, TR4 base. TRs 4, 5, 7 form the

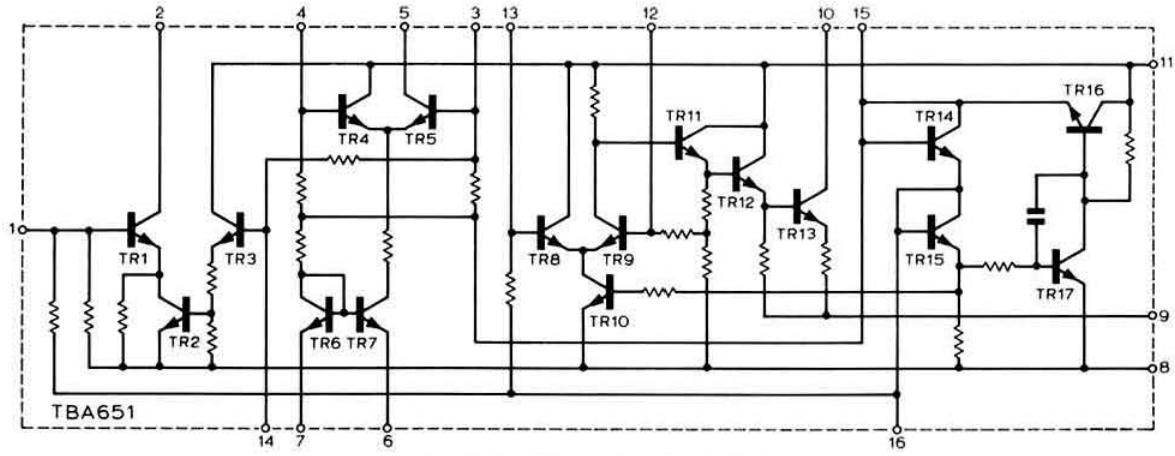


Fig 3. Theoretical circuit of the TBA651

mixer, TRs 4 and 5 a differential with TR7, the constant current tail and oscillator. AGC is also applied to TR5 base controlling conversion gain. As the oscillatory circuits connect between base and emitter, an alternative to the simple Hartley circuit shown in Fig 4 could be a Clapp oscillator, which should be well received by amateurs who know well the advantages of this circuit.

Between the mixer output at pin 5 and the i.f. input at pin 13, a ceramic block filter is again suggested.

The i.f. amplifier starts with a differential producing high common mode rejection of ground signals, making decoupling a more straightforward task. This is followed by TRs 11 and 12 which are drivers for TR13, the i.f. output transistor. Overall dc feedback makes a very stable gain package.

With this ic an external detector and detector transformer are necessary; a small price to pay for all the other desirable features. With an external detector a more advanced agc circuit is possible; the user is not stuck with what he has got.

A built-in voltage regulator maintains a high degree of overall working stability.

The TBA651 will operate at voltages between 4·5 and 18V with a current consumption of about 11·5mA at 12V.

RF stage gain is quoted as 20dB; conversion gain of mixer 40dB; i.f. gain 60dB with excellent signal to noise ratio, typically greater than 30dB for a 20μV input. Sensitivity for a signal to noise ratio of 6dB is 1μV. AGC range is 120dB; 50dB from the rf stage and 70dB for the mixer. In real terms a figure of merit of 80dB for a 10dB expansion in audio is claimed as minimum.

As will be noticed in Fig 4, only a handful of extra components is required to produce a very fair receiver.

The TBA651 should make a proud addition to the amateur's magic bag.

The RCA CA3088E

From RCA comes an odd a.m. ic, the business section of which is a bit bare-boned by modern ic standards, but a few surprising extras are thrown in for make-weight.

The CA3088 consists of mixer/oscillator, i.f., detector, agc and audio pre-amplifier. In addition to these expected

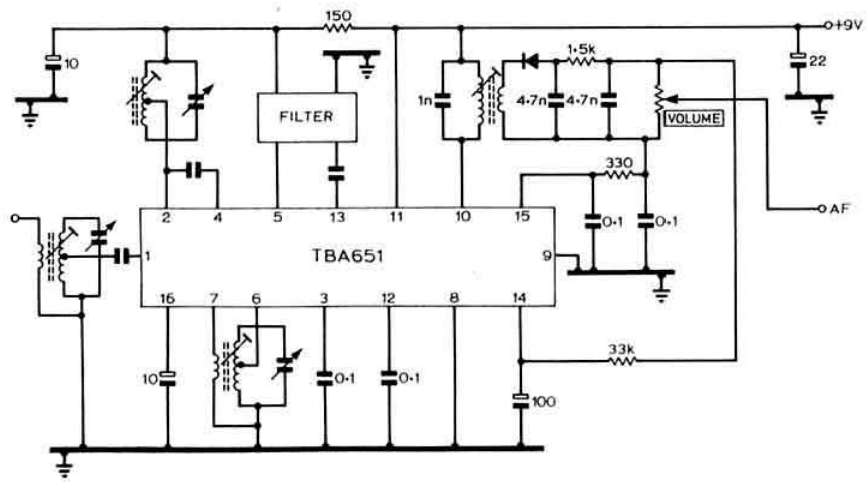


Fig 4. Receiver circuit using the TBA651

items, a circuit to provide delayed agc for a dual-gate fet rf stage is included; an output for a tuning or S meter and built-in zener stabilizer also.

The theoretical circuit is shown in Fig 5 and a basic receiver illustrated in Fig 6.

Perhaps many will agree that the one weak point in this ic is the self-oscillating bipolar mixer. There is no reason, however, why an external oscillator should not be fed into pin 1 if it has a low impedance output.

Between pin 3, the mixer collector, and pin 4, the first i.f. stage input, the i.f. block filter is placed. TR5, the first i.f., is the only stage to receive agc voltage. A conventional i.f. transformer either singly or doubly tuned couples the first i.f. to the second at pin 8, TR7, the emitter follower base. This feeds TR9, a voltage amplifier, and TR10, another emitter follower, acts as detector driver.

DC feedback from TR10 emitter via pin 7, which must be decoupled, is applied to pin 8 through the coil, thus stabilizing the working points of the whole group.

As the audio from this type of detector is often fairly low, an af pre-amplifier, TRs 13 and 14, is a useful addition.

AGC is developed at the detector load and is applied to TR11, the S-meter driver; to TR8, the rf stage take off at pin 13; and to TR6 which clamps the bias of TR5.

TRs 2, 3, 4 and the diode chain form a voltage regulator which stabilizes the working points of TR1 and TR5. A built-in zener demands that ht to pin 10 is always fed through a suitable resistor.

Again in Fig 6 it will be observed that circuitry is simple and should appeal to the amateur constructor.

A sensitivity of 100μV at 20dB s/n ratio is quoted with an audio output of 75mV at 30 per cent modulation.

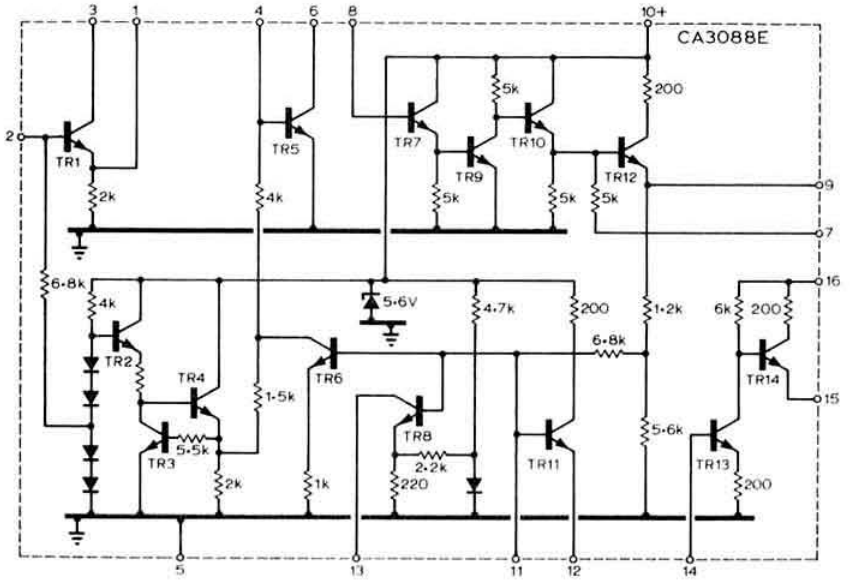


Fig 5. Theoretical circuit of the CA3088

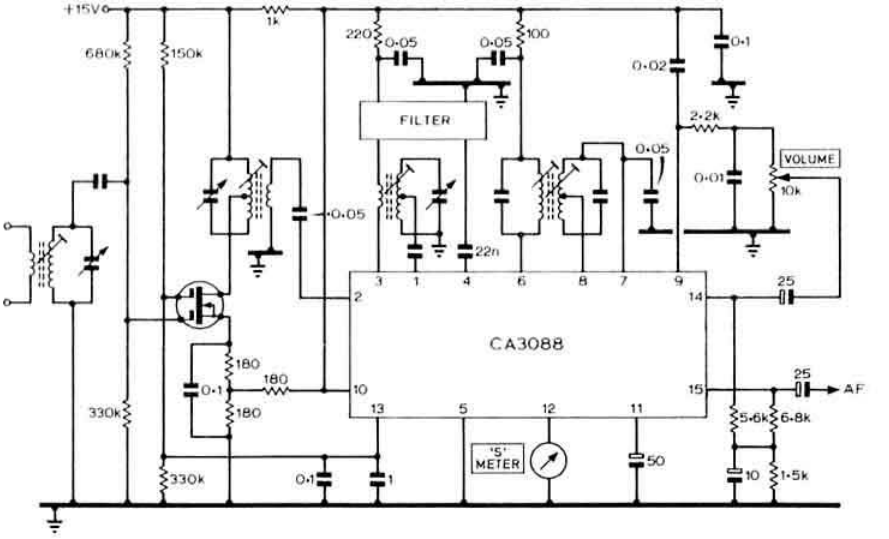


Fig 6. Receiver circuit using the CA3088

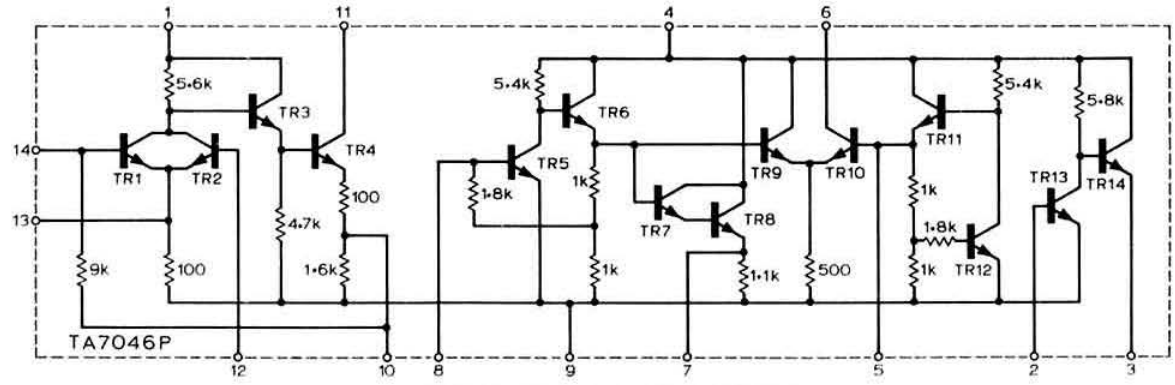


Fig 7. Theoretical circuit of the TA7046P

The Toshiba TA7046P

From Japan, Toshiba offer a simple but versatile chip in 14DIL, the TA7046P. In this there is no mixer or oscillator but two i.f. groups, a detector, agc, audio pre-amplifier and a limiting amplifier for feeding an fm discriminator.

The first gain package, TRs 1, 2, 3, 4, produces some 46dB of gain; agc is applied to TR2 via pin 12. Pin 10 must be decoupled; a conventional i.f. transformer couples the output of the first group at pin 11 to pin 8, the second group input.

The second i.f. amplifier, TRs 5 and 6, produces a further 9dB and feeds TRs 7, 8, the active detector. From the

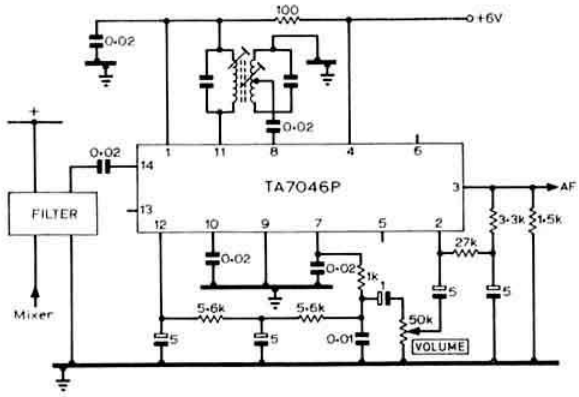


Fig 8. Receiver circuit using the TA7046P

detector output at pin 7, agc is fed via an external circuit to pin 12, TR2 base.

With an i.f. block filter in front of pin 14 to provide the selectivity, RC coupling was tried between pins 11 and 8. It is regretted the author's lash-up took off and howled madly. A single tuned i.f. transformer was also not entirely stable; the odd 13pF between windings seemed sufficient to cause a trace of hf instability. A double-tuned transformer worked wonders and the whole i.f. performed very well indeed.

G8EFF has tried a TA7046 with RC coupling and his worked without much difficulty, even at 10·7MHz. G8ESI is building up a third sample and the results are awaited with interest.

It would seem that the fm take off, TRs 9, 10, has better isolation than the similar circuit in the TBA570, so how would it perform as a product detector? About 150mV from a bfo produced a good note from pin 6 without any bodging. A 2·7kΩ load and 0·047μF bypass was all that was necessary.

An audio pre-amplifier, TRs 13, 14, is provided to give a lift to the detector output.

With a 5V supply, only 6·5mA are consumed. The constant voltage supply, TRs 11, 12, can supply 1·4V at pin 5 for biasing other receiver circuits.

65dB agc range is quoted, this taking effect at about 100μV input, the output then remaining constant up to 120mV.

With perhaps a fet as mixer in front of the TA7046P, a neat receiver begins to take shape and this ic may soon find its way into amateur shacks.

The Siemens TBA460

From Germany, Siemens offer the TBA460, comprising two separate amplifiers in one package. The first, an i.f. amplifier suitable for both a.m. and fm service, has no detector, but negative going agc from an external detector may be applied to pin 4, giving 60dB control. A 150kΩ resistor should connect between pins 4 and 16.

Input from the i.f. filter is applied to pin 2; a dc path consisting of either a coupling winding or a resistor must connect 2 and 3; the latter, being the earthy end, must be bypassed by a suitable capacitor, say, 0·022μF.

Output to the detector transformer is at pin 13; pins 12, 14 and 15 are all decoupling points.

The audio section is much the same as in the TAD100 and TBA570 ICs but is capable of driving a pair of AD161/162s to 10W, from an 18V supply.

This type of circuit is very versatile and may be used for several purposes, rather like an operational amplifier. Pin 9 is the inverting input and pin 10 the non-inverting. Pin 7 connects to the load resistors which would be split for bootstrapping, TR16 being the diode to bias the output pair. A stabilizing capacitor of some 50-100pF should be connected between pin 6 and pin 8. Pin 7 drives the upper npn power transistor, pin 6 drives the base of the lower pnp transistor.

Although the TBA460 has less to offer than some already considered, no doubt a few readers will have an application already in mind. The af stage alone might form the basis of a good modulator for a small transmitter.

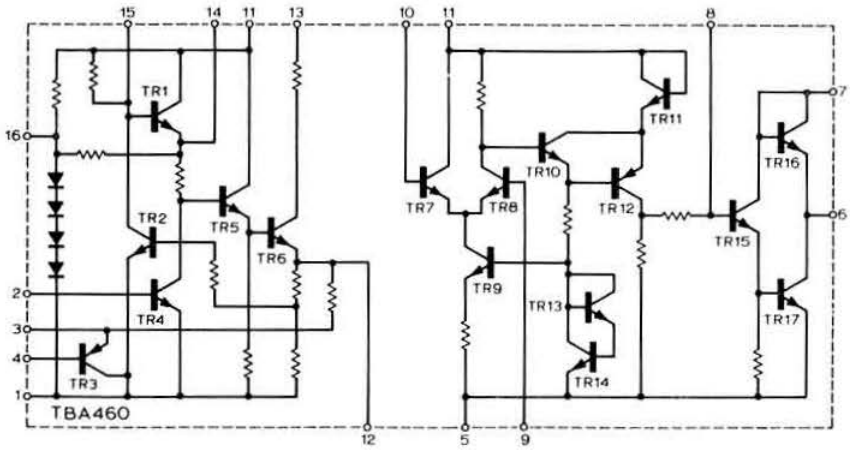


Fig 9. Theoretical circuit of the TBA460

Filters

While discussing this selection of a.m. receiver ICs, casual reference has been made to ceramic filters for shaping the desired i.f. passband characteristic at one go; this survey could hardly be concluded without some notes on these.

The first ceramic devices seen some years ago were the transfilters by Brush Clevite to replace conventional i.f. transformers. It has been shown how a number of these can be coupled together in a certain way so that bandwidth and shaping can be adjusted to almost any desired shape. Simple single ceramic resonators are also available and can be built up into complex networks to produce excellent filters. These are offered by Vernitron Ltd. (See Bulletin 66043).

Block and ladder network filters have been available for some time but the price has been a little prohibitive, comparing with mechanical filters in performance and price. With the introduction of ICs at consumer prices, something had to be done about the filter situation.

The most well-known and readily available filter is the Mullard LP1175 at under £1 (Fig 10a), comprising one ceramic resonator with two tuned circuits to match input and output. This filter can be used with any of the ICs described and is superb value for money. Mounted in a 1in by ½in can about ¾in tall, it produces a selectivity comparable with many of the traditional communication receivers with their great i.f. cans.

To the same electrical configuration, but only a fraction of its size, a similar filter is offered by Toko Inc of Japan, designated CFT-455A, B, C. (Fig 10b). For amateur a.m. use, the CFT-455C would perhaps be a good choice; the 6dB bandwidth being 6kHz; spurious responses —80dB.

From the same firm comes an even simpler filter shown in Fig 10c; the CFZ-455C. Again 6kHz at 6dB; spurii —60dB min.

Another Japanese company, Murata Mfg Co Ltd, offers a range of all ceramic filters. The SFD455B (Fig 10d) is in fact two transfilters back to back, top-capacity coupled, giving 4·5kHz at —3dB. Two of these would be ideal with the ICs discussed which required two coupling points.

A high-class 15-element ladder filter is also advertised by Murata, type CFS-455A to J. (Fig 10e). Taking the CFS-455H as an example, some figures are: bandwidth 3kHz at —6dB; 7·5kHz max at —70dB; insertion loss 9dB; input/output impedance 2kΩ. It can be seen that these compare with mechanical filters at many times their price.

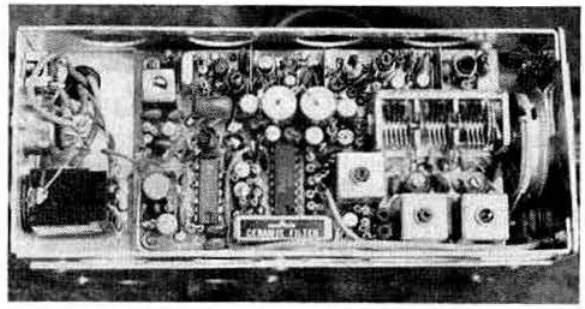
Described as a middle-class 11-element filter is the CFR-455A to I. Again as an example, CFR-455H: 3kHz at —6dB; 7·5kHz at —60dB; spurii —40dB min; insertion loss 8dB; impedance 2kΩ.

A smaller "popular" ladder filter, CFM-455A to H, is also listed. The narrowest one, CFM-455H, again 3kHz at —6dB and 7·5kHz at —50dB.

Returning to the Toko company, a range of mechanical filters is advertised. The HT series consists of three: the MFH41T, MFH51T and MFH71T. Again perhaps the best one for amateur purposes would be the MFH41T rated 4kHz at —6dB and 8kHz at —40dB; ripple 1dB. A H-shaped resonator with piezo elements on each end is completed by tuned LC matching transformers (Fig 10f). One matching transformer is housed with the resonator in one can 10 by 12mm, the output transformer being separate in a 10 by 10mm can.

A simpler filter, type H, housed in a single can is listed. Here the sides of the response are not as steep but still worthy of consideration. MFH40K, for example, is 4kHz at —6dB and 6kHz at 22dB with only 1dB max ripple.

A more splendid mechanical filter of larger proportions consists of a main filter block and two 10 by 10mm cans for matching. A selection of different matching transformers enables the filter to be used with both transistor and valve circuits. This "F" series filter comes in six bandwidths from



A 2m portable transceiver using three ICs described in this article. A five-in-line ic is tucked between the two i.f. cans

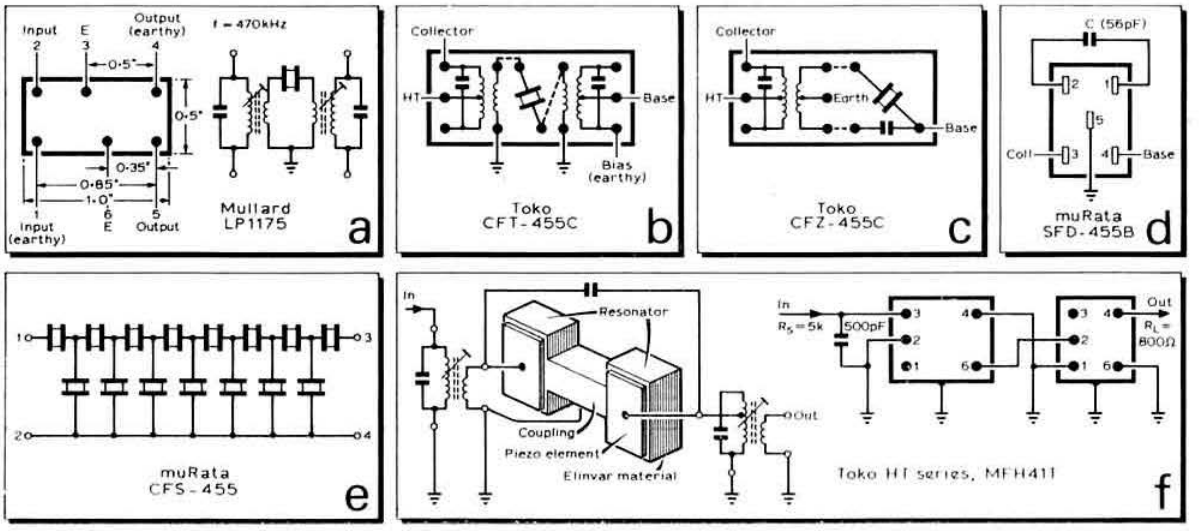


Fig 10. Various ceramic filters

5 to 28kHz. Taking MF455-050F as an example, the bandwidth at −6dB is 5kHz, max ripple 3dB, insertion loss 10dB. The input transformer for this particular filter would be FIN9579A matching 30kΩ, the output transformer FOUT9580A into 800Ω.

Vernitron Ltd list a range of professional ladder filters at professional prices. A 17-element filter in 10 bandwidths at 455kHz from 2kHz to 45kHz have shape factors between 1·4: 1 and 2·5: 1. Taking the TL-4D8A, it is 4kHz at −6dB, 8kHz at −60dB, giving 2: 1 shape factor with an insertion loss of 7dB; impedance 2·5kΩ; ripple 1dB; stability 0·2 per cent in five years.

A smaller 9-element filter at almost half the price of the one above has a minimum lowest bandwidth of 10kHz; still 2: 1 with only 4dB insertion loss.

A much less expensive device is their TCF-4 block filter described as hybrid having both LC and ceramic elements. The TCF-4-4D10A is 4kHz at −6dB, 10kHz at −60dB; 40kΩ input and 4·2kΩ output with 10dB insertion.

It will be seen that there is an abundance of available filters, those mentioned being only a representative selection at 455kHz. Filters are listed at 1·6MHz, 4·5MHz, 6MHz and 10·7MHz. Bandwidths of these are often much wider but one can see a possible double conversion application here.

Prices

It is difficult to be precise regarding the cost of ICs, as these depend to a great extent on the terms of trade of importers and distributors and on the quantities involved.

The price list of Vernitron Ltd, Thornhill, Southampton, dated September 1971, quotes, ex-works and subject to a £5 minimum order, for quanitites of 1 to 24: 37½p for TO series, Bulletin 6608, and 42½p for TF series, Bulletin 66043 transfilters; LF filters, Bulletin 66041, cost £9.75; standard ladder filters, Bulletin 6607, £15.50; miniature ladder filters, Bulletin 6606, £9; TBF4 and TCF4 filter ranges, £5.50; TBF6 and TCF6 filter ranges, £7.50, Bulletins 66035 (TBF) and 66021 (TCF); FM filter FM4, 50p

The author believes the first Japanese mechanical filters to be introduced in this country were about £10; the Collins filters can be anywhere from £15 to £25. As far as can be ascertained, the cost of a Mullard LP1175 ceramic filter would be about 82p.

The importers of Mu-Rata components sent the author quantity prices but from these he estimates that the 15-section filter will be in the order of £4; the 11-section about £3, and the small one about £2. The importers are Pedoka Ltd of London.

Toko prices were much more attractive but again the importers of these only quoted manufacturers' prices. The large F series mechanical filter was £2.75; the HT series mechanical filter about 50p; the CFT455C ceramic (like the Mullard) filter was 19p; and the CFZ455C only 12p. Impectron Ltd, who handle this range, said they were not happy about dealing with individuals but that Harrogate Radio were dealers they would supply small quantities to. No doubt the dealer would mark up the prices given but even then they would not be high.

Conclusions

Judging by the size of ICs, filters and components today, the cigarette packet communication receiver is just around the corner. For portable work, an interest shared by the author, these devices are unrivalled, and with prices dropping, amateurs will be taking their stations with them like the certain yl from Banbury Cross.

On the transmitter side, power audio ICs, now plentiful, make tidy modulators. A complete lightweight transceiver on any band for less than £10 is a desirable and yet practicable prospect.

To forestall an avalanche of mail requesting names of suppliers of both ICs and filters, the author invites dealers who are willing to supply the items listed to individual amateurs, to forward their names to the editor of *Radio Communication*.

To be continued

(Part 2 will look at consumer ICs for fm reception)

MICROWAVES—1,000MHz and up....

by DAIN EVANS, G3RPE*

The June 1972 microwave contest

THE first microwave contest of the season was held on 24-25 June and appears to have been successful. We look forward to VHF Contests Committee's report for full details. While it was hardly typical flaming June weather (or was it!), it was relatively marvellous compared with the wind and rain experienced during the three microwave activity periods earlier in the season. The general level of activity appeared higher than during last year's contest. A notable feature was that for the first time all six bands from 23cm to 15mm were used, as well as 70cm and 2m for talk-back. G3WDG and G8DEK had a full contact on 15mm over a 5km path near Winchester, and G3BNL and G3EEZ worked the five bands from 23cm to 3cm over the 70km path from Cheltenham to Ludlow. After this mammoth effort, G3BNL unfortunately had to retire *hors de combat* and was unavailable for the rest of the contest. We hope to obtain from G3BNL details of his comprehensive crystal-controlled equipment.

The increase in activity was particularly noticeable on 3cm, with G3BNL, 'EEZ, 'NHZ, 'RPE, 'THQ, 'WDG, 'ZGO, G5FK and G8DEK known to have made contacts. G8AZU, G8AYB, G8BCO and G8DGR were also around and about. Two of the stations operated fixed in the London area, G3NHZ at Dollis Hill and G5FK at Wembley, bringing some welcome contest activity into this area. Several people took advantage of the rule allowing two contest sites to be used and provided extra activity.

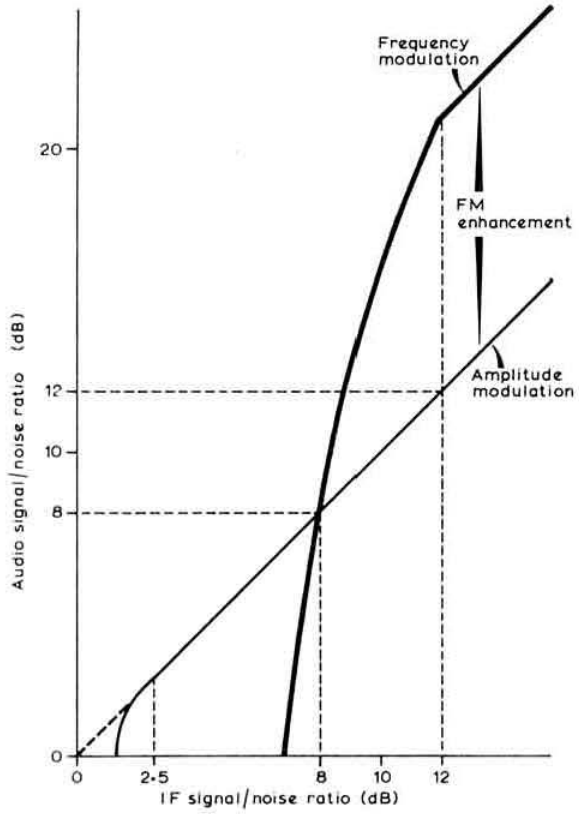
Another feature of the contest was the number of new call signs appearing in the log. These stations are of course most welcome, but one missed many of the old hands for their speed in completing contacts while still finding time to exchange news and pleasantries. Despite the extension of the contest to 24h, there were still a fair number of stations left unworked at the end due to time wasted chattering. Perhaps significantly, as the contest finished, a hot air balloon passed directly over the writer's site!

From a personal point of view, it was not the most straight-forward of contests. A salutary experience was copying G3ZGO/P 5 and 9 plus on 3cm and taking 20min to get through on 2m. A list of 18 things to be done before the October contest was all-to-easily compiled. Top of the list will be to check the field more thoroughly—this time there were 100 large bullocks to contend with.

FM enhancement

There is a basic difference between a.m. and fm systems on demodulation which becomes more apparent with the wide bandwidths commonly used on the microwave bands. As is shown by the figure, for a.m. the audio s/n ratio is the same as the i.f. s/n ratio (except at ratios below about 2½dB): that is, if the i.f. s/n ratio is 20dB then the post detector audio s/n ratio will also be 20dB.

In the case of fm, however, the audio s/n ratio is very dependent on the i.f. s/n ratio, particularly in the region 8 to 12dB, in the following way. Below an i.f. s/n ratio of 8dB, the audio s/n ratio is significantly lower than at i.f. Above an i.f. ratio of 12dB, the audio s/n ratio is improved by a factor equal to $20 \log \sqrt{3}.\frac{F_d}{F_a}$ decibels, where F_d is the maximum deviation employed and F_a is the highest audio frequency. At i.f. s/n ratios between 8 and 12dB, the audio enhancement lies between these extreme values.



The audio s/n ratio compared with i.f. s/n ratio for amplitude and frequency modulation

Assuming the standard microwave bandwidth of 1MHz (F_d = 500kHz) and an audio maximum frequency of 3kHz, the improvement of the audio s/n ratio is 49dB. Thus as signal strengths change by 4dB to increase the i.f. s/n ratio from 8 to 12dB, the corresponding audio s/n ratio increases from 8dB up to 61dB (12 + 49dB): for a rather small increase in received signal strength, therefore, there is this very large improvement in signal quality. Conversely, a small decrease in signal strength can result in apparently strong signals disappearing below the threshold of the receiver.

(Continued on page 529)

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

TECHNICAL TOPICS

by PAT HAWKER, G3VA

JUST two years ago (*TT* August 1970) I noted some of the questions and problems that face those of us who try to provide published material on amateur radio. At that time the Society had just published the 3rd edition of *Amateur Radio Techniques*. For the same reason these problems have again been much in my mind of late: by the time these words appear the new 256-page, 4th edition (with over 600 diagrams and well over 150,000 words of text) will have come hot off the press.

To provide this "collected" version of *TT*, I have tried to select and abridge some 150 additional items, throw out anything which seems no longer of real practical value or interest (though I continue to believe in the importance of the valve as well as the semiconductor) and to add quite a lot of new supporting material to fill in some obvious gaps. For example *ART4* includes a "quick guide to digital electronics" as well as a lot of extra information on integrated circuits—making one realise how quickly this side of electronics is spreading into amateur construction.

But the exercise also made me acutely aware of how international is the desire to develop and explore new ideas and new circuits. The new items in this edition stem from such diverse places as G, W, DL, PA, ZL, F, VE, I, LA, VU, ON, VK, 9J2, ZS, SM etc—and one reviewer took the trouble to note that some 24 prefixes were already represented in the credits in *ART3*!

It is the feeling that so many amateurs—whether or not they actually build much of their station equipment—are still genuinely interested in the technical side of the hobby that I find encouraging. In scanning the journals and newsletters, one reads so many comments that amateur radio is not what it used to be, that amateurs today are interested only in buying branded, fully-developed equipment rather than using up some of the abundant supply of surplus components in rolling their own or in modifying older equipment, and that too much activity boils down to yattering across town. On the contrary, it seems to me that amateurs *are* still genuinely interested in the whole subject of radio communication, in equipment ideas and techniques, in keeping aware of new trends (difficult though this may sometimes be) and thinking about and trying out, for example, new aerials. In other words, in its fundamentals, amateur radio in 1972 is still firmly based on the same type of appeal that it exercised when I first became interested some 37 years ago.

Of course, if nobody troubles to get a copy of *ART4* (and in how many other 1972 books can you still get some 4 diagrams and 1,000 words plus for a penny?) then maybe it will prove that interest in ideas and experimentation really is vanishing! Meanwhile this seems a suitable opportunity to thank all those amateurs who take the trouble to pass on their own ideas or bring to our notice those published elsewhere—and so make it possible to put together *TT* and *ART*.

The loop and low-frequency dx

Interest in dx on the 1·8, 3·5 and 7MHz bands has increased steadily in recent years, and with the current phase of the sunspot cycle it seems likely that even more effort will be concentrated on this subject this coming autumn and winter. From time to time, *TT* has drawn attention to the use of vertically or dual-polarized aerials for such operation (incidentally the advantages of dual-polarization for hf are again underlined in an article by Walter Stiles, W7NYO in *QST* March 1972). Another approach, a little neglected, is that of the advantages that can sometimes be achieved by using different aerials for transmission and reception. Amateurs with plenty of room have a "natural" in the Beverage *receiving* aerial (*TT* October, 1970 or *ART4*).

Some pertinent remarks about low-frequency dx aerials appear in *Ham Radio* (June 1972) in a letter from Harry Hyder, W7IV. He points out that while (with good earth systems) vertically polarized aerials usually radiate more at lower angles than the horizontally polarized aerials that are practicable at these frequencies, the vertically polarized aerials may result in up to 10dB more man-made noise. Because of this horizontally polarized aerials may be a better choice for *reception*.

Another reason for the use of separate aerials is the possibility of achieving good directivity on reception. Most of us have to write off any prospect of an efficient rotary beam for 1·8MHz! But in fact, for reception, this is entirely possible—in the form of the traditional loop or frame aerial, or its more modern equivalent the ferrite rod.

A recent contributor to *World Radio Club* described the reception of medium wave broadcast stations in the Far East and Pacific areas, in the West Coast of the United States and in South America with the aid of a frame aerial consisting of about seven turns of wire on a frame with (I think) 40in sides, tuned by a 500pF capacitor and with a single turn coupling coil connected to the dipole sockets of his receiver. This allowed him to null out interference from European stations while digging for the dx. I remember once using an almost identical system and finding to my great surprise that the Irish Radio Athlone programmes appeared to be transmitted (with commercials and all) from wartime England. At the time I almost convinced myself that this was due to some fundamental error in my amateur df—but years later read that this was actually done to prevent the Athlone signals providing a beacon for aircraft navigation!

So there might well be possibilities in using say a top-loaded omnidirectional vertical for transmission plus a loop for reception. And if you feel that "loops" are too old-hat, one could become trendy by designing this in the form of an "active" aerial by building in a transistor amplifier (see, for example, "Active loop-dipole aerials" by P. A. Ramsdale and T. S. M. MacLean in *Proc IEE*, Vol.118 No 12 December 1971.)

The Swedish "Optimist" transceiver

This month I seem to be running to reminiscence and I'll have to watch it. But once upon a time I was connected with an organization that made notable use of compact low-power hf transmitter-receivers for purposes which had better be left

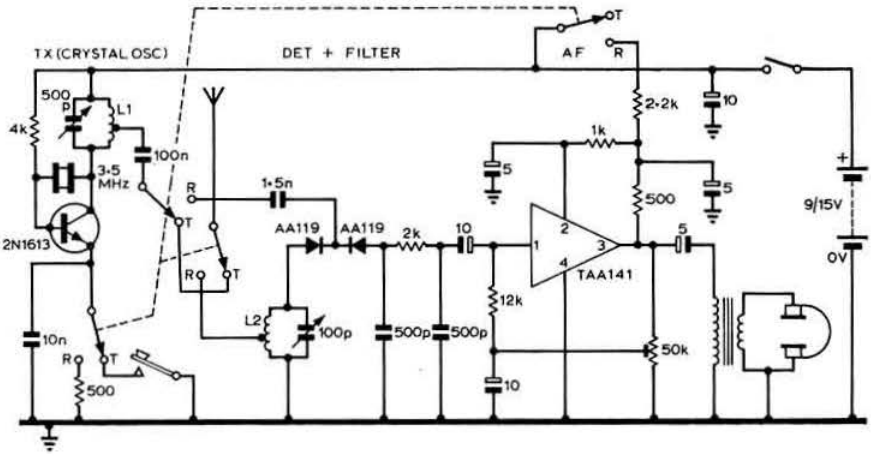


Fig 1. SM4BSN's "Optimist" simple 3·5MHz QRP transceiver using fixed tuned direct-conversion receiver and crystal oscillator transmitter

vague. These were often of much lower power and less complex than the more widely known B2 and "Polish" suitcase sets. But the experience left me with a lasting belief in what can, in certain circumstances, be achieved with an 0-v-1 receiver and a crystal oscillator—as well as a profound respect for those men and women who operated such equipments in the field in the most unfavourable circumstances imaginable.

So quite a few memories were awakened by a description by Karl Kottenhoff, SM4BSN in *QTC*, No 6/7, 1972, of what must be the simplest 3·5MHz complete transceiver for many a year. This QRP rig—Fig 1—is based on a crystal-controlled fixed channel direct-conversion receiver; the power of the c/osc is increased on transmit up to about 1W by switching out the 500Ω emitter resistor. The channel can be changed by using a selection of crystals.

The idea of a fixed-channel hf receiver may seem odd, and there might well be an advantage in making the oscillator a vxo, without adding too much complexity. But even with an ordinary crystal oscillator, the lack of receiver tuning could prove less of a handicap than it might appear; the simple dc receiver would allow stations up to about 5kHz from the crystal frequency to be received, and the main difficulty might come from stations who net most accurately to zero beat.

The tank circuit of the oscillator uses an ordinary air-cored inductor; the receiver input circuit is based on a small ferrite toroid core. SM4BSN indicates that the BFY34 would be a suitable alternative to the 2N1613 and the TAA263 (noted in the adverts of several British component suppliers) as the amplifier in place of the TAA141. SM4BSN built his rig using a printed circuit board.

So for the "optimist" this seems a most interesting little transceiver, capable of further development at the cost of some slight extra complexity. It is unlikely to dominate its channel, but in the absence of QRM could well give useful contacts on 1·8, 3·5 or 7MHz with suitable coils and crystals.

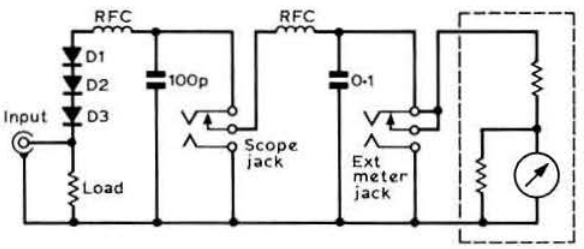


Fig 2. General-purpose power meter/dummy load. Diodes of suitable piv rating (G3EIW uses 70V piv diodes requiring the use of one diode for each 35V of meter indication resulting in three diodes for 80W)—a single diode of higher piv rating might prove equally suitable. The scope jack will be found useful for ssb applications

General-purpose power meter dummy load

Dick Halls, G3EIW/ON8KM recently sent along details of a combined power meter/dummy load (Fig 2) which he has found most useful over a number of years. Despite some admitted technical assumptions he considers it capable of indicating power output to within 10 per cent of the true value; he has used it successfully from 50Hz to 144MHz.

Basically he provides the transmitter with a matched dummy load (in his case based on a 67·7Ω Morganite non-inductive high-wattage resistor) and then simply measures the peak voltage developed across the load. In order to convert the voltage into watts, a high-resistance voltmeter can be built into the unit and directly calibrated; alternatively it

TABLE 1
$WR = V^2$

W	R	V^2	V	V peak
1	70	70	8·36	11·6
5	70	350	18·7	26·2
10	70	700	26·2	36·8
20	70	1,400	37·4	51
30	70	2,100	45·8	63·5
40	70	2,800	52·9	72·5
50	70	3,500	59·2	83
60	70	4,200	64·8	91
70	70	4,900	70·0	98
80	70	5,600	74·8	104
90	70	6,300	79·3	111
100	70	7,000	83·6	116
120	70	8,400	91·6	127
150	70	10,500	102·5	143
200	70	14,000	118·3	165
0·75	70	52	7·2	10·05
0·5	70	35	5·8	8·05
0·25	70	17·5	4·05	5·65

is quite practical to use an external test meter with a conversion table such as that shown in Table 1.

The only constructional precautions are to make the load "look" like lossy coaxial cable to the transmitter; to screen the detector from the load resistor to avoid direct pick-up; to provide effective decoupling to prevent pick up on the meter wires.

From the basic power relationship, $W = I^2R$ and $W = I \times V$ it follows that $W \times R = V^2$. A typical table of values is constructed as in Table 1, extending over the power range to be measured, the final value being the peak V to be used as an indication of power. If a built-in meter is to be used this should have an fsd current not greater than 200μA, and a suitable series resistance can be calculated from: volt range required/fsd current in amperes. For small increments of meter deflection, and to take up any inaccuracy in the series resistor, the damping resistor across the meter coil could be varied by up to 10 per cent of its nominal value.

A new scale can be constructed once the fsd is known in terms of volts and will be linear.

Direct-conversion detector

It is worth noting that many direct-conversion receiver designs are continuing to appear in amateur journals throughout the world, though most of the basic ideas being used have already been discussed in *TT* and *Radio Communication* from 1967 to 1970. For example, a series of stage-by-stage articles by T. W. H. Fockens, PA0KDF has been appearing in *Electron* covering a receiver for 3·5, 7 and 14 MHz. Fig 3 shows his product detector based on a CA3028 ic with two transistors used to combine the outputs from the differential amplifier. The June issue of this journal also contains a five-band dc receiver developed by NL 435, using ring demodulator, plug-in coils for the five-band vfo with two BC107 transistors; the main af section, including filter, uses three TIS34 fet devices, a BC107 and BC177 to provide earphone output.

A W8JK in the loft

Quite a few hf amateurs depend on loft or roof-space aerials and most will have found that results are in line with those described by John Roscoe, GM4QK in *Radio Communication* October 1970. There is no doubt that one loses a good deal of power in absorption and reflections of the water tank and electric conduit; my own feeling is that these losses are more significant than the actual roof attenuation which can be quite low, at least in dry weather. But the loft aerial does make hf operation possible, and can give reasonable dx.

Recently, Brian Booth, G3SYC, noting the interest in "wire aerials", sent along details of the simple single-section, end-fed W8JK that he has been using on 21MHz. This fits quite conveniently into the average roof space as indicated in Fig. 4(a).

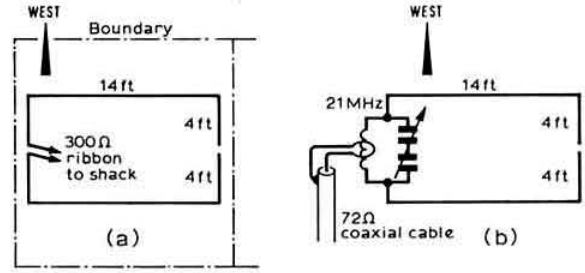


Fig 4. Simple single-section end-fed W8JK beam with "bent-in" ends favoured by G3SYC for loft use. (b) shows his proposed modifications

He writes: "It's simply voltage-fed and has really surprised me as to what an indoor aerial can do. I have used it in comparison with a 21MHz dipole and have never received reports other than that the beam was two S-points better. In bad conditions 4,000-6,000 mile dx cannot hear me on the dipole although my signals are workable on the W8JK. I know that this form of W8JK is not original, but I feel that

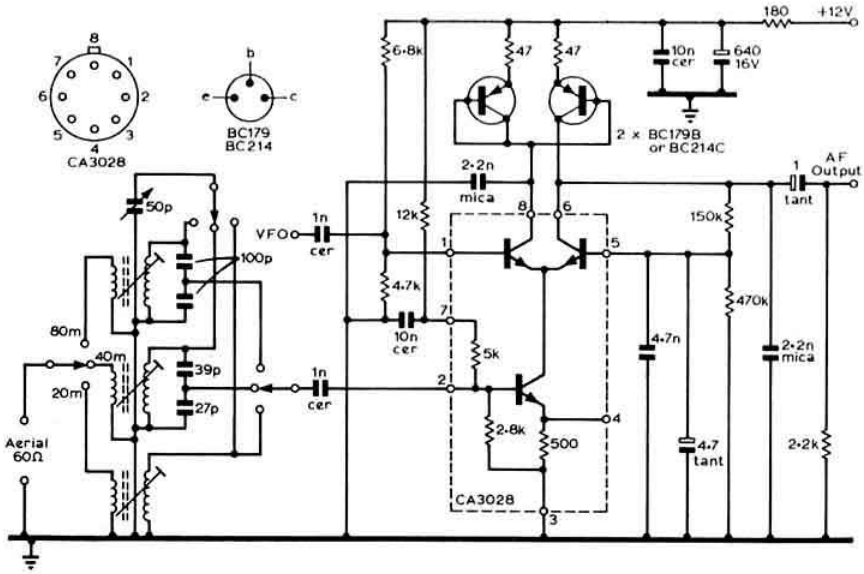


Fig 3. Front-end of PA0KDF's three-band direct conversion receiver with CA3028 product detector

the W8JK driven beam, in all its many forms, makes one of the best amateur radio antennas and is sadly neglected. After using them for a number of years I have great faith in them—particularly the low-angle benefits they give."

"This particular array is due for further development soon; the wire is being replaced by lightweight ¾in aluminium conduit which should broaden bandwidth and improve efficiency. A tuning unit is going to be placed in the aerial (as in the ZS6BT aerial described in *TT*, April)."

Stirred by G3SYC's letter, I put up a simple wire aerial to these dimensions in the roof space (very much around the plumbing) using a half-wave of 300Ω line to provide a resonant feeder. It all worked "first go" and in a few days provided a reasonable selection of contacts with Europe, and North and South America, though perhaps a little less consistently than the comparison 132ft end-fed (of which about 35ft are indoors). Because of the low radiation resistance of the bent W8JK (and hence high currents and voltages) results could almost certainly have been improved by using better wire and insulation; but certainly the aerial itself seems virtually fool-proof even when entirely indoors.

For anyone with a much larger roof space, an extremely interesting technique would be to form one of these W8JK arrays using G6CJ's "stretched dipole" (capacitively loaded wires) technique, since this would not only raise the radiation resistance but should be significantly less influenced by the proximity of the water tank etc. Because of the difficulty that newer members may have in getting hold of G6CJ's original 1961 paper on this technique we have included the bare bones in *ART4* for easy reference.

More on phase-locked ssb

Thanks to Dick Rollema, PA0SE, the March *TT* drew attention to the increasing use being made in Holland of an infinitely-clipped form of phase-locked ssb as a means of achieving long-haul vhf contacts with the tvi advantages of fm. In his June *Reflecties*, PA0SE provides further information on this technique, now being used by PA0MJK, 0EPS, 0BXD, 0LQ, 0EZ, 0LAM and 0KT. He includes the circuit diagram (Fig 5) of one method of obtaining the phase-locked signal from ssb, using an NE562 p11 integrated circuit. The capacitance between terminals 5 and 6 determines the approximate free-running frequency of the vco and those shown are suitable for use at about 7MHz. The two time-constant networks (Rx, C1) govern the control loop. The correct operation is best checked by means of a scope, a suitable signal being available from terminal 9.

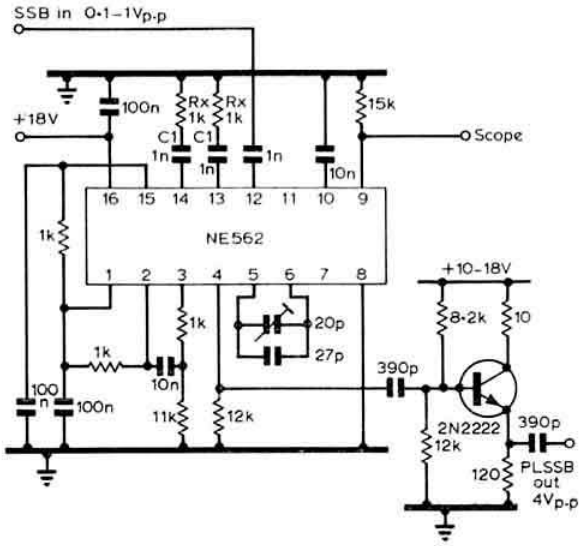


Fig 5. The use of a phase-lock-loop integrated circuit to produce plssb from a low-level ssb input, as used by PA0KT

Voltage controlled oscillator

In the course of experimental work on phase-lock-loop techniques, Brian Bradshaw, GW3JNA has been using a novel form of voltage controlled oscillator which does not involve the use of the more customary voltage variable diodes (vvc). The vvc approach, although often effective, can sometimes result in problems arising from their low-Q nature: lossy diodes may produce conduction distortion and noise injection at high frequency when, for example, the vco is to be used for a direct-conversion receiver—so that signal/noise ratio suffers.

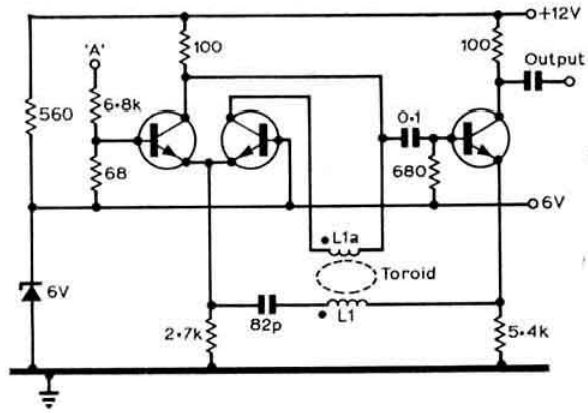


Fig 6. GW3JNA's voltage controlled oscillator based on "turns cancellation" techniques rather than a voltage variable capacitance diode

GW3JNA is using a technique which he noted when it first appeared in *Wireless World* (February 1965); originally intended for use at mf, he finds it works well to 10MHz. This technique uses what is effectively a voltage-controlled variable toroid inductance, by means of "turns cancellation": Fig 6. Briefly the oscillator tuned circuit is closely coupled to a driven winding on the same toroid: then, depending on the mutual inductance M and the turns ratio, a shift in the effective inductance (L_{ef}) can be achieved using a differential amplifier, since $L_{ef} = L1 + L2 \pm 2M$ (series aiding).

GW3JNA reports that the waveshape is good; there is a buffered output, and perhaps the most important of all the control volts/frequency law is very linear. With a variation of 0·5MHz at about 10MHz it is possible to draw a plot of frequency versus volts with a ruler! This, he feels, should provide very good dial calibration.

For the inductor he has used one of the small "polo mint" toroids (? FX1593) with L1A/L1 turns ratio of 4/10 turns of 24 swg enam. He feels that with air cored coils it might be possible to use the technique up to 28MHz. Now he is

wondering what factors would govern the maximum frequency shift and whether turns ratio greater than unity might be employed; and whether the technique might have application to spectrum analysers and the like.

Altogether a vco technique with interesting possibilities.

Delay line oscillator

A variable frequency oscillator significantly more stable than L-C oscillators and yet much cheaper than crystal synthesizers sounds as though it could be the sort of device which amateurs dream about: particularly when in its simplest form it could provide a series of discrete frequencies 15·625kHz apart, an increment well suited to vhf operation. From the preliminary information given in the international edition of *Electronics* (March 27 1972) and in rather more detail in *Wireless World* (May 1972 p218) such facilities could be provided by a technique being developed by M. J. Underhill of Mullard Research Laboratories. The key to this system lies in the use of a standard 63·943 μS delay line of the type now being produced in large numbers for PAL colour receivers; in effect instead of using a crystal to provide a reference frequency, this system uses as its reference a fixed period of time. The stability is thus determined by the phase stability of the delay line; with the standard mass-produced unit this will be less than can be achieved with a crystal reference but considerably better than with most L-C arrangements.

Basically the approach (Fig 7) is to use a vco plus phase detector as in the increasingly common phase-locked systems but instead of comparing the outputs from the vco with a reference signal derived from a crystal oscillator, two different outputs are obtained from the vco by passing part of the signal through the delay line; at certain frequencies the direct input and the delayed input will be exactly in phase, but as the oscillator frequency changes the delayed input gets further and further out of phase with the direct signal, passing through 360° in precisely 15·625kHz (which is of course the line timebase frequency in the 625-line television system). It is thus possible to arrange to "lock" the vco in a series of discrete frequencies spaced this far apart.

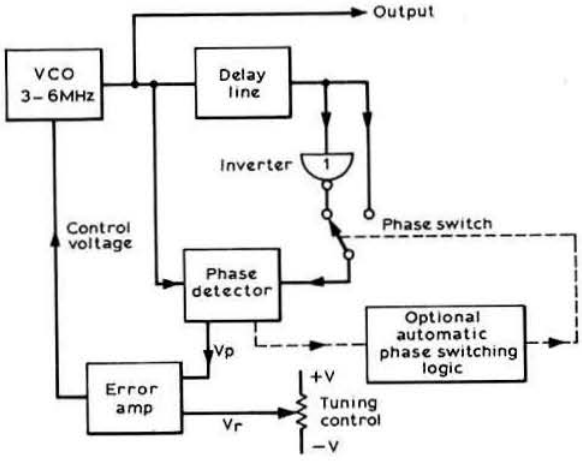


Fig 7. Basic principles of the delay-line stabilized oscillator

In order to provide interpolation frequencies needed to provide a virtually continuously tunable oscillator, two different techniques have been used. In one case a second comparator is used, comparing the signal with an adjustable reference voltage; but it is stated that other rather more elegant digital techniques are also being investigated. The experimental work has been carried out with a vco operating at between 3 and 6MHz, since the delay lines introduce minimum losses at these frequencies around the colour subcarrier frequency of 4·43MHz. *Wireless World* reports that the use of standard frequency dividers, either in the voltage controlled oscillator output or between the vco and the delay line, makes it possible for a system based on a DL14 delay line to provide any frequency output; the experimental model uses standard digital and linear integrated circuits operating from a single 5V stabilized supply and contains no inductors.

So here again is a novel technique that could have quite important applications to amateur operation, both hf and vhf.

Digital mixing

The recent notes on digital mixing techniques (*TT* April 1972) brought some interesting comments from readers who are either already working in this field or thinking of possible applications.

Julian Gardner, BRS6036 draws attention to a system on which he has been working for some time (though delayed by ill health) which would allow a digital counter to be used as an afc unit to counter any drift in the local oscillator of a receiver, transmitter or signal generator. In effect the local oscillator is still continuously tunable but once on the desired frequency can be locked to it. This facility reminds me of the "Racalator" system that has been mentioned several times in *TT*. But the BRS6036 system would apparently allow almost any existing digital counter to be modified for this application at little extra cost or complexity—to produce for example a receiver with built-in digital display of frequency plus the ability to lock to the desired frequency.

Details of his system are outlined in a letter published in *Wireless World* (January 1972 p13). In effect his system of frequency control can be included in any counter provided a store is used between the divide-by-ten stages and displays, and that the least significant divide-by-tens can be preset to any number.

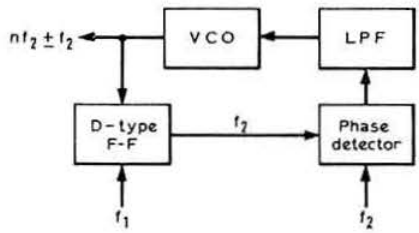


Fig 8. Basic synthesizer block using digital mixing

A. A. Goacher, G3YBJ, has also been intrigued at the possibilities that stem from the *Electronics Design* article on digital mixing. He has thought out a couple of "paper" circuits though these are still well down his list of things to be done, and no practical work on them has been attempted yet.

But he notes for example that the basic arrangement of Fig 8 should provide a circuit able to lock a vco to any frequency related to f_1 and f_2 by the relationship $f_0 = nf_1 \pm f_2$ where n is any integer such as 1, 2, 3, 4 etc. He feels this might provide a useful solution to the problem of how to achieve equal bandspread on harmonically related frequencies (such as the amateur hf bands) without using a large number of crystals. He notes that if one makes $f_2 = \frac{1}{4}f_1$ then

$$f_0 = nf_1 \pm \tfrac{1}{4}f_1 = f_1(n \pm \tfrac{1}{4}).$$

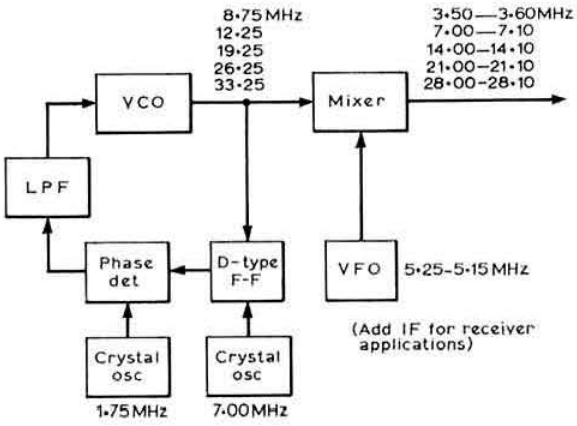


Fig 9. G3YBJ's proposals for synthesizer providing output on 100kHz segments of harmonically related bands

This suggests that the vco could be locked to any of a spectrum of frequencies equally spaced by $\frac{1}{4}f_1$. Putting a few actual numbers to such a system might result, for example, in a simple hf cw transmitter tuning the bottom 100kHz of each band: Fig 9. G3YBJ appreciates that in practice a vco would often be unable to tune the full range of 8·75 to 33·25MHz, but could be made to do so by means of switchable capacitors.

In addition, he also provides some thoughts on how the digital mixing approach could be applied as a basic building block for a frequency synthesiser. He believes that, for example, the Mullard D-type flip-flop FJJ131 could be suitable to at least 20MHz; with a TTL mixer it would seem possible to use a TTL NAND element as the phase comparator. Space precludes reproduction of the diagrams indicating this second application, but perhaps these notes will encourage others to look into these techniques.

Here and there

G3HWX reports that the LM370 integrated circuit (*TT* April 1972) is available from DTV Swift Service, 126 Hamilton Road, London SE27 9SG, at £1·87½, delivery about seven days. G3OGY tells me that the CA3088E (*TT* May) is available from: Electronic Components Supplies, Thames Avenue, Windsor, Berks.

Dr Tony Carr, G3OSU, has discovered a useful source of expanded polystyrene boxes; these are excellent for thermal insulation since they have tight-fitting lids of the same material. "Quite sizeable—nearly a five-inch cube—so one could get a whole transistor oscillator section in without any trouble. Thickness ⅜in," he writes. These boxes are being supplied to hospital pharmacies all over the country, containing Thymol pastilles from Kerfoot & Co. G3OSU points out that most hospital pharmacists are quite accessible by telephone, and would part happily with one or two to any amateur who cares to go and collect them, despite their popularity as lunch boxes! That is, as G3OSU points out, if there are still amateurs who find fascination in adapting readily available objects instead of rushing to the manufacturers' catalogues. Which brings us back to our opening remarks.

MICROWAVES—1,000MHz and up

(Continued from page 523)

A consequence of this effect is that one tends to hear either very strong signals or none at all. It also means that conventional "S" reports are of limited value and can be downright misleading. A much more reliable guide to signal strength is obtained by fitting a calibrated attenuator into the aerial lead and determining the attenuation possible before signals apparently disappear into the noise.

The improvements in audio quality corresponding to 3kHz and 100kHz deviation are 5dB and 35dB respectively. One can readily see why people tend to turn up the deviation knob on 2m. While this practice is most unwelcome on 2m, it is positively encouraged on the microwave bands. Wideband fm addicts please note!

3cm tv

In the June column, it was suggested that the demonstration of tv on 3cm by G3ZGO was the first time that the band has been used this way. Colin German, GM3VBB/GM6ADU/T, has since pointed out that he showed a similar link at the Scottish vhf convention last October, which puts the record straight. He intends to continue his tv activities using a portable station.

His is one of the few stations operating fixed from the home QTH: using klystrons in both receiver and transmitter, and a 2ft steerable dish, his best contact has been with GM3OXX/P 14 miles away in Fife.

Skeds wanted

Charles Suckling, G3WDG, will be on Dartmoor from 5 to 19 August with equipment for 2m, 70cm, 23cm, 13cm, 9cm and 3cm. People interested in working him on these bands should contact him QTHR poste haste or look for him on 2m or 70cm during the fortnight. One site recommended for working him is from the Prescelly Mountains in Pembrokeshire, NGR SMO73321. The site is about 200yd west of the car park, and has already been established as one end of an optical path to Dartmoor 155km long.

New faces

Briefly for the record are these new enthusiasts for 3cm: G8DGR of Newbury, G8CKN of Basingstoke, G8FCH (ex-G2BKO) at Willersey near Broadway, Worcestershire, and G3VNC of Wells in Somerset.

FOUR METRES AND DOWN

by JACK HUM, G5UM*

Clear ring?

Contestants checking logs after the big 2m event of 1-2 July with last month's "It tolls for thee" in mind will have hoped no doom bell sounded for them, that their transmissions rang clean and clear throughout the contest. Many who amicably shared common QRA Locators with rival groups enjoyed a freedom from mutual in-band QRM that augured well for their out-of-band performance. Any who may have been less fortunate still have a month ahead of them to put things right before VHF NFD.

* * *

Constant alertness to the danger of amateur out-of-band QRM to professional services is a must. In the opinion of G8BTU, probably more of it occurs than many of us suspect: it simply remains unidentifiable. And because many commercial users close down at the end of the working day before amateurs open up, much QRM which might occur does not. John Dowson adds: "Amateurs can usefully look at the spurious radiation specifications for transmitters and receivers on commercial services as issued by the MPT and try to work to them. The specification for spurious radiation from a 10W rf output transmitter is that all products must be better than 2×10^{-7}W down with respect to the main carrier. For a receiver there must be less than 200μW radiation at the aerial terminal with 50Ω impedance. These figures should not be difficult to realize, although the amateur without access to test equipment to measure his spurious levels may need to enlist the help of friends in more fortunate positions."

G8BTU proffers the reminder that the problem has been aggravated by the use of transistor pa stages. These should never be used without a good bandpass filter at the output. Even older commercial rigs with "clean" valves incorporate filters in their output circuits.

Commenting on last month's suggestion to limit power in contests to help overcome this problem, John Dowson observes: "Could this not be worked on a sliding scale of aerial gain and rf power, ie the greater the rf gain the less the rf power allowed? This would *lead* people rather than *force* them into reducing power; and of course the receiver side benefits from aluminium in the sky."

July's contest itself showed how enthusiasm for QRP is already directed into practical terms. Scores of stations in the few-watts category got themselves so well sited as to be indistinguishable from the bigger guns, eg G4BCO/P of Hastings worked Peebles using 2W of rf. Noting this, neighbour G8BQX says: "Even more contacts would have been made if receivers up country had not been desensitized by excessive local transmitter powers. If every portable had been limited to 5W dc in, it is my guess the results would have been practically identical, if not better, for everyone's reception conditions would have been better". Following up this thought John Ridd adds: "Perhaps the next May portable event might be subject to a power limit of 5W dc input, perfectly adequate for a portable contest." Any supporters?

* * *

Not unconnected with the above is a suggestion from G3RSD to devote the last four hours of a 24-hour contest like the July one wholly to cw. "I know it knocks the G8 men but given adequate notice they would probably recruit a morse-proficient friend and would realize what the key can achieve under average conditions," says John Reynolds. It also means of course that a Class A callsign would need to be used. Again, what do member-contestants think of the notion?

* * *

And whose were the very English voices behind FOLG/P on 1-2 July? Why, those of the ex-GB2GC team (they could see Alderney 15 miles west of their Cherbourg site). Present were G3PSH, SKT, TPF and VXK. Their 10-over-10 raised GD2HDZ as best dx of the 260 worked. "Some knowledge of French essential on a trip like this for negotiating all the unexpected situations which arise," remarks G3PSH.

* * *

Some contest statistics from BRS28005, Terry Cooper of Sussex: in the 1-2 July event he logged 129 stations of which 40 were Class B, 64 Class A G/GW and eight were two-letter calls.

* * *

Once again G3NHE has come up with some statistics. Over 1-2 July, of his 141 contacts 32 were cw yielding 7·7 points per QSO; sideband gave 7·6 points per QSO; and a.m. 5·1.

* * *

Finally, back to QRP: we have an increasing volume of comment from operators tired of being clobbered by well sited local vhf stations using at least the maximum allowed dc input. This is something worth a closer look when more space is available.

Propagation pointers

Untrue to form, the 18 June aurora occurred when people were at home and could make the most of it. But if the phenomenon is true to form and recycles 27 days later it also hit 13-14 July when most people will *not* be around. No matter: although auroras tend to favour afternoons they can persist into evenings. A double-take of the 18 June one was noted by G3WZT of Sussex: by 1630 gmt the band had shut down, but at 1750 gmt up came some Tone A from SM7BAE on a NW beam heading and a quick QSO was effected. Like most observers, WZT noted the opening began at a heading of 030 and ended well round to the NW.

On the subject of Swedes, SM6PU has been monitoring our 70MHz band following some success last year: three UK stations were heard on 16 July of 1971 and TF3VHF on 18-19 June 1971, up to S6. He has a 6-el beam and a high-

* Houghton-on-the-Hill, Leicester LE7 9JJ

gain converter for 4m. If sporadic-E looks promising, he will listen for UK stations on the hour at 1900, 2000 and 2100 gmt and will call "CQ QSX 70 de SM6PU" on 28,045kHz with a view to effecting cw crossband contacts.

Moonbounce, the ultimate in vhf dx, is also preoccupying the Swedes, among whom SM7BAE worked VE7BQH on 14 April and heard a station, believed W6UOV, calling him on 144·003MHz. The Canadian was worked also by DK1KO on 23 April with signals 3dB above noise in a 400Hz bandwidth.

In Rhodesia ZE5JJ has a 1kW rig on 432MHz ready for e-m-e. In VK2 a special moonbounce group has been formed at Illawarra, with some advanced equipment available, including a 30ft dish.

Nearer home Chelmsford's G3LTF added to his impressive list of e-m-e successes by moonbouncing with W2NFA, an old friend in this rarified context. Signals were 10dB over noise for half an hour. The date, curiously, was aurora Sunday, 18 June.

And the frequency? 1,296MHz once again. The LTF-NFA contact via e-m-e lasted 70 mins via the 15ft dish at the Chelmsford end.

Apropos the rarefied context, over now to . . .

Two years to TF (via m-s)

That machine gun morse you hear on the bottom hertz of 2m every Thursday 2100-2300gmt is G3CCH firing at TF3EA in Iceland via meteor scatter. In the two years the sked has been kept 33 complete QSOs have been achieved. Even in circumstances of random meteor count the signals are partially there. Summer produces as many as 140 pings/hour, and the best chance of a contact; while winter is as low as 24.

This sustained two-year observation has thrown up some curious effects, eg the "rusty note" when for as much as half an hour signals go T7, quite unlike the familiar auroral hiss. Reversion to T9 occurs without warning.

"Double signal", another effect peculiar to m-s, occurs rarely but consistently; a second burst or ping follows the initial received signal, and can be higher or lower in strength. As for doppler shift, Johnny Stace noticed this only on a very few strong signals.

And so into the third year, backed up by high power, gainy aerials, superb cw technique and, above all else, lots of patience.

Expeditionaries

RAFARS will put G3RAF/P on Dartmoor from 1900gmt 21 September continuously until 2330gmt 23 September, using 144·24MHz. Devon-hunters wishing skeds should state callsign, county, QRG and preferred QTR, stating alternative QTR, to G4ACK, Barry Scarisbrick, 15 Briar Close, Burnham on Sea, Somerset, and send sae.

Well worth while was the GB3GWC/P tour of GM and northern G counties. In all 400 contacts were made in spite of very normal conditions, via the 10-el Yagi and the 100W p.e.p. sideband rig or the cw 30-watter. Now QSLs are on the way.

Rare Scottish border counties on 4m are offered by GM3FDW/P from 8-20 August, 0600-0800gmt and 1800 gmt until the QSOs stop, phone and cw on 70·1MHz, helped by a 6-el. During the 13 August contest G3FDW/P will activate Co Durham.

BEACON STATIONS

Callsign	Location	Nominal frequency	Emission	Aerial direction
GB3ANG	Angus	145·95MHz	A1	SSE
GB3CTC	Redruth, Cornwall	144·13MHz	A1	ENE
GB3DM	Burnhope, Co Durham	145·975MHz	F1	N/S
GB3GI	Bangor	145·99MHz	A1	NE/SE
GB3GW	Swansea	144·25MHz	A1	ENE
GB3GM	Thurso	145·995MHz	A1	S
GB3GEC	W. London	433·45MHz	F1	N/W
GB3LDN	S. London	1,297·500MHz	A1	E/NW
GB3SC	Sutton Coldfield	433·50MHz	F1	N/S
GB3SU	Sheffield (temporary location)	70·695MHz	A1/F1*	Omni
GB3SX	Crowborough Sussex	28·185MHz	A1	E/Omni
GB3SX	Crowborough	70·699MHz	A1	N
GB3VHF	Wrotham, Kent	144·500MHz	F1	NW

* Callsign on F1 continuously, on A1 once a minute. When on A1, F1 is suppressed.

The IOM visit by two GM men will take in the RSGB 2m sideband contest. They will have 400W p.e.p. and a 10-el from 18-25 August alternating the callsigns GD8FFX/P and GD3ZBE/P daily. *Special note:* they will also have 90W fm on 433·35 and a 46-el. On 26 August, returning to Aberdeen, they will radiate from the Kilsyth hills in Stirling.

One for the microwave men: G3WDG/P, Cornwall and Devon 5-19 August, will have 3cm, 13cm and 23cm as well as 70cm and 2m on Dartmoor. For sked write to 'WDG by 5 August.

Buteshire on 4m (GM3JFG/P) and 2m (GM8AGU/P and GM3JFG/P) from 8-12 September, 7-11pm. First 15min 145·4 sideband, second 15min 145·5 telegraphy, last 30min a.m. 145·5. Special effort on 4m Sunday 10 September 10am to 1pm. Skeds G8AGU, QTHR, with sae.

Identical mode sequence by G3ZUL/P and G8ACB/P and same QRG plus 144·15 cw and 145·927 A3, when they visit Cumberland 17 August, Westmorland 18 August, Dumfries 19-20 August, Northumberland 21 August and Durham 22 August, nightly 7.30 to midnight. Write to G8ACB with sae for sked.

Few can have worked Wester Ross on 2m. There is a chance right now: GM8DTM/P is there, 3,000 ft up on 145·66 from 5 to 6 August.

Beacon news

Measured frequency of GB3LDN, Shooters Hill, SE London (believed first-ever 23cm beacon in the world) is 1297·886MHz. Long distance reports will be welcomed by beacon keeper G8AXA.

Has anyone heard ZB2VHF on 70·26 this season? If you do, and if you notice a break in the beacon keying sequence, this means the operator is listening through. Give him a quick burst co-channel. You might even get two contacts for the price of one: ZB2BL also is now on 4m.

Stop Press. G3ZYR and G3ZZA logged ZB2VHF at good strength on 10 July at midday.

Gigahertzian successes

Further successes were notched in mid-June in breaking down gigahertzian paths. On 11 June the redoubtable partnership of G3BNL/P and G3EEZ/P was again linked when they covered 45m on 6cm between Cleeve Common and Clee Hill, possibly a world first using crystal control in this band. The mode was nbfm.

Current European vhf/uhf distance records

Band	QRB (Miles)	Date	Participants
50MHz	4,200	16 November 1958	EI2W-XE1PFE
70MHz	1,430	11 June 1967	GM3EGW-ZB2VHF
144MHz	1,387	4 July 1965	EI2W-YU1EXY/P
432MHz	686	31 August 1961	G3JHM-SM6ANR
1,296MHz	Claim awaited		
2·3GHz	124	1 July 1969	G8AGM/P-F1RJ/P
3·4GHz	54	11 September 1969	G3EEZ/P-G3BNL/P
5·6GHz	45	11 June 1972	G3EEZ/P-G3BNL/P
10GHz	95·75	25 September 1971	GW3RPE/P-G8APP/P
21GHz	7·25	15 June 1972	G8ADP/P-G3WDG/P

Claims for current distance records on all bands from 50MHz upwards are invited from European stations, and will be included in this table until bettered.

Another for the records claim box occurred on 15 June when 7¼ miles was covered on 21GHz between G8ADP/P from Dundry in Somerset and G3WGD/P on Purdown near Bristol. Similar equipment was used at each end: diodes doubling from 10·5GHz to give about 30μW and 12in dishes. Yes, this was on a wavelength of 15 *millimetres*.

Supreme No 2 to G5NU

When Bill Lord of Reading turned in 9 plus 40 cards for the 432MHz Senior Certificate he made a claim also for the Supreme Award. For this he needed either two Seniors plus a 23cm Ordinary, or *three* Seniors. He now has his three Seniors, and he now has his Supreme, only the second ever to be issued (the first went to G3MCS two and a half years ago). Typed on the gold leaf endorsement sticker of Supreme Award No 2 is "70MHz Senior No 5", "144MHz Senior No 14" and "432MHz Senior No 14".

Says Bill Lord: "The 70cm Senior was the hardest, and took four years in all. Two years ago I was three cards short, and one year ago I was one card short. The final contact, for the ninth country, was GC2FZC on cw."

Skedspots

Dunstable Downs ARC now has gainy aerials for 70cm and 2m up at 50 ft above its town centre hq, and activates G8DDC and G4ARD frequent Fridays. Night on the air for members is Wednesdays on 2m with overflow on 70cm.

Seven Humberside operators have a twice weekly net on 70cm, 1000gmt Sundays and 1900gmt Wednesdays, frequent checks being made to bring in stations outside wishing to join in. And if you want Lincs for that FMD parchment on either 2m or 70cm try G3NJF. Nearby, G3RSD offers Lincs on 2m cw any time.

Tech Corner

From G8EQA (Paul Wood of Blundeston, Suffolk).

A number of STC/ITT crystal filters are now on the surplus market due, I believe, to the new licensing regulations in respect of channel spacing. They are 10·7MHz devices, ideally suited to vhf conversion strips. They carry a serial code which indicates their characteristics, as follows:

Note the serial number, typically 445/LQU/901G. The last group is the significant figure, ie 901A device is 50kHz channel spacing, bandwidth ±15kHz at 3dB down and ±35kHz at 70dB down.

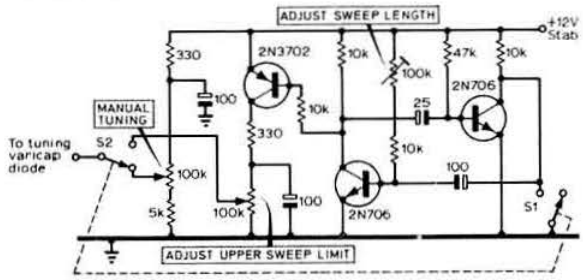
The suffix 901B indicates 25kHz channel spacing, bandwidth ±7·5kHz at 3dB and ±17·5kHz at 70dB. The terminations are 910Ω, 25pF.

The 901C device is for 12·5kHz spacing, bandwidth ±3·75kHz at 3dB and ±8·75kHz at 70dB, termination 470Ω, 25pF. This device seems to be specially suitable for providing good selectivity for a.m. and fm, if a little deficient for ssb. But who would complain at 37½p a time!

These filters are very clean and have a good shape factor.

From G8AGR (S. C. Craddock of Newcastle)

The question was put in *FMD* May, p313, asking if anyone uses a mobile receiver with an automatic tune and lock-in system. I use an automatic scanning system which has to be manually tuned to a signal when one is found. This is the easier part of what was asked for. The basic circuit is shown herewith. Many variations are possible. Transistor types are not critical.

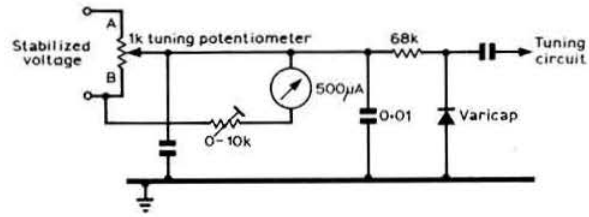


The slow sweep rate allows one or two words to be heard as a station is tuned through, which sometimes is enough to identify some of the locals. This circuit does enable the mobile operator to take a look around the band without twiddling or losing the channel he is expecting to be called on.

I hope this will start the ball rolling, and that someone will come up with a fully automatic system which is not too complex or costly.

From G8CYK (D. Poel of Brentwood, Essex)

The circuit diagram shows a classically simple form of tuning scale for use with varicap tuners in vhf/uhf equipment. Once calibrated, the system provides a totally resettable scale (edgewise meters are the neatest to use). The meter should be set for fsd with the slider of the 1kΩ potentiometer at "A".



Further to the subject of varicaps, these have possibilities as local oscillators at 136MHz for 2m receivers, followed perhaps by ics as i.f. stages and detectors. I would be interested to hear from any members whose thoughts have run along similar lines.

Buying specialized ics such as the LM373 in the one or two off quantities which most experimenters envisage is a costly business and a nuisance to suppliers. High costs and long delivery times delay the use of rf/i.f. amplifiers using ics in amateur circuits, a situation which could perhaps be improved if enough amateurs formed an ic bulk buying group. If any are interested in this suggestion I would be glad to hear from them.

Here and there

Someone on this side of the Channel who *did* puncture Anjou 1 was G8CFZ on the Sussex coast, whose 70cm input was heard transponded on to 145·6 by several locals. And an F listener report has reached him. But he agrees that more advance publicity for such ventures is a must.

Sad news comes from EI6AS: he reports the sudden passing of EI2A at the end of June. Shane MacNamee, of Navan, a courteous and friendly person and a superb vhf dx operator, will be sorely missed by all EI and UK metre-wave men who knew him.

The Colchester Club's vhf contest in April was such a success that a repeat has been organized for 14–15 October for 2m, 70cm and 23cm. Details later. Insert the dates in your radio room diary.

Details of the international amateur tv contest 23-24 September and 30 September-2 October appear in August *CQ TV*, journal of the BATC. Operation on 2m (sound only), 70cm and 23cm (sound and vision).

What they say

"Just located two 832 bases for a projected 70cm tripler. They are harder to get than gold dust, like a lot of components here"—VK4IC (ex-G3OZH).

"Contacts via German repeaters tended to be all identical to G3BA/BHT/LX (*FMD* June 1972 p 374). Yes, but a rare LX-pedition is the receiving end of a pile-up of 10's, 20's, 30's trying to work you . . . not representative of repeater operation"—G8AUU.

"Eating, sleeping and living vhf again. I'm up with the lark checking 145·41, then at lunch time, and at night they can't sleep in the house for the bump-bump of the Stolle rotator doing its rounds!"—G3BW.

"It is extremely dangerous to keep the M/rig in operation while filling is in progress. There is on record a very serious accident in America caused by a spark igniting the petrol due to the transmitter being operated during filling"—G3BZG.

"What a pity some of the S5 signals on 2m with hardly any mod cannot plug a key in!"—G4BBR (formerly G8DKN).

RAE Courses, 1972-3

Beckenham, Kent. Beckenham and Penge Adult Education Centre, 28 Beckenham Road, Beckenham, Kent. Enrolment by post to the Area Office (244 Beckenham Road, Beckenham, Kent. BR3 4DA) or in person at the Centre from 11 September on. Course commences Tuesday 19 September at 7.00pm. Instructor R. E. Piper (G3MEH).

Birmingham 19. Holte Adult Education Centre, Wheeler Street, Lozells, Birmingham 19. Enrolment 11 and 12 September, 1915-2115. Commences 1915, 20 September. Enquiries to G4ABV QTHR.

Boreham Wood, Herts. College of Further Education, Elstree Way, Boreham Wood, Herts. Enrolment 11 and 12 September 1000 to 1300 and 1600 to 2000. Commences 27 September, 1900-2115.

Camberley, Surrey. Robert Haining Centre, Mytchett Place, Mytchett. Enrolment 11 September, or at first class on 27 September (7.30-9.30pm). Fee £3.12 for 22 weeks. Further information from the Principal, A. H. Morgan, Institute of Further Education, France Hill Drive, Camberley, Surrey.

Corby. Corby Technical College, Corby, Northants. Enrolment during first week of term, course begins September. Instructor D. J. Wilson, G3VCQ. Write for further details or ring Corby 3252. Morse practice classes may be held, depending on demand.

Cove, Hampshire. Cove Further Education Centre, St John's Road, Cove, Farnborough. Commencing 7.30pm, Thursday 28 September. Further details from Mr P. D. Dimmick, Principal, at the above address.

Grantham, Lincs. St Hugh's Secondary School, Dysart Road, Grantham, Lincs. Enrolment 4 and 5 September, or on first evening. Commences Monday 11 September at 6.45pm, and/or Tuesday, depending on demand. Instructor A. Ellis, G3PJR.

Harlow, Essex. Harlow Technical College, College Gate, Harlow, Essex. Commencing September. All enquiries to instructor Mr E. P. Essery, G3KFE, 17 Ascot Close, Parsonage Lane, Bishops Stortford, Herts.

Ilford, Essex. County High School for Girls, Cranbrook Road, Ilford, Essex. Enrolment 7-8.30pm, 11-14 September. Courses 7.15-9.15pm commencing 27 September. Fees £3 (over 21), £1.50 (under 21). (Now in its 25th successful year).

London Borough of Croydon. Further Education Centre, Tamworth Road Annexe, Croydon. Enrolment 16 September 9.00am-3.00pm and 18 September 7.00pm-9.00pm.

London N.W.1. Holloway Institute, Whittington School, Highgate Hill, London N.19. Enrolment 18 to 22 September. Commences 25 September 7.00-10.00pm. Instructor, Mr B. C. Bond, G3ZKE. All enquiries to G3ZKE or Mr T. Coleman, G8EEI, QTHR.

Newport, Mon. Newport College of Further Education, Nash, Newport, Mon. Commences 11 September, Monday evenings.

Oxford. College of Further Education, Cowley Road, Oxford. Details from the Principal, at the College.

Portsmouth. North End Further Education Centre, Drayton Road, Portsmouth. Course evenings Tuesday and Thursday. For further details contact G6NZ, or write to the Principal.

Slough, Bucks. Slough College of Technology, Wellington Street, Slough, Bucks. Enrolment 13-15 September. Basic RAE class 6.30-9.30pm Fridays, plus "on the air" session 5.00-6.30pm. Advanced class 7.00-9.15pm Fridays, mainly for existing licence holders. Further details from E. C. Palmer BA, G3FVC, Department of General Studies, at the College.

Welwyn Garden City. Mid-Herts College of Further Education, Welwyn Garden City. Enrolment 11, 12 and 13 September, 2.00-9.00pm at the Campus. Further details from Mr R. Stringer, G3IOZ, 88 Pentley Park, WGC, Herts.

Cannock, Staffs. Cannock Chase Technical College, Cannock, Staffs. Commencing September, on Thursday evenings 7.00-9.00pm. Instructor Mr F. A. Fear. All enquiries to P. M. Linley, Head of Department of Engineering at the College.

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

CONCERN is being caused throughout the world by the ever increasing intrusion into amateur service frequency allocations by commercial and broadcasting stations in spite of the excellent work being done by the intruder watch organisations. It seems that we are now witnessing a further pollution on the 14MHz band—which has so far escaped some of the more virulent type of interference—by a group of stations which operate between 0800 and 1300 in the area between 14,280 and 14,350kHz. They appear to be speaking Arabic and give no identification other than code names. Some have admitted to being located in Kuwait, Saudi Arabia and Dubai and it is fairly certain that some hold valid Kuwait callsigns. Action through official channels will undoubtedly succeed in due course but in the meantime if their illegal status is pointed out to them by sufficient genuine amateurs they may be persuaded to cease their illegal activities!

News from overseas

9V1QU has returned to the UK and is G4AUN. He believes that he has QSLd all contacts made during the time he was on the air—from 21 July to 8 December 1971—and says that anyone who was using his callsign outside that period was a pirate. Outstanding QSL cards may be obtained by sending an sae to the address in *QTH Corner*.

G3YCP/MM has commenced another trip to New Zealand, via Panama, Samoa and Fiji, and should be heard on 7,080, 14,160 and 21,310kHz. He has an SB101 and 14AVQ aerial aboard the *Otaki* and his licence was arranged in only four days thanks to much co-operation from all concerned. Arrival at Suva is expected to be on 4 August and an attempt will be made to be on 14,160kHz at 0700 daily.

ZD8RW was due to commence operation from Ascension Is on 13 July with an FTDX 401 transceiver and 14AVQ aerial. He intends to use all bands 7 to 28MHz and to be particularly looking for UK contacts. QSLs will be dealt with by G8BXU (see *QTH Corner*).

Top band news

During the June tests PY1DVG managed to contact DL9KR, EI8H, EI9J, EL2CB, G3IGW, G3ORP, G3VYF, G3XAP, G3XVY, G3YMH, G4AEE, GC3ZES (believed to be the first GC/PY contact on 160m), GW3UPK, HB9NL, OK1ATP and OL1AOH. G3VYF was Rolf's first contact (on 4 June) and has already received his QSL. VP8KF is reported to have heard EP2BQ's signals also during the test periods.

A summary of signals heard or worked during the tests by G3ORP includes details of seven loggings of PY1DVG (usually just after 0000 and sometimes RST 579). Other dx heard includes VP8KF (about 0100 at RST 349), ZP9AY at 0110 (RST 469), ZD9BM at 0212 (RST 459), and W1BB/1, W2LWI, W1HGT and W4EX (around 0200). EP2BQ was received at RST 469 at 0040 on one occasion, and EL2CB contacted at 0101 (RST 479).

Dxpeditions

David Woolf, G4BFZ, reports that there will be a British Joint Services Expedition to Chagos during the months of November and December, and that he has been invited to go along to operate an amateur station from Egmont Is daily during the two months stay. Equipment will consist of two KWM2As and linears, and aerials are most likely to be dipoles on 14 and 21MHz. Further details of schedules will be available later. The expedition is making film for the BBC "World About Us" feature and will also receive publicity in the national press.

There will be an expedition to Trindade Is (PY0) by some Brazilian amateurs probably on 13-14 August. One of the operators will be PY1DVG who hopes to be able to put out a signal on 1·8MHz.

F0AFV/FC and F0AHY/FC were scheduled to start operating from Corsica during late July and to remain on the island for several weeks. They have a Galaxy V with them and have given the following frequencies as those they intend to use: 3,505, 3,620, 3,790, 7,005, 7,080, 14,050, 14,195, 21,050, 21,280, 28,050 and 28,550kHz.

West Coast DX Bulletin reports that a number of KA amateurs are hoping to visit Minami Torishima (JD1) in late October. Rumours of a late summer or early autumn activity from Spratly Is are also mentioned, and a visit to Bajo Nuevo in November by a group including some of those who recently operated KC4DX is also a possibility.

A group of Brazilian amateurs hopes to visit Islas das Rochas (PY0) during September. DXCC status is not known but your scribe believes that it has been investigated previously and rejected. W2NSD/1 is reported to be intending to visit Bajo Nuevo (HK0DX) during the weekend of 11 November.

Rumours concerning Clipperton Is continue to circulate—*West Gulf DX Bulletin* suggests that there is a group hoping to go in late October or mid-November.

DX news

The Director General of the P & T Department of Vietnam has notified ITU that XV5AC is permitted to contact amateurs outside that country and therefore QSOs with XV5AC since 14 June may be counted for DXCC credit. This seems to have come about as a result of considerable hard work and diplomacy by HS3DR, HS5ABD and WA7QDG.

As mentioned in a previous *MOTA*, Stan Kohn, KC6BK, has moved from Ponape to Yap. He will be there for two years and will operate on all bands 3·5 to 28MHz using an FT101. At the time of writing he was using a 14MHz ground plane and inverted-V for 7MHz.

VK9ZB has been worked from Willis Is on 14MHz ssb at around mid-day. There seem to be two operators—Brent and Clem—and the station will remain active until December.

* 10 Knightlow Road, Birmingham B178QB.

K6IC is reported to have received a QSL card from ZA1ZA via YU2BRO. His contact was on 8 April 1972 and the card gives "Bob Antich, Rizwelli 9, Scoderia" as the operator's name and address.

DXers Magazine says that there is no more activity from Qatar as MP4QBK, who was the only licensed amateur in the country, has been closed down.

There are two new operators at ZS2MI on Marion Is and the station seems likely to be more active for a while. F2GM and his wife operated from Algeria as 7X0GM and 7X0GA respectively during June and they were expected to change to using 7Y0 prefixes during July. OK1VJG, Jan Grecner, is licensed as 7X0JG and will be there for two years.

PA0VDV has returned to Curacao and will be on the air for the next three years on all bands with his old PJ2VD callsign. VP2LI, on St Lucia, is often to be found talking to his QSL manager on 14,260kHz at 0001 on Wednesdays. The station using the callsign 3G3AA on World Telecommunication Day was located in Chile and should be QSLd via the CE Bureau.

There has been considerable activity from Bangladesh. This began with a short spell of S21IR operation by John Van Lear, 9M2IR, and it is understood that a number of amateurs who are working with the Red Cross in Dacca are also licensed. These include ON5AB (S21AB), HB9YC (S21YC), LA6UH (S21YH), and another Swiss operator who is S21EW. Their station is in the International Hotel, Dacca, and they have a 2kW linear and a beam.

K5AAD and WA5ZNY anticipated visiting VP2V, VP2E, FS7 and FM7 during the period 7 July to 15 August. QSLs for all calls should be sent via WA5ZNY, 12301 Zavalla St, Houston, Texas, 77045, USA.

Contests

Results of the **Phone** section of the **1971 CQ WW DX Contest** have been received from W1WY. GM3YCB, GM4ANR/P and GM3YOR are listed as world first, second and sixth on 1·8MHz. G3XVY is world fourth on 3·5MHz, and G3FXB world sixth on 14MHz. The complete UK scores are as follows:

Single-operator—Single transmitter

G3LNS	(All band)	**1,414,336**	points	**G3FXB**	(14MHz)	**452,513**	points
G3VBL	,,	544,027	,,	**GM3DZB**	,,	**81,880**	,,
GM3BCL	,,	**237,748**	,,	G3NSY	,,	39,872	,,
G3SEM	,,	218,648	,,	G3XMX/A	,,	34,958	,,
G3PEU	,,	169,764	,,	GM3ZXH	,,	26,488	,,
GC3YIZ	,,	**128,524**	,,	**G3SSO**	(7MHz)	**25,568**	,,
G2AJB	,,	31,581	,,	**G3XVY**	(3·5MHz)	**49,895**	,,
G3MWZ	,,	11,322	,,	**GM3RFR**	,,	**6,534**	,,
G3GXO	,,	4,920	,,	**GC3NLX**	,,	**5,868**	,,
G2BOZ	(28MHz)	**35,120**	,,	GM3VTB	,,	5,412	,,
G3YTU	,,	2,520	,,	**GM3YCB**	(1·8MHz)	**4,590**	,,
G3KWK	(21MHz)	**242,073**	,,	**GM4ANR/P**	,,	**3,204**	,,
G3YHB	,,	60,168	,,	**GM3YOR**	,,	**392**	,,

Multi-operator—Single transmitter

G3WYX	**2,019,735**	points	G3TZH	260,920 points
G3FVA	842,052	,,	G3YXR	235,872 ,,
GD3WJN/A	**506,020**	,,	G3RCV	181,738 ,,
G2KK	436,653	,,	**GW3ZIL**	**28,782** ,,

Congratulations to the certificate winners (listed in bold type).

The results of the **1971 WAE DX Contests** are also to hand and are as follows: **Phone section**—(single-operator) **G3TXF** (58,308 points), G3YWI (2,444), GC3YIZ (2,050) and G2FNK (1,260); (multi-operator) **G3LNS** (389,759), G3FVA (37,666). **CW section**—(single-operator) **G3KWK** (102,661), G3ESF (95,480), **GM3CFS** (78,080), G2DC (76,275), G2AJB (1,375) and G3OLU (54).

Thanks to the kindness of G4AEO and W2EQS the results of the **1972 CQ 160 DX Contest** have been received and UK scores are as follows:

GW3UPK	**45,849**	points	G3VIP	8,775	points
GM3IGW/A	**43,776**	,,	G4AR	7,670	,,
GM3YCB	26,298	,,	GW3UCB	7,579	,,
G3VRW	**20,240**	,,	G3XTT	5,070	,,
GM3YOR	16,252	,,	G3XWZ	4,708	,,
G3HZL	12,222	,,	G3VIW	3,360	,,
G3XEP	9,648	,,	**GD3TNS**	**2,020**	,,
G3KMI	8,970	,,			

World winner appears to be KV4FZ who amassed 166,128 points and top European DL9KR with 60,996 points. Congratulations to certificate winners (listed in bold type).

Awards

The Olympia Diploma 1972

Issued by DARC to celebrate the Olympic Games. Requirements are that applicants should have contacted (or heard) 50 countries who have sent competitors to the games, all contacts to have been during 1972. Send a certified list and six IRCs to DARC Olympia Diplom 1972, P.Box 262, D 8950 Kaufbeuren, Germany, *after* the closing ceremony.

The ZL—72 Award

For working 50 New Zealand stations during 1972, all four districts must be represented. Certified log data (no QSLs needed) should be sent with three IRCs to ZL2GX, 152 Lytton Rd, Gisborne, New Zealand. (There will be ZL—73, and ZL—74 Awards issued on similar lines in 1973 and 1974.)

Marconi-Kemp 75th Anniversary Award

The award will take the form of a commemorative certificate available in three classes with special star award for operation on cw. To qualify for the award, stations must submit proof of contact with three, four or five commemorative stations plus 10 British stations and 10 Italian stations. The award is available until 31 May 1973. The commemorative stations are GB2SM, GB3RCS, G4RS, G2WS, GW3VKL, I4FGM, IP1TTM, I0IJ and HV1SJ, which will operate frequently throughout the year.

The award is worded in English and Italian, and it is hoped to obtain the signature of Elettra Marconi and that of a relative of George Kemp on behalf of the Bologna section of the ARI and of the Barry College of Further Education RS, respectively. For further details contact Barry College of Further Education RS, 49 Colcot Road, Barry, Glam, sending sae (foolscap) or irc.

In connection with the first-day cover bearing the Marconi stamp franked on Flatholm Island, GB3BCT (Flatholm) will operate for a week from 10 September as also will G2WS from Brean Down.

G3VWK, on behalf of the Cornish RAC, wishes to apologise for the long delay in despatching the certificates to those who applied through him for the award offered by the Newfoundland Society to those contacting both stations connected with the Marconi 70th Anniversary celebrations. There has been a hold-up with printing, but all applicants will receive replies in due course.

Band reports

Typical summer conditions seem to have taken over on the bands if not elsewhere! Ten metres is carrying good signals from Europe with occasional African and Middle Eastern stations and some from S America. Fifteen is now good sometimes into the Pacific area in the mornings and is open quite late in the evenings into the Far East and Australia. Twenty metres is often open for 24 hours daily, but dx activity on 40m and 80m is now at a very low ebb.

QTH Corner

A35JH	WB5BHN, 2020 Guthrie Pl, Las Cruces, NM, 88001, USA.
C31CD	(see C31FH)
C31FE	(see C31FH)
C31FG	via ON6SR.
C31FH	DL0LJ, Box 211, D-4132 Kamp Lintfort, Germany.
C31FI	F6ACU, 66 Rue de Cornehotte, 80 Dargnies, France.
C31FN	PA0PMP, P. M. Patings, Mgr v Schalkstr. 5, Den Bosch, Netherlands.
CR3RY	CT1RY, Impasse 1, A Estrada da Luz, Rua C NR 9-1-E, Lisbon 4, Portugal.
CT1EL	J. G. Roberts, c/o REP, PO Box 2483, Lisbon, Portugal.
CX5RV	G5RV, R. L. Varney, 82 Folders Lane, Burgess Hill, Sussex.
F0AFV/FC	DJ5UAC, Bischofsheimer Platz 24, 6 Frankfurt, Germany.
F0AHY/FC	DJ0UP, Hellerhofstr. 41, 6 Frankfurt, Germany.
VP2VV/FS7	F6AEV, Philippe Luizard, Hotel Digue, 50 Mont St-Michel, France.
JY6FC	K6AQV, 53205 Doubleview Drive, Box 932, Idyllwild, Cal, 92349, USA.
KC6BK	Stan Kohn, Box 55, Yap, Western Caroline Is, 96943.
KC6SX	via KH6HIF, P. G. Bissonnette, Box 2351, Honolulu, 96804, USA.
PJ8WP	W5KGJ, 1302 57th Terrace, Ft. Smith, Ark, 72901, USA.
S21AB	ON5AB, 379 Ferrerlaan, B-9000 Gent, OV, Belgium.
S21IR	VE7BWG, 488 East 4th St, North Vancouver, BC, Canada.
TL8RD	BP 22, Bangassou, Central African Rep.
TR8AF	BP 203, Libreville, Gabon.
VK9JW	VK3JW, J. W. Martin, PO Box 239, Bairnsdale, 3875, Vic, Australia.
VK9XW	W2GHK, Box 7388, Newark, NJ, 07107, USA.
VK9ZB	PO Box 708F, GPO Melbourne, 3001, Vic, Australia.
VP5RS	W4GDS, 2710 NE Fifth St, Pampano Beach, Fla, 33062, USA.
VP8LR	WB4FIN, 5508 Idlewood Lane, Louisville, Ky, 40291, USA.
XV5AC	W1YRC, 30 Rocky Crest Rd, Cumberland, RI, 02864, USA.
YK1AA	(w.e.f. 1/7/72) via K3RLY, Box 125, Simpsonville, Md, 21150, USA.
ZD8RW	via G8BXU, R. Weston, 64 Darvel Down, Netherfield, Battle, Sussex.
3B8DA	Alex Mootoo, 39 Brown Sequard Ave, Vacoas, Mauritius.
3G3AA	CE QSL Bureau, POB 13630, Santiago, Chile.
9M8WUW	JA2KLT, Y. Maruyama, Shinozuka, Kozakai, Houigu, Aichi, Japan.
ex-9V1QU	R. A. Collett, The Knoll, Brean, nr Burnham on Sea, Somerset.

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

Very many thanks to all correspondents and specially to the following who provided the information from which this section of *MOTA* has been compiled: G2HKU, G3AAE, G3GVV, G3HB, G3IFB, G3ORP, G5JL, G6GH, BRS 2098, BRS 17567, BRS 25901, A7545 and A7951.

Stations listed in italics were using cw, the others ssb.

1·8MHz. 0200 *8P6DR*. **0400** *4S7DS*. **2200** *W6AIS (?), 4S7DS*. **2300** GB3IOS.

3·5MHz. 0100 LU4FCB. **0400** CE8AA, PY2ERS, ZD8TS. **0700** *XE1DE*.

7MHz. 0000 ZS1MH, 9Y4VT. **0100** *CX9BT*, LU9DM.

14MHz. 0500 DL2CI/HC8, *ZK1AA*. **0600** C31FK, KJ6CW, VK9KA (Papua), VR6TC, ZK1AJ. **0700** K4II/KH6, *W7ISG* (Nev). **0800** LG5LG, VA8RA, 9L1GC. **1400** AC3PT. **1700** KH6BB, 4S7SW. **1800** HZ1HZ, JY5HB, VQ9DC. **2000** FK8BQ, ZB2A, ZD3D. **2100** HS2AGP, PU0WH, XV5AC, ZD7SD. **2200** HK0BKX, HM1DK, JY9LOM (QSL to K6LOM), *PT0MI*, VE3GCO/3 (Manitoulin Is), ZD3M. **2300** VP2VV/FS7, VP1BH (QSL to VE2AKZ), XT2AF.

21MHz. 0700 K6ZNH/KH6, KJ6BZ, VQ9R. **0800** *JT1KAA*. **0900** MP4TDM. **1000** KS6CY, KX6JN. **1100** CR3KD, KX6AA, YJ8GH, 5W1AB. **1200** TU2DI, VK9MH. **1300** KA6DO (Kume Jima, Ryuku Is), TR8AB, *VK9KE*. **1400** TR8WR, VK9DM. **1500** PJ2ARI, *PQ0MI*, ZD9BM. **1600** *HM5EE*, PY0WH, VQ9R, VS9MB, 9M2s. **1700** DU1KJT, VP8ME, *XV5AC*, ZD8KO, 9L1VW (QSL to W9FIU). **1800** CT2BD, *TY1ABE*, W6/W7, *VP8LR, 4S7EA*, 5U7AS. **1900** AP2TU, JW1EE, PQ0MI, TU0WH, XV5AC, 9K2CM. **2000** HC2OM (Darleen, formerly WA6FSC), VP8MM, 5X5NA. **2100** VKs, W6s, *YV7IM*, ZD8JT, 9H1CZ (Gozo). **2200** *CE3AD, G5RV/LU*, TN8AU, VP9DV. **2300** *CP7GM, VK2EO*.

28MHz. 1300 9G1DY. **1400** ZS3B, 5H3LV. **1500** TU2DN, 9J2LK. **1600** CR6IS, HV3SJ, PYs, ZD8JC. **1700** CE2CC, LUs. **1800** CX4AR, PZ1CU, ZD8TR, *ZP5AQ*, 5Z4LW. **1900** CE, LU.

Propagation Predictions

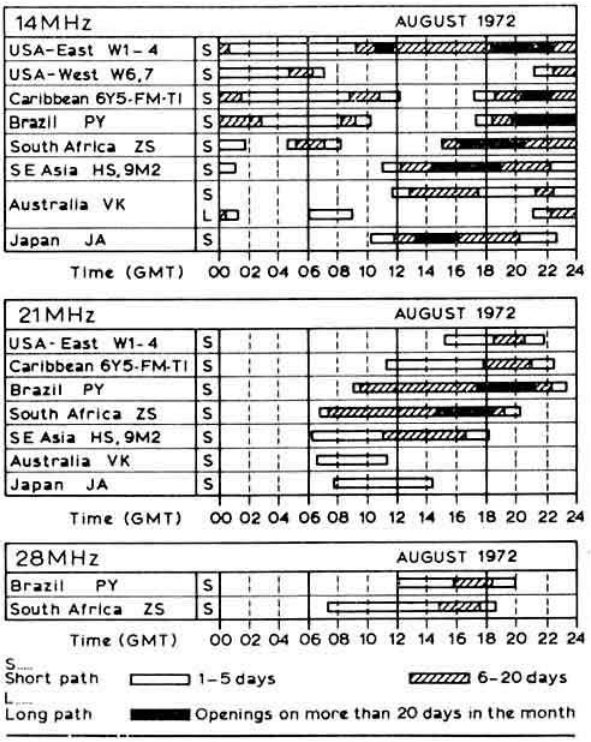
August will be the last month with poor summer-time dx conditions on the 28 and 21MHz bands. Conditions will improve during September but will not reach their peak until October or November. As the sunspot number is expected to be around 50 in the coming autumn, much lower than in previous years, dx conditions will be very poor compared with those of a year ago.

Conditions on **28** and **21MHz** during August will be similar to those during June and July, with 21MHz being better for dx. South America and Africa will only be heard on 28MHz under good conditions but they will be heard with certainty on 21MHz. Summer-time short-skip conditions will continue during August, but will slowly come to an end.

Night-time dx conditions will worsen slightly on **14MHz**, compared with July and June, especially towards the end of the month as the nights become longer. DX traffic will also worsen on the indirect path with the approach of the equinox. As it is now spring in the southern hemisphere, communication with South Africa on 21MHz and 14MHz will remain open longer.

On **7** and **3·5MHz** conditions will remain the same as in June and July. In the latter half of the night the dead zone will only interrupt local communication on rare occasions on 3·5MHz.

The provisional sunspot number for June 1972 from the Swiss Federal Observatory was 83·4 with solar activity reasonably evenly distributed throughout the month. The predicted smoothed sunspot numbers for October, November and December are 53, 51 and 49 respectively.



Very many thanks to all correspondents and especially to the following for items reproduced: the **West Coast DX Bulletin** (*WA6AUD*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX'press** (*PA0INA/PA0TO*), **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*VK6JR*), **QUAX** (*G3DME*), the **DXers Magazine** (*W4BPD*) **NARS Newsletter** (*5N2ABG*), **Long Skip** (*Nick Sawchuk*), and **CARS Newsletter** (*ZC4RS*).

Please send all items for **September** issue **to reach G3FKM** no later than **5 August**; for **October** by **8 September**; and for **November** by **5 October.**

COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 1 June 1972

Present: *Mr R. J. Hughes (President, in the Chair), Messrs B. D. A. Armstrong, J. O. Brown, W. J. Green, E. G. Ingram, G. R. Jessop, W. F. McGonigle, L. E. Newnham, C. H. Parsons, J. R. Petty, W. A. Scarr, R. F. Stevens, G. M. C. Stone, F. C. Ward, E. W. Yeomanson (members of Council), and D. A. Findlay (general manager).*

Apologies for absence had been received from Dr E. J. Allaway, and Messrs J. Bazley, A. W. Smith, and A. W. Hutchinson (editor).

Marconi-Kemp 75th Anniversary
Mr Scarr reported that he had attended the lunch given by the Barry College of Further Education on the occasion of the Marconi-Kemp 75th Anniversary celebrations. Messrs Parsons and Jessop had also attended the lunch and they agreed with Mr Scarr that the function had been outstandingly successful and reflected great credit on the organizers.

Finance report
The Honorary Treasurer presented the provisional accounts as at 30 April 1972 and explained various points. It was agreed that the implications of VAT would need careful consideration by Council and Mr Brown would provide explanations when the Bill became law. Council expressed appreciation of the accounting information provided by Mr Brown.

Membership and affiliation
Council noted the membership figures for May.
It was resolved:
(i) to accept reduced subscriptions from five members;
(ii) to waive the subscriptions of 15 members on the grounds of blindness or other disability;
(iii) to grant affiliation to the Chad Radio Club, Lichfield; the Ely Amateur Radio Society, and the Port Talbot and District Amateur Radio Club.

Region 1 ORM
The Region 1 ORM to be held at Lancaster University on 24 September will be held between 3 and 5.30pm.

IARU Conference
The President reported on the IARU Region 1 Division Conference held in Scheveningen from 15 to 19 May 1972. The President, who had led the delegation, had been accompanied by Messrs Ingram, Newnham, and Stone.

The President commented on the high esteem in which the RSGB was held and the inclination of all societies to look to the RSGB for guidance. This was in no small measure due to the efforts of Mr Stevens, who as chairman of the IARU Working Group and secretary of IARU Region 1 Division, had ensured that the delegates were fully briefed on all matters likely to be considered. Mr Hughes said that he felt that representation at IARU conferences was essential and that such representation must be informed, dynamic and active. Messrs Ingram, Stevens and Stone reported briefly on the conference. The full report was being published in the July issue of *Radio Communication*.

Committee Terms of Reference
Mr Armstrong reported that provisional Committee Terms of Reference had been circulated to Council members and that these were now for final consideration. It was agreed that they should come into effect on 1 July 1972.

Committee minutes and recommendations
Council approved the minutes of the following committee meetings: HF Contests (16.3.72), VHF Contests (6.4.72), Education (8.4.72), Diamond Jubilee (13.3.72), Mobile and Exhibition (21.3.72 and 25.4.72), Raynet (11.3.72), Scientific Studies (8.5.72), Technical & Publications (21.3.72), VHF (3.5.72), IARU Working Group (24.3.72).

Mr Parsons reported that a further meeting of the Membership and Representation Committee had been held during the afternoon of 1 June when consideration had been given to the fees payable by Affiliated Societies. It had been decided to make a recommendation to Council regarding receipt of *Radio Communication* by affiliated societies and affiliation fees.

After consideration it was proposed as an amendment to the recommendation that there should be a scale of fees for affiliation: a fee of £2 per annum if *Radio Communication* was not required and a fee of £4 per annum if *Radio Communication* was required.

It was proposed, seconded and carried unanimously that the recommendation and amendment be considered at this meeting of Council, following which it was then resolved that the amended recommendation should be accepted.

Diary dates
It was agreed:
(i) that Council meetings would be held on Thursday 3 August, Tuesday 10 October, Thursday 23 November 1972, and Thursday 4 January 1973.
(ii) The Annual General Meeting will be on Friday 1 December 1972.
(iii) The Presidential Inauguration will be on Friday 5 January 1973.

Presidential activities
The President reported that he had been interviewed for an article which was to appear in a Mullard publication.

A report was given on the operation of station GB2ITU by Mr Hughes and members of Tonbridge School Radio Society on the occasion of celebrations marking World Telecommunication Day 1972.

Council approved the proposed visit of the President to amateur radio clubs and societies in East Scotland during the summer.

VHF/UHF band plans
Mr Stone reported that the IARU Region 1 Conference had decided to change the VHF/UHF Band Plans, and it was agreed that an invitation should be extended to Mr A. H. Dormer, G3DAH, to discuss the proposed changes.

Zone C meeting
Mr Green asked that authority be given for a meeting of Regional Representatives from Zone C. It was agreed that this meeting could be held subject to approval of expenditure by the Honorary Treasurer.

YOUR OPINION

The Editor
Radio Communication
Sir—I would like to add fuel to the fire regarding the recent correspondence on the change of the NFD rules. I, and my NFD colleagues in the Cornish Radio Amateur Club, fully endorse what has already been said in *Radio Communication*.

The contest, as we understand, was originally conceived to tels the ingenuity and team work of clubs in setting up a portabet station under emergency conditions. Stipulating the use of tents, a time limit for setting up, aerial restrictions, were all part of the "magic" of NFD and now this has been removed. Like G3LCH we also envisage fully-equipped caravans brought to the site with only aerials to erect. Where is the appeal in that?

I presume that the multiplier for 160m has been introduced to create more activity on the band. I predict that the only clubs to benefit from this will be those in the London and Midland areas. Anyone outside these areas will not be able to get through the QRM to work stations in sufficient numbers to justify going on the band. You have only to look at the AFS results to see where the top 160m stations are located. Stations compete on a more equal footing on 80 and 40m so I would suggest scrapping Top Band for single station operation and either covering 80-10m or pick any three bands of the five. As it is now, the contest will develop into a battle of KW2000Bs, being the only six-band transceiver easily adaptable for NFD use.

Last year the CRAC came sixth in the single station entry which gave us a lot of satisfaction when you consider our location, and we felt that a cw filter for the HW-100 would give us the selectivity we were lacking last year, with a consequent boost to the score. However, if present trends are anything to go by perhaps we should have built a speech processor and linear. I only hope our fears are unfounded.

Yours faithfully,
J. Farrar, G3UCQ

The Editor
Radio Communication
Sir—The letter from G3YMH points out the difficulty of communicating over long distances using Top Band and with this statement I am in complete agreement. At the same time I feel that this difficulty is quite artificial, being brought about by the deliberate choice of a frequency not suited to the distance involved.

Some time ago at a lecture on point-to-point communication the speaker pointed out that the most valuable tool at the engineer's disposal was his choice of a frequency to suit the distance and the path conditions.We can of course make any problem more difficult by selecting the wrong tool for the job but I would suggest that no good engineer would see any real merit in doing so.

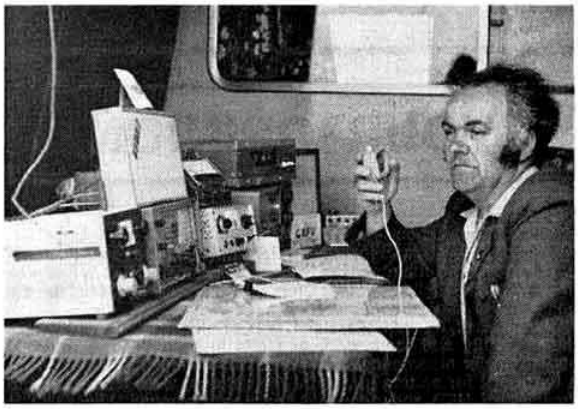
The loss of Top Band would indeed be unfortunate but I would suggest that its interest could best be served at the present time by more use within the already well-known limitations. The occasional shaky contact over a long distance hardly comes in the "worthwhile experiment" category.

Yours faithfully,
K. M. Dunsford, G6KD

MOBILE RALLY NEWS

Anglian Mobile Rally, 18 June
This fourth mobile rally organized by the Colchester & Ipswich ARCs was held at the Suffolk Showground, and designed to provide entertainment for all the family. Talk-in stations were on 160, 80, 4 and 2m, and there was a 20m station and a 70cm television link over 6km.

There was an ambitious range of entertainments for the 1,100 people who braved the elements and attended the rally.



Anglian Rally Top Band talk-in station with G3ZLA, G. Hall, at microphone

North Midlands Mobile Rally, 16 April
This rally, organized jointly by the Midland ARS and Stockton-on-Trent ARS at Drayton Manor Park, attracted an estimated 4,000 visitors, including 500 mobiles. The event was opened by Mr F. C. Ward, G2CVV, RSGB immediate past president.

Derby Mobile Rally, 13 August
Organized by Derby and District ARS, the rally will take place at Rykneld Schools, Bedford Street, Derby (off Derby Ring Road, between Uttoxeter Road and Burton Road).

Free admission and parking, junk sale, prize draw, band concert, children's events, trade exhibition, refreshments etc. Talk-in stations G3ERD/A (160m) and G2DJ/A (2m). Doors open 11am, further information from G3FGY QTHR.

Mobile Rallies Calendar

6 August	RSGB Woburn Abbey Rally
13 August	Torbay ARS at Newton Abbot Rugby Ground
13 August	Derby & DARS at Rykneld Schools, Bedford St, Derby
20 August	Saltash & DARC at Saltash Grammar School
20 August	East Kent at Westgate Hall, Canterbury
27 August	Preston ARS at Kimberley Barracks, Preston
26–27 August	Stratford upon Avon RC and Mid-Warwickshire ARS combined in conjunction with National Town & County Festival, Royal Show Ground, Kenilworth, Warwicks
24 September	Harlow & DARS

The Swindon and District ARC has notified us that it will not be holding a mobile rally in 1972.

SPECIAL EVENT STATIONS

57th Universal Congress of Esperanto, 29 July-5 August
The station WI7UKE is operating from the home of W7MG at the following times and frequencies:
1 and 3 August, 1600-1800gmt near 14·245MHz, and 0300-0330gmt near 21·255MHz. **2 and 4 August** 2130-2330gmt near 14·245MHz.

Esperanto is being used where possible, but non-Esperantists are encouraged to listen out and make contact.

Wycombe Show, 2 September
In addition to the details in last month's issue, the Chiltern Radio Club announce that they hope to have rtty equipment operating, skeds welcome.

Preston Guild Week, 4-9 September
GB3PP will be operated by Preston Amateur Radio Society, during the Guild Week, 4-9 September inclusive. Operation will be on hf only, 10-80m.

Leicester Scouts Autumn Fair, 7 October
GB3SAF will be operated in collaboration with 62nd Leicester Scouts, at Glen Parva. 160, 80, 20 and 2m will be worked simultaneously, and special QSL cards will be sent. All correspondence to station manager G3YXM QTHR.

OBITUARIES

Mr V. Caley, G8BTF
"Vic" Caley, of Selsey, Sussex, died on 7 June in Crawley Hospital. A popular member of Chichester and District ARC, he was active on 2m right up until his admission into hospital.

Mr E. Markham, G2BIP
"Ted" Markham, well known in the Hull area before he moved to Wetherby, died on 25 June. He was a founder member of Harrogate and Knaresborough RS, and licence holder for Farnell RC.

Mr B. Matthews, G6CC
"Ben" Matthews, well known on the Midlands 2m net, died on 17 June. The first ever RSGB call book and diary was printed by his firm 45 years ago.

Mr G. B. Shucksmith, G8DTU
"Geoff" Shucksmith died on 21 June at the early age of 27. A committee member of the Lincoln Shortwave Club, he was active both from the club and at portable events.

CONTEST NEWS

Rules for 80m Field Day 1972

1. The **General Rules for RSGB Contests,** published in the January 1972 edition of *Radio Communication*, will apply.
2. When. 0900gmt to 1600gmt on Sunday 10 September 1972.
3. Eligible entrants. Multi-operator entries will be accepted. A maximum of two operators per station will be allowed.
4. Contacts. CW (A1) only in the 3·5–3·6MHz band. The location of the station must be sent.
5. Scoring. 15 points for a contact with another portable or mobile station; 5 points for a contact with a fixed station.
6. Power. The maximum power input to the pa stage must not exceed 10W. The power for all parts of the station must be derived entirely from dry batteries or accumulators, the practice of "float" charging the batteries or accumulators is not permitted.
7. Trophy. The Houston Fergus Trophy will be awarded to the winning station.
8. Logs. Column (5) should be headed "Location of station contacted".
9. Entries must be addressed to: The HF Contests Committee, c/o D. Thom, G3NKS, 20 Bramble Close, Copthorne, Crawley, Sussex RH10 3QB.

BARTG VHF RTTY Contest 1972 rules

When: 1700-2300gmt Saturday 16 September and 0600-1200gmt Sunday 24 September.
For: Licensed amateur radio stations within Zones 14 and 15 are permitted to use rtty as a mode of operation. Portable operation will be permitted, but must be from one location for the duration of the contest. SWLs may also enter.
Bands: 144MHz and 432MHz amateur bands. 70MHz amateur band for UK stations. (This will be considered as a separate contest during the same period.)
Stations may not be contacted more than once on any one band. Additional points can be claimed from the same station if a different band is used.
Messages will consist of: (a) Message number, (b) Time gmt, (c) RST report, (d) QRA Locator (standard 5-symbol locator) or QTH given either as a town or as a bearing and distance in kilometres from a town. The town **must** be identifiable on a normal tourist road map.
Points. (a) All two-way rtty contacts will score in accordance with the distance chart below.
(b) All stations will receive a bonus of 25 points per country worked including their own.
(c) Band multipliers as follows: 70MHz & 144MHz bands score × 1; 432 MHz band scores × 10.

Distance			
0–50 km	scores	1 point
50–100 km	scores	3 points
100–200 km	scores	6 points
200–300 km	scores	10 points
300–400 km	scores	14 points
400–500 km	scores	18 points
500–600 km	scores	22 points
600–700 km	scores	26 points
700–800 km	scores	30 points
800–900 km	scores	34 points
900–1,000km	scores	38 points

Scoring (a) Two-way exchange points multiplied by countries worked per band.
(b) Country bonus points multiplied by band multiplier.
(c) Total score = a + b.
Logs. Use one log per band. Logs to contain: message number, time gmt, callsign of station worked, RST of his signals, QRA or QTH received, estimated distance and points claimed.
Send your logs to: Ted Double, G8CDW, BARTG Contest Manager, 89 Linden Gardens, Enfield, Middlesex EN1 4DX, England.
All logs must be received by 31 October 1972 to qualify
Awards. Certificates will be awarded to the top scorers, fixed and portable, on each band in each country. A certificate will also be awarded to the station making the greatest number of contacts irrespective of distance. The judge's decision will be final and no correspondence can be entered into in respect of incorrect entries.

144/432MHz CW Contest rules

From 2000gmt 4 November to 0800gmt 5 November.
All entries and check logs must be sent to: VHF Contests Committee, c/o G3XHU, 5 Birkdale Drive, Oakham Green, Tividale, Warley, Warcs.
The following General Rules, published in the January 1972 issue of *Radio Communication*, will apply: 1,2,3,4b,5a,6a,7a,8b,9b,10a, 11-24.
A multiplier of five will be used for 432MHz contacts.

6-7 May 432MHz Contest results

It was generally agreed that conditions during this event were poor, but a slight lift was noticed by several stations on Sunday morning. Some well-known callsigns were missing from the fixed section, resulting in a smaller entry than last year. Feelings on the split operating period were mixed, but recent decisions at the IARU conference (see *Radio Communication*, July, p449) have settled next year's operating periods.
The best contact was 570km between PA0EZ in Hilversum and GW3VER/P near Pontypool. This was achieved using cw during the Sunday morning lift. PA0EZ walked away with section F, having the advantage of ssb and Continental activity which few Gs tapped. His log shows 10 contacts on cw, 10 on fm and 39 on ssb. Near neighbours G3NEO and G3NHE, both east of Sheffield, fought neck and neck for the places, but superior power and aerial gave Philip Bagshaw, G3NEO, second place.
The University College of North Wales ARS, GW3UCB/P, located near Wrexham, took first place in section P. Runners up were Robin Lucas, G8APZ/P, operating near Broadway, and C. Desborough, G3NNG/P, who was near Wantage.
Comments from logs. G3TTV/P (by appointment?): "visited by PM Ted Heath on Sunday . . . /P site was near Chequers." G8DDC/P and G4ARD/P: "Is Dunstable Downs ARC the only one able to run two stations?"
Certificates will be awarded to PA0EZ, G3NEO, GW3UCB/P and G8APZ/P. As overall winner, GW3UCB/P receives the Council Cup

R. G. S.

SECTION F

Posn	Callsign	Score	QSOs	County	Best dx	Pwr	Aerial
1	PA0EZ	368	59	Hilversum	570	150*	27-el
2	G3NEO	228	48	YS	430	40	MB
3	G3NHE	175	35	YS	240	30	PB
4	G8CIT	167	66	MX	265	80	PB
5	G8AVH	160	42	WK	196	2†	PB
6	G8ERW	137	59	HF	243	26	PB
7	G2RD	132	54	SY	264	30	MB
8	G5DF	107	33	BK	240	100	MB
9	G8EDF	87	27	DY	230	20	MB
10	G8AKT	84	30	BD	226	40	MB
11	G8CTT	73	46	KT	115	30	PB
12	G5UM	72	26	LR	170	16	14-el
13	G8BWO	56	22	SD	135	50	PB
14	G8CRN	54	18	CE	230	40	PB
15	G8FAI	50	32	EX	227	5†	MB
16	G8CGN	40	20	GR	120	30	MB
	G3WFM	40	30	HF	90	30	8/8
18	G4AGE	39	19	DY	—	5†	PB
19	G8BKR	26	14	GR	97	25	MB
20	G8VN	25	15	DY	107	22	PB
21	G3ILO	22	12	GR	97	3	10-el 2m
22	G8DIU	14	14	EX	—	72	—
23	G3SHY	12	8	NM	67	25	15-el
	BRS 28005	69	10	SX	110	—	6/6

* Also ssb, 500W. PB = 18-el Parabeam.
†rf power ou MB = 46-el Multibeam.

SECTION P

Posn	Callsign,/P	Score	QSOs	County	Best dx	Pwr	Aerial
1	GW3UCB	404	72	DB	313	30†	2PB
2	G8APZ	318	76	WR	303	25	PB
3	G3NNG	286	78	BE	470	6†	2MB
4	GW3VER	278	54	MH	570	15†	MB
5	G3ZUL	256	60	WR	278	8	2PB
6	G3TTV	247	87	BS	210	12	PB
7	G8DDC	188	68	BD	280	25	PB
8	G4ARD	184	68	BS	218	40	PB
9	G3VCP	165	56	SY	275	40	MB
10	GW3OXD	129	33	RN	305	15	—
11	G8ATD	115	47	BD	160	24	2MB
12	G4AGQ/A	111	36	YS	186	25	PB
	G3UBX	111	31	HE	181	8†	PB
14	G8ALM	108	44	EX	280	40††	PB
15	G4ABR	70	23	GR	170	4	MB

† rf power out. PB = 18-el Parabeam,
†† 2m power in. MB = 46-el Multibeam.

May 144MHz Contest results

G3CGO/P has described the contest weather for the May 2m contest as "very ordinary gale force winds with some rain". Unfortunately the gloom that accompanied the weather extended to the radio conditions. There were few dx contacts and the meagre activity from the Continent prompted many contestants to regret that the contest had not been timed for its traditional date of the first week-end in May.

Despite the poor conditions, the level of activity was high and the spread of co-channel working, with the advent of VFOs and ssb, enabled the leading stations to make a large number of contacts.

The portable section was dominated by the GWs who occupied the first three places. The winning entry, GW8ERP/P, was operated by the University College of North Wales ARS which was closely followed by the runner-up, GW3OXD/P.

The fixed station entry was won by a new callsign, G4BEL, which is really Roger Taylor, perhaps better known as G8 triple B. The runner-up to this section was the Manx station GD2HDZ.

In addition to the transmitting entries, one listener log was received from Terry Cooper of Storrington, who has requested a large number of log sheets and seems to be absolutely determined to win the listener's championship.

PORTABLE STATIONS

Posn	Callsign	Score	QSOs	County	Best dx	Km
1	GW8ERP/P	915	203	DB	G4AJC/P	353
2	GW3OXD/P	907	161	RN	F1BHL	388
3	GW4ABR/P	580	117	BR	G4AJC/P	315
4	G8BHH/P	527	97	HD	G8AUN/P	301
5	G3UES/P	391	136	HE	G8WY/A	
6	G3OBD/P	384	122	WE	G3WRD/P	
7	G4AJC/P	375	71	KT	F1BZV/P	405
8	GW3NWR/P	367	109	DB	GM30XX/P	275
9	GW4ALE/P	338	61	MR	G3ZNZ	240
10	GW3ATZ/P	319	91		G8DTQ	305
11	G3JFO/P	314	82	YS	G6GN	293
12	G3NYY/P	305	87	HD	G3DAH	276
13	G8CFZ/P	299	87	SX	G4ADV/P	345
14	G3XJM/P	293	99	SY	G3EFZ/P	366
15	G3WXI/A	291	93	YS	G8DTQ	251
16	G3CGO/P	279	67	DT	F1ANH/P	250
17	G8FAB/P	277	77		G8DML/P	355
18	G3WOI/P	274	100	BE	G8EFZ/P	
19	G8EFZ/P	265	59	YS	G3XJM/P	366
20	G3JEQ/P	260	106	SY	GW3ATZ/P	295
21	G8DML/P	247	60	CD	G8FAB/P	355
22	G3IZD/P	238	92	SX	G8DJW/P	145
23	G3XUS/P	228	82	SX	GW4ABR/P	235
24	G4ACG/P	225	86	SX	FICCP	175
25	G3TBK/P	220	60	LE	G3XJM/P	185
26	G8BXC/P	215	76	EX	GW8ERP/P	277
27	G8FQY/P	188	75	BE	GW3ATZ/P	230
28	G8DDC/P	186	72	BD	G3JFO/P	230
29	GW8CLY/P	175	28		GI3RKE/P	310
30	G3UBX/P	172	50		G8AUN/P	
31	G8ARS/P	168	66	SE	G3UEU/P	170
32	G8DGP/P	165	63		G3JFO/P	260
33	G8GCP/P	159	61	SY	G3DVM	163
34	G8FBL/P	156	53	SD	G8CIB/P	141
35	GW4AQR/P	155	47	CV	G3ZNZ	250
	G3KUE/P	155	57	LE	GW4ABR/P	220
37	G2DSP/P	150		SX		
38	G3NTJ/P	147	67	LE	GM3OXX/P	200
39	G8DOW/P	143	55		G4AJC/P	175
40	G3WDH/P	141	59	LE	G3BHH/P	190
41	G3UEU/P	133	53	YS	GW3OXD/P	180
42	G8CDL/P	130	50	BD	G8EFZ/P	292
43	GM8BDX/P	129	35	BW	GW3NNF	296
44	G4AQH/P	128	54		GW4ABR/P	138
45	G8AUN/P	124	30	NK	G8BHH/P	301
46	G3VPR/P	116	36	LN	GW8ERP/P	190
47	G3ZLQ/P	111	43	OX	GW3OXD/P	165
48	G8KMG/A	109	58		GW4ABR/P	185
49	G8ALV/P	95	37	YS	GW3OXD/P	175
50	G8DAZ/P	93	30	ND	GM8AZS/P	240
51	G8FCD/P	87	45	SX	FICLP	155
52	G4ADV/P	84	18	CL	G8EFZ	345
53	G8FCV/P	81	41	KT	G3OBD/P	160
54	G8DXS/P	70	30	YS	GW4ALE/P	155
55	G8EQX/P	64	38	CH	GW3OXD/P	145
56	G8CMU/P	54	20	LR	GW4ABR/P	180
57	G3RWW/P	50	26	CH	GD2HDZ	154
58	G8DOH/P	39	19	KT	F6ALH	130
59	G3OHW/P	30	22		G3VPR/P	93
Late entry:						
	G4BAY/P	167	46			

Check logs also received from G8EUN, G4AEQ and G8ECT.

FIXED STATIONS

Posn	Callsign	Score	QSOs	County	Best dx	Km
1	G4BEL	501	111	CE	F1ANH/P	420
2	GD2HDZ	413	59	IM	G8CUT	425
3	G3SCP	381	127	BD	G8ELZ/P	300
4	G3NHE	313	62	YS	G4AJC/P	285
5	G3NEO	280	48	YS	G3DAO	280
6	G3NNG	264	72	BE	G3JYP	340
7	G8WY/A	206	66	LE	G3WZT	340
8	G3USB	202	50	CE	GD2HDZ	373
9	G8DDW	193	55	LD	GD2HDZ	410
10	G3ZXK/A	180	62	HE	GW8ERP/P	258
11	G8FIH	171	55	GR	GW3NWR/P	160
12	G8DTQ	170	66	SY	GW3ATZ/P	290
13	G3RXK	162	62			
14	G8CUT	157	39	EX	GD2HDZ	425
15	G3UCU	151	69	LD	GW4ABR/P	220
16	G8ERW	149	63	HF	GW4ABR/P	208
17	G3RAF	138	46	ST	G8DML/P	320
18	G3WHK	131	73	SY	G8BHH/P	210
19	G8CUO	121	47	NM	GW4ABR/P	200
20	G3ILO	107	43			
21	G8FOT	103	55	LE	G6CN	222
22	G8FTR	102	48	MX	GW3ATZ/P	235
23	G8BXJ	88	42	GR	G8DIQ/P	125
24	G8DHP	85	43	SX	FICCP	160
25	G8FDL	83	43		GW3OXD/P	151
26	G5UM	82	18	LR	G3BJD	299
27	G8BKR	78	38	GR	G8DIQ/P	140
28	G8DOT	70	34	EX	FICCP	170
29	G8FJE	65	27	BE	G4ALT/P	150
30	GM8BKE	55	13	DU	GW3NNF	280
31	G8DLZ	54	20		GW8CLY/P	260
32	G8ENX	29	17	BS	G3OBD/P	95
33	G8AUN	21	9		G8GCP/P	94
34	GC3YIZ	15	5	GY	G2BHW	187
*	BRS28005	318	70	SX	G3BW	

*Listener's entry.

Cray Valley RS 4th SWL Contest rules

1. From 1800gmt on 23 September to 1800gmt on 24 September. Up to 18 hours logging may be done during this period and the rest period must be clearly shown.

2. The contest is open to anyone in the world.

3. The 3·5,7,14,21 & 28MHz bands may be used.

4. Stations may be logged using any mode.

5. The practice of logging a series of contacts made by one station is deprecated. Log entries must not include the same callsign in the "station worked" column more than 20 times.

6. The object of the contest is to log as many stations in as many countries as possible. Scores should be compiled as follows: one point for each station heard *multiplied* by the number of different countries heard. A list of countries heard must be furnished.

7. The call areas of the USA, Canada and Australia will each count as a separate country, ie W1234567890 V01 V02 VE1 2345678 & VK 12345678. All other countries will be determined by the official RSGB Countries list.

8. No CQ or QRZ or similar call will be allowed to count for points. AM or MM stations are not to be included in entries.

9. A separate log must be submitted for each band. The final score will be the total number of QSO points multiplied by the number of different countries heard. In addition, a bonus of up to 100 points will be awarded for neatness. Illegible logs will not be accepted.

10. Log sheets are available from Bob Treacher who must be sent a large sae at the address below. It is desirable that entrants use official log sheets but entries on home-made log sheets will be accepted as long as the following information is given: date, time (gmt), band, station heard, station being worked, report at SWL's QTH. Points may only be claimed for stations actually heard and the callsign must be shown in full. If points are claimed for both stations the callsign of each must appear in the "station heard" column. Each callsign may be claimed once only regardless of band.

11. Entries should be addressed to the contest manager, Mr R. A. Treacher, 392 Rochester Way, Eltham, London SE9 6LH, England, *to arrive not later than 6 November 1972.*

12. Certificates of Merit will be awarded to the overall winner and runner-up and to the first contestant in each country placed among the top 25 entries.

13. The decision of the committee of the Cray Valley Radio Society will be final.

(For details of all awards run by the Cray Valley RS, send an sae to Bob Treacher at the above address.)

Contests calendar

12–13 August—WAE CW
13 August—70MHz (Rules in June issue)
20 August—144MHz SSB (Rules in June issue)
26–27 August—All Asian DX
2–3 September—VHF NFD (Rules in March issue)
2–3 September—IARU VHF (Rules in April issue)
3 September—DF Qualifying Round—Rugby
9–10 September—WAE Phone
10 September—80m Field Day (Rules in this issue)
16–17 September—SAC (cw)
16-24 September—BARTG VHF RTTY Contest (Rules in this issue)
17 September—DF Final Round—Oxford
23–24 September—SAC (phone)
7–8 October—21/28MHz (Rules in May issue)
7–8 October—IARU UHF (Rules in April issue)
7–8 October—VK/ZL/Oceania DX (phone)
14–15 October—VK/ZL/Oceania DX (cw)
21–22 October—7MHz CW (Rules in June issue)
28–29 October—CQ WW DX Phone
4–5 November—7MHz Phone (Rules in June issue)
5 November—144/432MHz CW (Rules in this issue)
11–12 November—Second 1·8MHz
12 November—Czechoslovakian
25–26 November—CQ WW DX CW
November-December—70MHz Cumulative

G2AAN Top Band Contest results

	AM	CW	SSB	CW & AM/SSB Total claimed
G3YUV	19	65	90	155
G3UPV	23	46	61	107
G3YMH	—	45	56	101
G3UID/A	—	24	73	97
G3ZDY/A	63	1	—	64
G4AEQ/A	—	22	41	63
GM3YOR	8	31	—	39
G2BTO	11	13	—	24
GM3WDF	—	—	82	—
GW3UPK	—	—	74	—
G3ZYE	—	—	65	—
G3IGW	—	53	—	—
G3MMN	50	—	—	—
G3VRW	50	—	—	—
G3LQI	—	29	—	—
OL1AOH	—	27	—	—
OK2BEC	—	24	—	—
Received late				
G3WXS	5	28	—	—

Many stations were active and all seemed to enjoy themselves.

In response to many requests the *Grafton VHF Contest* will be introduced later this year.

1972 BARTG Contest results

With a winning score beyond the 200,000 mark for the first time and with nearly half the contestants making contacts with all six continents, this was the best BARTG contest yet.

In first, second and third places were I5MPK, IT9ZWS and I1BAY, respectively, who are congratulated on their achievements. Congratulations also to G3OZF on securing sixth place; it was very encouraging to see many more G stations taking an active part.

All continents were accessible most of the time and 37 operators were able to work all six, which were also logged by four SWLs. Ninety-one competitive logs were received this year compared with 62 last year.

Mid-Severn Valley Teleprinter Contest results

Much of the activity was located in the south-east with a small amount in the midlands. Most entrants thought that conditions were poor with activity even worse.

The habit of some stations on F3 and A3 using 144·6MHz ± 20kHz was reported. As this is the rtty channel it is rather annoying to have to suffer QRM from stations not looking on their own frequency before transmitting.

Stations also active during the contest: G3AJS, G3EFP, G3NNU, G3PAQ, G3UHK, G3UOA, G3VZZ, G3WRA, G3ZGO, G4AZL, G8CUO, G8DJF, G8EYC.

Posn	Callsign	County	QSO	Score	Best dx	km
1	G3PWJ	SD	8	26	G3OLM	185
2	G3OLM	SY	10	16	G3PWJ	185
3	G8FCD	SX	5	15	G3XSO	70
4	G3MOU	MX	9	15	G3PWJ	165
5	G3YKB	LD	11	13	G8FCD	70
6	G3XSO	BS	10	12	G8FCD	70
7	G3NUE	WR	4	6	G3UOA	34

RAYNET

by S. W. LAW, G3PAZ*

Have you checked your diary? Here is a last reminder: Woburn RSGB Mobile Rally, Sunday 6 August. Raynet will be there and we hope to see a really good turnout this year. We shall endeavour to see that all Raynet cars are parked together, so let it be known on your arrival that you wish to go to that location and make the Raynet stand your first port of call in order to sign the book and, we hope, to proffer any assistance to relieve the load on the stalwart few who will be doing their level best to do the finest job yet at this venue.

Talk-in will be available on Raynet frequencies commonly current on 2m and 4m so listen out on your way to the rally and get on the list. There is no need to enumerate the other attractions available, so if the weather is kind a good time must be had by all. In any case, we understand that the main marquee is the biggest yet, so do not worry about possible summer showers should they occur.

Thanks to the helpful co-operation of BARTG, a teletype section will be adjacent to us and will be only too pleased to advise members on the use of this mode with particular reference to Raynet.

The lecture scene

It has been said that no man is an island, yet we know only too well that even after nearly 20 years our work, aims and even existence remain quite unknown to many who should be aware of us and would indeed be only too glad to be put in the picture. Therefore, we always welcome requests for lectures from various sources and do our best to arrange for a knowledgeable member to put the message over. We have no doubt that the Edgware Radio Club were considerably enlightened by the Raynet lecture on 10 July which we trust served to take their minds off the pressing problem of obtaining a new venue due to the impending demolition of their present home. We wish them success and hope to hear of them in our sphere when their immediate problems are settled.

Most organizations are always on the lookout for lecture material for their meetings, so do not hesitate to put forward the suggestion to your local radio club or user service and pass on the word to either your controller or any member of the Raynet Committee.

Frequency list

If your latest list of frequencies has not been forwarded to G3GJW, do so now if you wish to be included in the next edition of the *RSGB Call Book*. Next month will be too late!

"Incident book"

As all groups should be aware, an "Incident book" is compiled and kept up to date by G3MBQ, co-ordinater for the Midlands area, from information supplied by controllers. This book is made available to the authorities and user services by the Raynet Committee, which has now suggested that it would have even greater impact if a larger section were to be compiled listing exercises carried out by all groups in the UK. It would be much appreciated, therefore, if all controllers could provide as full information as possible to either the chairman, or G3MBQ, of each and every exercise held, together with details of the personnel and any user service involved, in order that a complete picture of overall activity can be compiled for examination at any time. Comments such as remarks from local authorities who express interest would also be welcome.

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

* 130 Alexandra Road, Croydon, Surrey CRO 6EW

CLUB NEWS

Items for inclusion in this section should be sent to regional representatives before the first of each month for inclusion in the following month's issue. They should not be sent direct to the editor.

The date of publication of the following month's issue, first Tuesday in the month, should be borne in mind so that events are not, in fact, history when the details are published. While regional representatives are pleased to receive clubs' events calendars for several months ahead, they still require monthly events lists so that entries can be confirmed or amended.

REGION 1 — RR B. O'Brien, G2AMV

Special events

North-West Amateur Radio Convention, 23-24 September in Lancaster.

Ainsdale (ARC)—Members should contact N. Horrocks, G2CUZ, for details of meetings.
Blackburn (ELARC)—1st Thursday each month 7.30pm. Edinburgh House, Shearbank Road, Blackburn. Secretary, W. E. Baxendale, G8FDG, "Juverna", Westland Avenue, Darwen, Lancs.
Blackpool (B & FARS)—Mondays 8pm. Pontins Holiday Camp, Squires Gate. Morse tuition 7.30pm.
Bolton (B & DARS)—1st & 3rd Wednesdays, Bolton Recreation Club, Kensington Place. Morse tuition at every meeting. Further details from G3XOM.
Bury (B & RRS)—2nd Tuesday each month 8pm. George Hotel, Market Street, Bury. 8 August (Quiz). Organizing secretary, G3RSM, 13 Rhiwlas Drive, Bury, BL9 9DD.
Carlisle (C & DARS)—Mondays 7.30pm. Currock House, Lediard Avenue, Currock. Secretary, A. R. Harper, 23 Roman Way, Stanwix.
Cheshire (Mid Cheshire ARC)—Wednesdays 7pm. Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Morse from 1900-2000bst, also on the air working on 160, 80 and 2m. 2000 to 2130bst main activity. Monday is net night on 160m at 1900bst. Tuesdays 2m at same time. Details from G3JWK.
Chester (C & DARS)—Tuesdays 8pm, except first Tuesday in month which is net night. YMCA Chester. Details from G8AYW.
Douglas, IOM (D & DARS)—Secretary GD3YUM will be pleased to hear from any member who intends to visit the island.
Eccles (E & DRC)—Tuesdays 8pm. Bridgwater School, Worsley, Manchester. Club 2m net channel is 145·7MHz. Secretary, G4AEQ.
Lancaster University (UOLARS)—Prospective members should write to Phil Jones, Department of Environmental Sciences.
Leyland Hundred Amateur Radio Group—Second Monday each month 7.30pm. "Rose & Crown", Ulnes Walton, Leyland. Net night Saturdays 1900bst on 145·8MHz. Details from F. Harrison, 78 Lancaster Lane, Leyland, Lancs.
Liverpool (L & DARS)—Tuesdays 8pm. Conservative Association Rooms, Church Road, Wavertree. Secretary, G3WCS.
Liverpool (NLRC)—Tuesdays 8.30pm. Informal meetings at the "Nags Head", Thornton, Crosby, Liverpool 23. Visitors welcome. Secretary: G3XMG.
Liverpool University (ARS)—During the summer vacation "Lid Net" will be held on 80m so that members can keep in contact. Listen for G3YSH, G4AUF, G4BBP, G3WZR and G4AXA. New term begins on 10 October and a special call GB3LID will be in use during Fresher's Week. We would be interested to hear from any amateurs or SWLs who will be joining the University this year. Secretary: G4AXA. 234 Derby Road, Chesterfield, Derbyshire S40 2EP.
Manchester (M & DARS)—Wednesdays 7.30pm. All meetings include morse class. Secretary: G3IOA.
Manchester (SMRC)—Meets on Fridays 8pm. Sale Moor Community Centre, Norris Road, Sale, Cheshire. VHF section meets on Mondays at the club shack, "Greeba", Shady Lane, Manchester 23 at 8pm approx, with operation of G3OHF on 2m. The club hopes to operate in the VHF NFD on 3-4 September and will be running a club df event on 10 September. Details next month. 4 August ("Construction and use of gdo", by P. Torry, G3SMT), 11 August ("Technical forum"—general discussion), 18 August ("Design & list of QSL cards", by Bert Cross, G3ZBZ), 25 August ("Radio night"), 1 September ("Some current topics", by W. R. Parkinson, G3FNM). Visitors welcome on Mondays & Fridays. Secretary: G3WFT, QTHR.
Manchester University (ARS)—G3VUM is active on all hf bands. The society continues with its programme of lectures, visits and tuition for the RAE and morse test. Details from G8BVF, G3ZNS or GM3YOK at the University Union, Oxford Road, Manchester.
Preston (PARS)—3, 17 and 31 August 7.30pm. Windsor Castle (private room), St Paul's Square, Preston. Morse practice 7.30pm. Main feature 8pm. Secretary: G. Earnshaw, G3ZXC.
Stockport (SRS)—Second Wednesday each month is a discussion night; fourth Wednesday is a lecture night 8pm. Blossoms Hotel, Buxton Road, Stockport. Secretary: G8BCG.
Thornton Cleveleys (ARS)—First and third Wednesdays 8pm. St John Ambulance Brigade HQ, Fleetwood Road North (behind the Police Station), Thornton. Construction group meets Mondays 7.15pm at Rossall School. Book through G4APP.
Warrington (W & DARS)—First and third Tuesdays 8pm. Thames Board Mills Social Club, Alford Hall, Manchester Road, Warrington.
Westmorland (WRS)—First Monday each month, New Allen Technical College. Acting Secretary is N. Stanley, G3UEC, 9 Castle View, Sedgwick, Westmorland.
Wirral (WARS)—First and third Wednesdays each month 7.45pm. Sports and Recreation Centre (Old Drill Hall), Grange Road West, Claughton, Birkenhead. Secretary: G3WSD.
Wirral (Wirral DX Association)—Last Thursday each month at members' homes. Secretary: M. Davidson, G3YSM, 43 Stuart Avenue, Moreton, Wirral. Visitors welcome, please inform secretary beforehand.

REGION 2 — RR J. E. Agar, G8AZA

Barnsley (B & DRC)—Summer recess until the AGM on 8 September 7.30pm. King George Hotel, Peel St, Barnsley. AR Peter Ackley, "Camelot", Greenside, Havercroft, Wakefield. G3LRP QTHR.
Bradford (BRS)—15 August ("Natter night") meets at 7.30pm, HQ, 10 Southbrook Terrace, Great Horton Road, Bradford 7. Hon Sec: R. Harker, A7585, Bdfd 43971, 65 Whitby Rd, Bradford BD8 9JN.
Fulford (FARS)—Tuesdays, 7.30pm. Scout HQ, 31 George Street, York. Hon Sec: G5KC QTHR.
Halifax (NHARS)—12 August ("Memories of 2LO (BBC) by Mr Balderstone, BSc"), 16 August ("Ragchew"), 30 August (Pea and pie supper). Hon Sec: G3MDW QTHR.
Harrogate & Knaresborough (H & KRS)—Meets second and third Mondays each month. Details from Hon Sec: R. Troughton, QTHR.
Hull (H & DRS)—Meets at clubroom, 592 Hessle Road, Fridays, 7.30pm. Hon Sec: Mary Longson, 4 Chester Road, Hull.
North Riding (NRARG)—Meets at "Alma Inn", Scarborough and "White House Hotel", Whitby, on alternate fortnights. Details Hon Sec: J. E. Agar, G8AZA QTHR.
Northumberland (Morpeth) (NRC)—Northumbria Radio Club meets 3 Wheatsheaf Yard, Morpeth. Details, G3XAI QTHR.
Otley (ORS)—ORS is holding an open construction competition. Details from D. G. Mott, G8BZY, 17 Newall Carr Road, Otley.
Scarborough (SARS)—Summer recess at normal meeting room. Meetings arranged elsewhere. Details, G3VAN QTHR. AR G8KU QTHR.
South Shields (SS & DARC)—Fridays, 8pm. Trinity House Social Centre, Laygate, South Shields.
Spen Valley (SVARS)—HQ, Grammar School, High Street, Heckmondwike. 7.30pm. Hon Sec: G8DSB QTHR.
Sunderland (SARS)—Summer recess. Details from G3XID QTHR.
Tyneside (TARS)—Meets at Community Centre, Vine Street, Wallsend. Details Hon Sec: George Lowden, 21 Winefred Gardens, Wallsend NE28 6EF. Phone Wallsend 627878.
Wakefield (WRS)—Meets alternate Tuesdays, 7.30pm, Wakefield Youth Centre, Ings Road, Wakefield. Details, G3XVU QTHR.
York (YARS)—Thursdays, 7.30pm, British Legion HQ, 61 Micklegate, York. Hon Sec: J. A. Rainbow, 14 Temple Road, Bishopthorpe, York.

Hon Secs and PROs please get your programmes in as early as possible to ensure your publicity in "Club News". 73 to all. G8AZA.

REGION 3 — RR R. W. Fisher, G3PWJ

Birmingham (MARS)—15 August, 7.30pm, The Birmingham & Midland Institute, Margaret Street, Birmingham 2. G8BHE.
(Slade)—11 August (Preliminary Discussion on VHF NFD), 25 August ("Logic" by J. Nally and K. James), 6 August (Third df Test), 8pm. The Church House, High Street, Erdington, Birmingham 23. G8EYL.
(South)—First Wednesday in each month, 8pm. Every Friday evening club shack open 8pm, West Heath Community Centre, Hampstead House, Fairfax Road, West Heath.
Bromsgrove (B & DARC)—11 August ("Ambulance Service" by Mr B. Hughes), Royal Oak, Barley Mow Lane, Catshill.
Coventry (CARS)—4 August (VHF night), 11 August (Night on the air), 18 August (Slide Show by G2DRW), 25 August (Beginners night), 8pm. City of Coventry Scout HQ, 121 St Nicholas Street, Radford Road, Coventry.
Dudley (DARC)—1-15 August, 8pm. Central Library, St James's Road, Dudley, G3PWJ.
Lichfield (CRC)—This newly formed club meets second Tuesday and fourth Monday, 8pm. Swan Hotel, Lichfield. Anyone wishing to join contact Mr G. Benson, G8FBL, 2 Saxon Walk, Lichfield.
Rugby (R & DAR & EC)—Last Tuesday of each month, *Lawrence Sheriff* Public House, G3YQC.
Solihull (SARS)—15 August, 7.30pm, Manor House, High Street, Solihull.
Stoke-on-Trent (NSARS)—Every Monday evening, 7.30pm, Harold Clowes Community Centre, off Dawlish Drive, Bentilee, Stoke. Please note the new Club Callsign G4BEM active 3·5MHz to 28MHz.
Telford (WARS)—2 August (DF hunt, Ketley Bank 145·15MHz), 8pm. 9 August (Committee meeting). 16 August (Outside visit). Details from F. Smithson, 32 Vicarage Drive, Shifnal, Salop.
Wolverhampton (WARS)—7 August, 8pm, Neachells Cottage, Stockwell Road. 28-29 August, demonstration station, Walsall Show and Fete. The Black Country Certificate, sponsored jointly Wolverhampton ARS and Black Country Society to celebrate the 50th Anniversary of WARS is available. Further details from G3UBX.
Worcester (W & DARC)—7 and 19 August, 8pm, Commercial Room, Crown Hotel, Broad Street. G8ASO.

REGION 4 — RR T. Darn, G3FGY

Derby (DADARS)—9 August (Preparations for the Rally at Rykneld Schools). 13 August (Annual mobile radio rally), Rykneld Schools), Bedford Street, Derby. Gates open at 11am. 16 August ("Ladies Evening"—A quiz presented by Miss Ann Woollerton of BBC Radio Nottingham). 23 August (Film show "Aerials" Part 1, to be followed by a discussion). 30 August DF practice run No 5. All meetings are held at the Clubroom, 119 Green Lane, Derby, at 7.30pm. Visitors always welcome. Activity night every Monday at 1930 clock time on 1930MHz. G2CVV.
Grimsby (GARS)—3 August (Metre Foxhunt). 17 August (Slide of the year?). 13 August ("Hobbies for all" and organisation VHF NFD). All meetings take place at the Red Cross Rooms, Rowston Street, Cleethorpes, commencing at 8pm. Visitors very welcome. *G8EDK.*
Mansfield (MARC)—Meetings are held the first Friday in every month at the *New Inn*, Westgate, Mansfield. On other Fridays in the month meetings are held in The Westfield Folk House, Westgate, Mansfield, Notts. *G3XWZ.*
Newark (NARCS)—The club meets on the first Thursday of each month at the Newark Technical College. Other Thursdays club net at 1900gmt on 145·80MHz. *G8CUO.*
Melton Mowbray (MMARC)—The next meeting will be the AGM on 15 September at 7.30pm. in the St John Ambulance Hall, Asfordby Hill, Melton Mowbray, *G3FDF.*
Nottingham (ARCON)—3 August (Forum Night), 10 August (Activity Night), 17 August ("Printed Circuits Part 2", by G3YUT), 24 August (Sale of radio equipment, not the usual Junk Sale), 31 August (Visit to Ratcliffe on Soar Power Station. Activity Night in the Clubroom.) All meetings start at 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. The Club station should soon have a TA33Jnr aerial erected. *G4AFJ.*

REGION 5 — RR P. J. Simpson, G3GGK

Bedford (B & DARC)—3 August (HW101 Dem, G3XNB), 10 August (RSGB discussion), 17 August (Members equipment—Talk and Dem), 24 August (All 1972 Rag Chew), 31 August (On the air-night-G3WTP), Meetings 7.30pm. *The Dolphin*, Broadway, Bedford. Hon Sec: John Bennett, G3FWA, 47 Ibbett Close, Kempston, Beds.
Cambridge (C & DARC)—Every Friday during August (informal) 1 September, (Dxpeditions G3NAC). Meetings 7.30pm at HQ, Corporation Yard, Victoria Road, Cambridge. Hon Sec: J. Hern G3NAC, 5 Acheson Road, Brampton, Hunts.
Dunstable Downs (DDRC)—4 August (Between week) 11 August (Annual bring and buy Junk Sale) 18 August (Between week) 25 August (Talk by G8ASP) 1 September, (VHF NFD final plans). Meetings 8pm. Chews House, 77 High Street South, Dunstable.
Ely (EARS)—Meetings 7.30pm alternate Thursdays at Ely Adult Education Centre, St Mary's Street, Ely. Hon Sec: P. Brown A6775. 59 Fieldside, Ely.
March (M & DRAS)—Tuesdays 7.30pm. 88B High Street, March. At the AGM attended by the RR the following were elected to office: President G3BK, Chairman G4BEL, Secretary G8BJZ, Treasurer G8BDS. The club is mounting a Dxpedition to Huntingdonshire on 19 and 20 August. Callsign G3PMH/P details from Hon Sec: R. E. Ludman, 7 Elwyndene March PE159BL Cambs.
Peterborough (PR & ES)—The society has had to find a new meeting place due to development in the city. Meetings will start on 6 October at Peterborough Technical College. New members are welcome and should contact Hon Sec: A. H. Jackson, 57 Peterborough Road, Castor, Peterborough, Phone Castor 353.
Shefford (S & DRS)—No meetings until 31 August (VHF NFD planning and Junk Sale) Hon Sec Arthur Sullivan, G2DGF, 12 Glebe Road, Letchworth, Herts. Meetings at Church Hall, Ampthill Road, Shefford, Beds.
Stevenage (S & DARS)—Meetings first and third Thursdays each month. 7.30pm at Senior Staff Canteen, Hawker Siddeley Dynamics Ltd, Gunnels Wood Road, Stevenage, Herts.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday of each month 8pm. Royal Crescent Hotel, Clarence Street, Cheltenham. *G2FWA.*
Oxford (O & DARS)—Now has a new QTH, the University, Mansfield Road Club, but still meets on the second and fourth Wednesdays of each month. For further details, contact Dave Ward, G4AOQ, 2 Lincoln Road, Oxford, Tel: 47771.

REGION 7 — RR R. S. Hewes, G3TDR

Acton, Brentford & Chiswick (ABCRC)—15 August (Tests with G3CCD/F0UT in France) 7.30pm Chiswick Trades and Social Club, 66 High Road, Chiswick. Hon Sec: W. G. Dyer G3GEH QTHR.
Ashford Middlesex (Echelford ARS)—7 August (Being arranged) 31 August (Being arranged) 7.30pm for 8.00pm. St Martins Court, Kingston Crescent, Ashford, Middlesex. All visitors welcome. Hon Sec: V. Higgs, G3WVJ QTHR.
Barking (BR & ES)—10 August (No details received) 7.45pm. Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking, Essex. All visitors welcome. Hon Sec: H. Davidson, G3FZP, QTHR.
Bexley Heath (North Kent RS)—10 August (Talk by Chris Whitmarsh G8CIU on "Radio teleprinter telegraphy"), 24 August (Talk by T. I. Lundegard G3GJW on "Raynet"). Doors open 7.30pm. Congregational Church Hall, Chapel Road, Bexley Heath. 28 August (Bank Holiday Monday) Club station at the "Erith Show and Sports", Avenue Road Recreation Ground, Erith, Callsigns: hf bands G4CW/A, 2m G4BAL/A. Hon Sec: Maurice Lee, G4BAZ.
Burnham Beeches (BBARC)—3, 17 August (No details received) 8.00pm, Hedgerley Scout Hut, Hedgerley Nr Slough, Hon Sec: Nina Appleby G8ENX QTHR.
Cheshunt (CDRC)—4 August (No details received) 8.00pm, Methodist Church Hall, opposite Theobalds station, Cheshunt Hon Sec: Richard Ludwell, G3ZZQ, QTHR.
Chingford (Silverthorn) RC—Every Friday 7.30pm, Friday Hill House, Simmonds Lane, Chingford E4, Hon Sec: K. S. Arnold G3XNP, QTHR.
Cray Valley (CVRS)—3 August (Colin Westwood G3VFD talking on "PE generators") 17 August (Natter Nite) 8pm. Congregational Church Hall, Court Road, Eltham, SE9 Hon Sec: P. F. Vella G3WVP, QTHR.

Croydon (Surrey Radio Contact Club)—15 August (Miss N. Corry G2YL on her trip to Iran, India, Nepal & Afghanistan) 7.30pm. *Swan & Sugarloaf*, 1 Brighton Road, South Croydon, Hon Sec: S. A. Morley G3FWR. QTHR.
Crystal Palace (CP & DRC)—19 August ("VHF repeaters" by Mike Foster, G8AMG & Geoff Stone, G3FZL) 8pm, Emmanuel Church Hall, Barry Road, SE22, Hon Sec: Geoff Stone G3FZL QTHR.
Dartford Heath (DF Club)—20 August (Mobile Rally DF event–Swindon) 27 August (DH DF Club camping weekend). Hon Sec: Maureen Worbey, G3XVC, QTHR.
Dorking (DR & DRS)—8, 22 August (No details) 8pm, *Surrey Yeoman*, Dorking. Hon Sec: P. B. Gilby, 6 Hawkwood Rise, Great Bookham, Surrey.
Ealing (E & DRS)—Every Tuesday 7.30pm. Northfields Community Centre, Northcroft Road, Ealing, W13. Details from Hon Sec: J. E. Alban G3JEA, QTHR.
East London RSGB Group—Meets at Wanstead House, The Green, Wanstead, E11. Chairman: Ron Ledgerton G2ABC QTHR.
Edgware (E & DRS)—Thursday 21 August (Briefing for VHF NFD) 8pm. Meetings now moved to the Watling Community Association, 145 Orange Hill Road Edgeware. Hon Sec: Alan Masson G3PSP QTHR.
Gravesend RSGB Group—Mondays at 7.30pm, *Windmill Tavern*, Shrubbery Road, Gravesend. Area representative, P. F. Jobson, G3HLF QTHR.
Greenford (GARS)—11, 25 August (no details) 8pm. Greenford Community Centre, Oldfield Lane, Greenford. Hon Sec: John Hedges G3MMQ, QTHR.
Guildford (G & DRS)—11 August (No details) 8pm, Model Engineering HQ, Stoke Park, Guildford, Surrey. Hon Sec: Peter Hopwood G8CQM, QTHR.
Hampton Court (Thames Valley ARTS)—3 August (No details received) 8pm. *The Three Pigeons*, Portsmouth Road, Long Ditton, Ditton, Surrey PRO: Rob Muir. G3LHN, QTHR.
Harlow (DRS)—Every Tuesday 8.00pm, Mark Hall Barn, First Avenue, Harlow, Essex. Club station operative on 80-10m ssb/cw. Club net Sunday mornings at 1030 on 28·8MHz, members use frequency most nights at 2100gmt. Hon Sec: V. Heard, 106 Vicarage Road, Harlow.
Harrow (RSH)—No meetings at school this month due to holidays. 26 to 28 August The Harrow Show. Hon Sec: Les Light G3KDC, QTHR.
Havering (H & DARC)—9 August ("Styles of music" by G3WRO), 23 August (/P 2m Rig construction by G8CED). 8pm. British Legion House Western Road, Romford. Hon Sec: S. J. Hobday G3SKV, QTHR.
Holloway (Grafton ARS)—Mondays (RAE) Fridays (Morse and club night) 7.30pm. Archway School Annexe, Whittington School, Highgate Hill, N19, Hon Sec: Tom Coleman. G8EEI, QTHR.
Kingston (K & DRS)—9 August ("Varicaps" by G3TDR) *Penguin Lounge* 37, Brighton Road, Kingston. Hon Sec: R. S. Babbs G3GVU, QTHR.
Loughton (L & DRS)—4 August (converting a radio to Top Band for DF use) 18 August (Informal) 8pm, Loughton Hall, (Nr Debden Station) Hon Sec: David Bowers, 12 Theydon Park Road, Theydon Bois, Essex.
New Cross (Clifton ARS)—Meetings every Friday 8pm. 225 New Cross Road, London SE14. Hon Sec: R. A. Hinton, 38 Camilla Road, Bermondsey SE18.
Northolt (BEA ARS)—First Wednesday in the month BEA Trident Club, Western Ave, Northolt, Middlesex. (This club is open to non BEA employees by invitation. Contact David Evans G3OUF, Tel: Amersham 3257 for details).
Paddington (P & DRS)—Every Wednesday. Club meets at 8pm, Beauchamp Lodge, 2 Warwick Crescent, W2. Further details from Hon Sec: Mike Pawley G8AWV, QTHR.
Purley (P & DRS)— 8 August (Natter nite) 22 August (Talk by Mike G3TWJ on "Diagnostic Tubes") 8pm, Lansdowne Hall, Lansdowne Road, Purley. Hon Sec: Alan Frost G3FTQ, QTHR.
Reigate (RATS)—2 August (Club Night) 8pm. *Nutley Hall*, Nutley Lane, Reigate, 16 August (Ragchew) 8pm *Marquis of Granby*, Hooley Lane, Redhill. Hon Sec: F. Munday G3XSX, QTHR.
Scouts (Baden Powell House ARG)—17 August (Open evening) 7.30pm. Baden Powell House, Queensgate, South Kensington SW7. Hon Sec: A. H. Watts G3FXC, QTHR.
Southgate (SRC)—10 August (Natter nite and arrangements for VHF NFD) 8pm. Civil Defence Hut, Bowes Road N11, (Near Arnos Grove underground station). All visitors welcome. PRO: Steve White G3ZVW, QTHR.
St. Albans (Verulam ARC)—15 August (No details received) 7.30pm for 8pm. St Albans Town Hall, Herts. Hon Sec: Hugh Young G3YHY, QTHR.
Sutton & Cheam (SCRS)—15 August (No details received) 8pm. *The Harrow Inn*, Cheam, Surrey. Hon Sec: Jack Korndorffer G2DMR, QTHR.
UK FM Group (London)—Tuesday 22 August 7.30pm. (Outdoor Meeting, weather permitting, in the Ham/Richmond Area, "Talk-in" on 144·48MHz). Further details from Mike G8CKT or Kris G8AUU. PRO: G8CKT QTHR.
Welwyn (Mid-Herts ARS)—No information received. Club meets at Welwyn Civic Centre Welwyn, Herts. Hon Sec: Peter Wilcocks G8AIE, QTHR.
Wembley (GECARS)—Thursday 7pm, Sports Club, Preston Road, North Wembley (This club is open to non-GEC employees by invitation. Tel: Dain Evans G3RPE, at 01-904 1262 during business hours for details).
Wimbledon (W & DRS)—11 August (No details) 8pm. St John Ambulance HQ, 124 Kingston Road, Wimbledon SW19. Hon Sec: F. W. Hill G3WDO, QTHR.
Woolwich—This society is being re-formed, Contact B. C. Corper G3ZOJ QTHR for details.

REGION 8 — RR D. N. T. Williams, G3MDO

Canterbury (EKRS)—20 August ("Mobile Rally" at Westgate Hall, Canterbury) Talk-in stations on 160 and 2m. Further details of Rally and future meetings from G3MDO QTHR.
Brighton (BTCACR)—Details of future meetings from Hon Sec: G2CMH, 35 Willington Way, Brighton.
Maidstone (MYMCAARS)—All meetings at "Y" sports centre. First and third Fridays devoted primarily to the beginners.
Horsham (HARC)—1 August ("Ragchew" Those constructing gear to bring and discuss) at Guide HQ, Denne Road, Horsham. 15 August (Informal) at Star Roffey. 2 September ("Transistors and Diodes") A net is active every Thursday on 3650kHz at 2000hrs.
Crawley (CARC)—Monthly meetings held at Trinity Congregational Church Hall, Ifield, Crawley.
Eastbourne (SARS)—Meetings held first Monday in the month at *Victoria Hotel*, Latimer Road, Eastbourne.
Mid-Sussex (M-SARS)—All meetings held at Marle Place, Leylands Road, Burgess Hill.
Worthing (W & DARC)—Meetings held every Thursday, Rose Wilmott Youth Centre, Littlehampton Road, Worthing. Details of meetings from G6KFH/T.
Tunbridge Wells (WKARS)—Meetings held at Art Centre, Monson Road, Tunbridge Wells. Details of future meetings from H. Richards, 17 Reynolds Road, Tunbridge Wells.

REGION 9 — RR H. W. Leonard G4UZ.

Bristol (City & County RSGB Group)—21 August ("Vintage equipment" by G6GU and G5KT), 7.30pm. Becket Hall, St Thomas Street, Bristol 1. Longleat rally was a great success and we were delighted to have the RSGB President with us. *G3ULJ*.
Bristol (BARC)—Tuesdays during the summer, 7.45pm. 24 Bright Street, Barton Hill, Bristol 5. *G8BIR*.
Bristol (University ARS)—Every Saturday 2.30pm. Dept of Physics Royal Fort, Tyndalls Park Road, Bristol 8. *G8ADP*.
Burnham on Sea (BoSRC)—Contact J. Robertson, G3ZOR for details. BoS 2333.
Cornish (CRAC)—First Thursday in month. 3 August ("Colour TV" by G3HFS). 7 September ("Coil Winding" by G3OCB). 7.30pm SWEB Social Centre, Pool, Camborne. Visitors and holidaymakers always welcome. Mobileers contacted by appointment. Ring G3NKE at Camborne 2419. *G3UCQ*.
Newquay Group (CRAC)—Fortnightly 7.30pm. Treviglas School, Newquay. Dates from G3THT. Further details of Cornish & Newquay Group from G3NKE QTHR.
Exeter (EARS)—Every Tuesday. 8 August (Film show) 7.30pm. Community Centre, St Davids Hill, Exeter. Hon Sec: A. W. Bawden, 232 Exwick Road, Exeter EX4 2BA.
North Devon (NDRC)—Second and fourth Wednesdays of month. 7.30pm, "Grinnis", High Wall, Sticklepath, Barnstaple. RAE session at 7.pm. each meeting. G4CG is on the look-out for holiday mobileers. G4CG.
Plymouth (PRC)—First and third Tuesdays of month 7.30pm. Virginia House, Bretonside, Plymouth. Hon Sec: S. E. Martin, 32 East Park Avenue, Plymouth PL4 6PF.
Saltash (S & DARC)—First and third Fridays of month 7.30pm. Burraton Toc H. Saltash. 20 August (mobile rally at Saltash Grammar School). Hon Sec: G4AJU, 302 St Peters Road, Plymouth PL5 3DU.

South Dorset (SDRS)—First Friday of month 7.30pm. Alma Road section of Weymouth Technical College. *G3VPF.*
Taunton (T & DARS)—Fridays, 7.30pm Jelalabad Barracks, The Mount, Taunton.
Torbay (TARS)—Every Tuesday and last Friday & Saturday of month. 26 August ("Radio Navigation" by G2CKQ). 7.30pm rear of 94 Belgrave Road, Torquay. 13 August (Torbay mobile rally). Visitors always welcome at club house. *G3NQD.*
Weston-super-Mare (WsMRS)—Second Friday each month. Contact G8FNL at WsM 29327 for details. Visitors very welcome. *G3GNS.*
Yeovil (YARS)—Every Thursday, 7.30pm. Youth Centre, Park Lodge, Yeovil. *G3NOF.*

REGION 10 — RR D. M. Thomas, GW3RWX

Blackwood (ARC)—Fridays 7.30pm during school terms, at Oakdale Community Centre, Oakdale, Mon. Further details of summer meetings from GW3TUG.
Barry College of Further Education (ARS)—The final transmissions of the Marconi-Kemp 75th Commemoration year will be made from Flatholm Island during the period Saturday 9 September to Friday 15 September. Operation on all bands and callsign GB3BCT. This is also the callsign embodied on the stamp special cover. This first day cover will be franked by the PO at Flatholm Island, and further details will be supplied on application to Mr Dan Adams, Barry College of Further Education, Colcot Road, Barry, Glam.
Cardiff (RSGB Group)—Monday 14 August 7.30pm. BBC Club, Llandaff, nr Cardiff. *GW3GHC.*
Glamorgan Raynet Group—Details from GW3ZFG. Tel Cardiff 62411.
Haverfordwest (ARS)—Tuesday 7.30pm HQ, Rosemary Lane, Haverfordwest, Pembs. *GW3YBB.*
Hoover (ARC)—Mondays 7.30pm Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glam. Sec, Mr F. E. Tribe. The club is unfortunately losing one of its founder members and officers, Roy Thompson, GW3VZR, who is leaving the firm to take up a new business venture. Club members and his many friends in South Wales join in wishing him every success in his new activities.
Pembroke & District (RSGB Group)—Last Friday of each month 7.30pm, at the Defensible Barracks, Pembroke Dock, Pembs. *GW3LXI.* The GW2OP Bucket & Spade Party on Sunday June 25th did not enjoy its traditional fine weather, but still had an enjoyable meeting in the well-appointed Regency Hall.
Sully & District Short-wave Club—Tuesdays 7pm at The Annexe, Sully Bowls & Social Club, 59 South Rd, Sully, Glam. *GW3ZSV.*
Rhondda (ARS)—Meetings at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. *GW2PHH.*
Swansea Radio Society—This Society now replaces the Swansea Telephone Area ARS, and meets on the first and third Tuesdays of each month at the Palace Bar, High St, Swansea. An RAE course is being run at the same venue on the second and fourth Tuesdays of each month and morse practice is also available on these evenings. Further details of activities may be obtained from Mr M. D. E. Connor, 54 Tally Rd, Penlan, Swansea, Glam.
University College, Cardiff (ARS)—It now seems certain that the Society callsign GW3UWC will be in evidence on the air next session since more licensed amateurs will be available. New students please contact the Secretary, Mr Simon Northeast, c/o Students Union, Dumfries Place, Cardiff.
University College of Wales, Aberystwyth Radio & Electronics Society—An ambitious programme for next year has been received from the outgoing Secretary, Miss Ruth Bury ,who next session will take over the appointment of equipment officer. Her successor as secretary is Mr Tim Reynolds, to whom all enquiries should now be sent. The society has now received its callsign, GW4BGG, and hopes to be active on all bands in consequence. More details of activity will be published in the near future, when plans are finalised. All enquiries to the Secretary, Radio & Electronics Society, c/o Students Union, University College of Wales, Aberystwyth.

REGION 12 — RR A. J. Oliphant, GM3SFH

Aberdeen (AARS)—Fridays, 7.30pm, 8 Blenheim Lane, Aberdeen. GM3HGA, Tel Aberdeen 33838.
Dundee (Kingsway Technical College ARC)—Wednesdays, 7pm prompt, Kingsway Technical College, Old Glams Road, Dundee.
Inverness (IRS)—Fortnightly on Fridays at 7.30pm. Next meeting 11 August. Cameron Highlanders Memorial Youth Club, Planefield Road, Inverness. Mr L. Bell, 114 Glenurquhart Road, Inverness.
Lhanbryde (MFARS)—Wednesdays, 7.45pm, St Andrews School, nr Lhanbryde, Elgin, Morayshire. GM3UKG. Tel Clochan 225.
Queen's Own Cameron Highlanders Memorial Youth Club Radio Section—Tuesdays, 7.30pm, Planefield Road, Inverness. Section caters for all young people from 13 years interested in learning and obtaining practice in, the elements of radio technique. Mr. Bill Begg, 68 Tomnahurich Street, Inverness.
Thurso (CARS)—Second Tuesday in each month, 7.30pm, Scapa House, Thurso. *GM3JUD.*

REGION 13 — RR V. W. Stewart, GM3OWU

Berwick (BARS)—Last Sunday in each month, 3pm, Tweed View Hotel. Further details from C. H. Crook, G3YOG, 19 Hatters Lane, Berwick on Tweed or from the AR, G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Dumfermline (DRS)—Second Wednesday in each month 7.30pm, Abbot House, Dunfermline. Further details from G. Martin, GM3NVQ, 42 Rose Street, Dunfermline.
Edinburgh (LRS)—Second and fourth Thursdays, 7.30pm, 66 Hanover Street, Edinburgh. Further details from K. C. Henderson, 97 Granton Road, EH5 3NH. (Phone 552 2147).
Glenrothes (GDARC)—First Sunday in each month, 7.30pm, Old Nursery Buildings, Leslie, Fife. Further details from K. Horne, GM3YBQ, 14 Liss Way, Kirkcaldy.

REGION 14 — RR M. A. Comrie, GM3YRK

Ayrshire (AARG)—27 August 7.30pm, YMCA Howard Street, Kilmarnock.
West of Scotland (ARS)—4, 11, 18, 25 August, 8.00pm 81 Virginia Street, Glasgow.

REGION 17 — RR L. Hawkyard, G3ZKR

Basingstoke (BARC)—Meeting on 19 August at Chineham House, Popley. Plans for VHF NFD 7.30pm. *G3CBU.*
Harwell (AERE ARC)—Meetings on the third Tuesday of each month, also informal meetings and junk sales every Friday lunch time. 7.30pm at the Social Club, AERE, Harwell, Berks. *G3NNG.*
Southampton (RSGB Group)—Saturday 12 August at the Lanchester Building, Southampton University. Every Wednesday evening at the Clubroom, Kent Road, *G3ZKR.* Tel: 73378.
Swindon (SDARC)—9 August (Mobile Foxhunt). Club meetings at Penhill Junior School, Swindon, at 7.30pm. *G3YKC.*

MEMBERS' ADS

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

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

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

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

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

FOR SALE

BC221 + stab psu £12. Cossor dble beam scope 339A £15. TF144G sig gnrtr £15. B44 MKII no mods £5. AVO 7 + case £17. 75W Mod with UM2 £5. Parker 3ft metal bender £7. G2AQJ QTHR.

Pye Vanguard 4m £15. 4m tx valve convertor mains psu £4.50. Pye Reporter 4m, 6ft rack sundry cabs, type 3X teleprinter, ea 50p. G3NBU QTHR. Tel 073 529 2257.

Tuning capacitors 500pF approx 5kV £5. 1000pF 3·5kV £6. 100pF 3kV £1·50. PO relays and switches. Tel dial 30p. instrument case 16in × 8in × 7in £1.50. P. Heap, 198 Abbots Road, Abbots Langley, Watford, Herts. Tel Kings Langley 63889.

R1155, CR100, DX40U, class D wavemtr 70cm cnvrtr also scrap eqpment, xfrmrs multimtr, 1000pF F'throughs transistors, fets, valves CRTs magazines phones mikes. Lewis, 1 Western Road, Pontardawe, Swansea. Tel Swansea 862297.

KW Z match, mint £10. G3SQM, QTHR. Tel Hambleden 443 Bucks.

Property of late G2BIP: CR100 £12, 160/80m tx £5. gen coverage rx up to 16MHz £4.50. 80m tx approx 60W £6. 100kHz calibrator £1.50, all with internal psu all homebrew except CR100. G3ZEP, QTHR Tel Wetherby 2099.

Transistors 2N525 and 2N1303 at 5p ea, 2N3905 FT 200MHz at 22p ea, xtals 0·33333 12·4167 12·650 12·750 19·625MHz B7G all at 70p ea, sae for list. G8ADC QTHR.

I.C. xtal calbrtr, 1MHz 100kHz o/p to above 2m with xtal £4. G8DJE QTHR.

TA33JR with reinforced boom weatherproofed £20. 2m omni-vee exc cond £5. 19in × 21in table top cab 13in deep grey hammer finish carrying handles, exc cond £3. Buyer coll latter item. G4AJW 53 Wynford Road, Birmingham, B27 6JH. Tel 021 706 0881.

Trio 9R59DS + xtal calbrtr + stablsr + SP5DS speaker only one yr old £40. Carr extra. Taylor 4in moving coil mtr 2·5, 5, 25, 100, 500 mA brand new and boxed £1. GM3ZVB QTHR. Tel 031 443 3381.

RSGB Bulletins vols 36 to 40 and 45 to 47 inc, 60p per volume + postage. HRO dial assembly. G3KZC, QTHR. Tel 0272 673026.

Lafayette HA350 with topband and xtal calbrtr £50. Codar T28 as new £12. buyer coll. G3XOQ, QTHR. Tel Redhill 61454. C

Unused Pye SSB 125T 5-band tx-rx with transistor rx on 80m to 10m and hybrid tx modified up to pa o/p stage, less psu but with makers full handbook £35 ono. G3NGK QTHR. Tel Beaconsfield 3109.

KW Vespa MKII tx with mains psu 6HF5 power amp in exc cond £80 or exch for Hammarlund SP600JX rx, or 2m gear. G3YCU QTHR. Tel Wilmslow 25403.

Elizabethan 150W tx less mains trnsfmr £5. BCC 4m 69 set fully modified tunable £7. 2m 69 set unmodified £5. valve vmtr £2. 53 set VFO unit 1·2–17 MHz £5. QQZ04–15 valves £1. G3OQT, QTHR. Tel Medway 361567.

FET 2m cnvtr i.f. 28–30MHz £7. sim 4m cnvtr £5. 18W 2m tx comp with modulator and psu £10. Pye transistor ranger on 4m £5. 20W modulator £6. **Wanted** Trio 9R59DS. K. Basterfield, 51 Ruskin Crescent, Crownhill, Plymouth, Devon.

WS No 19 tx/rx unmodified in perf working order comp with control box 12V rotary psu, head and mic set and connectors £12. Buyers coll. O. Walker, 63 Hardridge Ave, Roehampton, S.W.15.

AR88D rx vgc £30. 1392 modded for 2m gc £5. LM13 gc £3. (no xtal) Stab psu 250V or 500V 250mA £5. G8EMQ QTHR. Tel Hemel Hempstead 59091.

Panda Explorer tx exc cond £30. Hammarlund HQ170 receiver exc cond £85. **Wanted** KW2000B tx with psu. G3XWV QTHR.

DX100U + SB10 adapter switchable a.m. to ssb 80–10 with low psu mod for 160m a.m. demo or sked. Help with del manuals wiring etc £60 pair. Mullard 7 + 7W stereo amp less control unit £5. G3VYP QTHR. Tel 021 747 2358.

Eagle field strength mtr RF40 unused £2.50. Chassis punch set unused £2. Newnes "Radio and TV Servicing" £2.50. Electroniques SMD2/WH slow motion dial £1. Trnsfrmr 425V 200mA 6·3V 4 amp 6·3V 4 amp 5V 3 amp new £2.50. H. H. Seymour, 6 Chichester Buildings, Swan Mead, London SE1 4RX.

Drake R4A receiver with MS4 speaker unit £85, or offers. Morse key type D £2.50. G3FXA. Tel Bude 2624.

Codar CR70A gd cond £12. G8FQP. Tel 01 505 0900.

144MHz 50/60W transmitter, 3·20A/2xEL34, eleven xtal positions, four xtals £40. exc for 144MHz mobile, 10W plus stable narrowband tunable receiver, no VHF VFOs 12v negative earth, cash adj if nec. G8BUR QTHR. Tel 0438 81 (Knebworth) 2229.

Lorenz tape printer immac £7.50. ceramic 866A bases new 30p ea. 4CX250K valves OK for max legal input 70/23 CMS £1.50 ea. Kokusai 455kHz ssb filter £2.50. H. A. Buckenham, Steeple View, Peartree Lane, Doddinghurst, Brentwood, Essex. Tel Blackmore 822891.

PTC2207 4m Ranger comp £23. Cossor 4m walkietalkie £6. High power strobes £23. ea. **Wanted** manual and small silence cover for Creed 7E. Pye Bantam spares. G2BHY QTHR. Tel Orpington 26802.

CR100 few parts missing needs attention buyer coll RF24 converted for 10–20m QQVO–7–40 valve. **Wanted** cheap 2m FET cnvtr. Offers? G. Benson, 2 Saxon Walk, Lichfield Staffs, WS13 8AJ. Lichfield 3919.

KW2000 with ac psu Shure 444 mic £140. TW2 tx ac psu and nuvistor cnvtr i.f. 28–30 £25. CDR rotator AR22 £14. all mint pref buyer coll. P.M. Rackham, Mashanti, Bromley Rd, Lawford, Manningtree, Essex. Tel Manningtree 2957.

CR100 coil box IFTs tuning capacitor £5. Switched 5-band pi-tank coil £1.50. CR100 ganging tool £1. Klystron base X band waveguide attenuaters piston tuned cavity £5. RF26 unit £1.50. G3XLB QTHR. Tel 051 36 71968.

Heathkit OSI scope new mains transf not perfect £5. 2X6146 MZV transistor SSB tx needs xtals and coils for all but 80m 200W p.e.p. worked when last tried internal psu any offers. G3YJC QTHR.

Codar /M installation AT5 tx T28 rx type 12 M/S psu type 12R/G remote control unit helical whip ant £30. Vibroplex bug key unused £6. carr extra. GW8NP QTHR. Tel Cardiff 68768.

Trix 15Ω 15W horn outdoor type P/A spkr 30in long approx, £6. Also 3ft high 19in rack cab £1.50. Buyer coll pse phone or write for appointment to view. Pickering, 19 Park Court Rd, Bridgend, Glam, CF31 4BP. Tel Bridgend 4251.

Labgear design multi-band cw tx, 80–10m PA 2X 807 psu rsnble offer secures. Pye Ranger 2002 rx/tx for 4m converson £9. Buyers coll. G3XFB QTHR.

Trio 9R59DE rx as new still in orig. packing £35 ono. G8DTV QTHR. Tel Flitwick 3265.

CR100 + noise limiter gd con with handbook £14 will del if local. Mark Nathan, "Hill Top", Milton Cresc, Ravenshead, Notts. Tel Blidworth 2073.

0·055556MHz xtal for 2m mobile channel 145·000MHz brand new 95p. GM3ZVB QTHR. Tel 031 443 3381.

RF ammeters 3A only £1.25 inc p + p. R1132A, with psu, needs slight repair £8. Giant Marconi roller coaster £3. Dr. D. P. Nicholls, Ancoats Hospital, Manchester M46EB. Tel 061 205 2204.

Almost comp Mullard 20W amp inc chassis cover valves treble bass and volume controls only requires 35 passive components £10. Also Unica Uria gen coverage receiver offers around £20. buyers to coll. R. J. Deasington, TFF 17A. Westbury Park, Bristol BS6 7JA. Tel (0272) 32065 (evenings).

Minimitter "Mercury" 5 band tx am/fm/cw exc cond £35. BC312 rx (1·8–18MHz) xtal phasing with psu £15. both with circ notes. Buyer coll. G2KI, QTHR. Tel Byfleet 46722.

Pye transistor Ranger dash mount on 2m; 20ft dural mast £4. 8 element 2m J beam £1.75. mod transformers 100W £2 ea. Carbon dummy load 80Ω 300W £2. P. Heap, 198 Abbots Rd., Abbots Langley, Watford, Herts. Tel Kings Langley 63889.

Trio JR310 160m conversion £60. Heathkit HW32A tx/rx HP23E ac psu G12 push-to-talk mic £60. Both mint with manuals. Mosfet 144MHz cnvtr 28–30MHz as new £12.50. Phone 9am–12.30pm 1.30–5pm. G8GAG. Tel Stratford-upon-Avon 4646.

100 amp 3 phase Leece Neville car altrntr with 240V single phase trnsfrmrs £30. Redifon hi-band tx/rx £5 ea. Philips transistor car radio £8. Wharfedale corner spkr cab with crossover unit, offers? Buyers coll. G3TGF QTHR. Tel Orpington 26802.

Brandenburg stabilised psu 200–250V dc at 50mA plus 2 × 6·3V ac at 1·5A hammer finish case 7in × 6in × 4½in in maker's box with data £2.50, plus 30p p + p sae for circuit. **Wanted** BAY 96 varactor Mr. D. N. Luscombe, 15 St. Margaret's Road, Knaresborough, Yorkshire. H95 0JS.

Katsumi electronic keyer £5.25, only recently purchased. May be heard on air by arrangement. G5BM QTHR. Tel Gloucester 25415.

Hy-Gain TH4 beam exc cond £30. Heathkit GR64 swl rx £21. Heath V7A vtvm electronically perfect, case fair £7. Heath MSP1 stab psu, mint £16. G3NMR QTHR, 01–550 0882.

CR100 £15. 19in rack mounting psu 400V + 300V (nominal) stblzd, 300V unstblzd, 6·3V (over 10A) £5. **Wanted:** to complete vol *Radio Communication* Jan and Feb 1970. G8DAW QTHR, 0582–35617 (after 6pm).

RTTY complete stn 7B printer silence cover two-speed motor auto tx perforator all on GPO table terminal unit & lots of spare parts, to clear £25. G3BXI QTHR, Great Easton 235.

Ficord prof /p tape recorder 1⅞–7½ in/sec ¼ track v small £10. Ficord automatic batt charger £4. Stblzd psu 10 + 20V ½A ea, fully floating, solid state £4. FSK modulator and demod. PCBs complete 50p ea. B. S. Homer, 32 Iron Mill Lane, Crayford, Kent DA1 4RR, Crayford 24625.

Codar CR70A and PR30 preselector, mint cond, little used £25 ono. P. Mellors, 16 Lorraine Ave, Elvington, York, YO4 5BB, Yorkshire. Elvington 369.

SB1OU, SB adaptor for DX100 as from Heathkit with instrctns £13–op, buyer coll. J. H. Roscoe, 4 Bryn Awelon, Eryrys, Llanarmon, Mold.

Creed teleprinter model 54 (much improved 7B) silence cover, one with built-in perforator £28, one without £23. LG300 with high-power psu mod £27. Imac Creed auto tx 6S5 vgc £9.50. B. L. Cedar, Cedarville, 2A Convent Hill, London SE19, 01 622 7101.

Eleven Plus sailing dinghy, terylene sails, two lifejckts £40 or exch for Eddystone EC10. GW3PEX QTHR, Aberdare 4803.

HR93 rx 2–30MHz magnificent beast. Offers. G3III QTHR, 0608 61882 after 7 p.m.

100μA high grade mtrs. Ernest Turner, 703 705 £2.50, £3.50. 240/240 isolation trnsfmrs, suitable lins. £5. Good quality low-V trnsfmrs for bias and transistor PSUs, sae list. G4AKL QTHR.

National NCX–3 tx/rx with ac psu, gd cond, £75 carr pd. G3VXK QTHR, 051–928 1610.

KW2000B + ac psu £150. DC psu £25. VFO 4B £20. SB610 £35. HRO £15. Shure 444 £7.50. TA33 Senior £22.50. TR44 rotator £25. Homebrew lin 2x 4–250'A + spare tube £30. G3POX QTHR.

UHF signal gnrtr wavemtr combined type RCA 734A 1,200–3,750 MHz not wkg but clean untouched cond with maker's service manual offers or exch modern rx or tx. G3PNI, 17 Durban Road, Margate, Kent.

Trio 9R59DS rx fitted with MT stab £40. Hamgear preselector £5. E. F. King, 12 Towers Avenue, Maghull, Liverpool L31 0AJ.

Marconi 2,300–1,700MHz osc strip DET22 o/p £4.50. Racal RA17 vfo and film strip dial complete £4. Eddystone 898 dial £4.50. Used (tested) 4CX250B £1 each. Buyer coll 6pm to 10pm any day except Friday. G8CZZ, 40 Prendergast Road, Blackheath, London SE3.

Audio and i.f. ICs SGS TAA661, TAA621AX1, TAA611A, TBA261, TBA631 all 50p ea. Microwave transistors 2·5GHz Ft 10p ea with data. Also some vhf/uhf TO5 and stud pwr devices. SAE list. G3RTJ QTHR.

GDO transistor Tech TE–15 gd cond with manual £6. G3VXZ QTHR. Maidenhead 27350.

2m fet cnvtr, 28MHz i.f., noise fig 3dB, self-contd reqs 9V supply, £9.80. G30LB QTHR, Oldbury (Glos) 4559.

Hy-Gain 18 AVT/WB vert £25. KW103 mtr new £8.50. KW ext vfo not used £29 or exch for TA32. Telomast. Good rx. G3VZY QTHR. Haverhill 3298.

Pye Cambridge modded 2m tx/rx., rx tunable, fully mtrd 3-chan no xtal supplied £30 ono. A. J. Wright, 34 Webbs Way, Stoney Stanton, Leicester. Sarcote 3404.

Comm rx Trio MGR 59DS cost £44 will take £32. Heathkit 2m tx/rx will work 250V ac and 250V dc 6V dc 12V dc, £28. Wavemtr Model C3005 £5. L. Shann, 4 Croft Cottages, Blubberhouses, Otley. Blubberhouses 616.

KW600 lin 500W p.e.p. input matches KW2000–A–B "tested trade in" from KW last August £70 ono. 2m Zone 8 HC6/U xtal 12,127·5 kHz or for KW2000–A–B covers 21,100 to 21,300kHz £1.25. Wallis, 17 Meadowside, Walton-on-Thames, Surrey. Walton-on-Thames 23228.

Teleton 8-band transistor radio model TF–182 battery mains, band 4 needs calbtg otherwise perf £35 or exch for Trio 9R59DS. J. Simmons, 267 Central Avenue, Southend-on-Sea, Essex. 65608.

Hammarlund HQ–180A, 54–30MHz, bndsprd 80–10m mtchg spkr, 24hr clock, vgc, £125 ono, cnsdr exch KW77, 888A, /M gear, HX20. Cheyenne MT–1, Gonset G76, G77, Swan 270, why. R. Perrin, 30 Franchise St, Kidderminster, Worcs. 61752, 6–7.30pm.

TV camera 625 lines mains oprtd all transistor, gd cond, without lens £30. G3UQH QTHR, 0743 54096.

Hammarlund HQ110A rx also Hammarlund HX50 tx both recently o'hauled by KW Electronics both in mint cond, £140. S. R. Green, Fleettrailer Park, Appleton Roebuck, York. Appleton Roebuck 417.

Trio JR500S £45. Digit-Migit 3-channel proportional RC system 2 servos in Impala Glider £35. Cossor 1035B scope with burnt-out ht eht trnsfmr, offers? G3ZUD QTHR.

AR88LF S-metr some mods needs attntn, no case, £18 ono. 2m cnvtr fet mixer i.f. 2–4MHz £7.50. Sinclair stereo 60 + 2 Z30s £12 or split. 35V psu £2. All plus p and p. **Wanted:** Cambridge hi or lo band wkng or not. N. Perrott, 1 Melbury Grange, Mavelstone Rd., Bickley, Kent. 01 467 6030.

Top Band /M stn comprising HE40 Lafayette rx, Top Band and 80 home-brew tx with /M psu and Tavasu 160m coil £15 ono. P. Webster, 15 Lindsay Road, Sprowston, Norwich, Norfolk NOR92P. Norwich 44602.

KW2000 G line with ac psu £100. KW1000 lin £100. Both immac cond. Demnstrn. Will del to 50 miles. G3UJY QTHR, Kingham 270.

70cm tripler mains psu s/plated lines £8. SWR bridge and wattmtr 500MHz £9. G8ABP 70cm cnvtr £7. Rough HRO and psu £5. Garex 2m a.m. rx plus ⅝ wavelength 'G' whip £40. G3THW QTHR, Wolverhampton 35686.

Harmonic expected December, must sell mint Trio TS510D £150. TX never used, orig pkg. Miniscope £10. Trio 9R59DE well modded £35. AR10 plus 8-el Yagi £14. Shack clearance valves etc, sae. Barry G. Capper, 49 Hawthorn Close, Takeley, Bishops Stortford, Herts. Takeley 517.

Ex-eqpmnt germanium transistors OC42, OC44, OC45 GET 572, GT13; diodes OA73, OA5. All transistors 2½p, diodes 1p, 20% reduction for quantities of 25+ each type. G3HMJ QTHR, Oxford 58498.

AR88 rx with S-mtr fitted £25, buyer coll or can del rsnble dist. A. C. Whitehill, 49 Oxford Square, RAF Locking, Weston-Super-Mare, Somerset.

Marconi CR300/2 comms rx 15kHz–24MHz with tech manual and psu leads all complete and in gd cond £18. Payne, 159 Micklefield Rd, High Wycombe, Bucks.

Amp twin EL 34s output by Lowther 10W in good order year unknown also pre-amp, buyer coll, £5. G8EDM QTHR. Parbold 2412.

Heath testgear S3U scope switch, valve vmtr V-7A/UK, sig gnrtr RF1U, Sine/Sq gnrtr AO/1U R/C bridge C3U. Offers. Acton sig gen CG6/1 £8. All perfect cond. Carriage extra. J. R. Easton, 70 Leven St, Motherwell ML1 2QH. Lanarkshire, M'well 66597.

HRO rx miniaturized front end + 7 coils + psu £18. Heathkit Cheyenne tx 80–10m + psu £25 or nearest offer. Pye Cambridge on four, rx req tuning £15. AVO9 Multimeter, offers. GM3ZXG QTHR. Tel 0475 28282.

Teletype 19 set with handbk £18, buyer coll. Teletype unit type 14 £15. Tiger TR200 rf unit £5. Codar AT5 tx £15. 4ft 6in rack with sides and back door £130. B. Robertson, Toll House, Wilburton Road, Stretham, Cambs.

Scope Cossor 1040 £10. 5W tx 230V input 500kHz tuning plus 1MHz xtal output 1·4/6·7MHz RCA £12. Gunn diode cavity as *Rad Com* £2.50. Callers only. G3JGF, 69 Strathcona Ave, Gt Bookham, Surrey. Bookham 6544.

KW77 rx triple conversion good example of model no mods, good opportunity for a good rx at £65. Wanted EC10s Mkl or MkIIs Honda /p gnrtrs 300 and 800s. G8FIS, 25 Campbell Avenue, Acomb Road, York, YO2 4LA. York 59861 ext 294 daytime.

HRO £20. /M tx 1·8 to 2MHz cse £30. GL75 stereo unit £30. Scope £20. Solarscope DC–643 £30. Audio gnrtr £10. Solid state vmtr £10. Testmtr 500 £6.50. G3HCY QTHR. 7175 724.

Trio 9R59DS rx xtal calibr, voltage reg, calibd amateur bands 160m–10m mech fltr unused brand new cond plus matching spkr and 8 ohm stereo hdphns all in first class cond at £60 buyer coll. M. O. Humphreys, 41 Moreton Road, Shirley, Solihull, Warwickshire.

HA600 Lafayette rx currently sells at just under £50 hardly used, boxed with manual £35, post extra. N. J. O'Brien, 150 Westfield, Harlow, Essex. Bishops Stortford 57356.

HW100 comp stn, matching cab housing HP23A psu, Z-match, low-pass fltr and spkr. Also rf tuning indicators. G3XYD QTHR. Watford 43516.

KW2000 ac psu mint £130 KW lpf 52 ohm mint £4. KW2000A dc psu £25. G3VMY QTHR. 0734 340321 weekends.

Plessey PR/136/1 rx, 240V ac psu 12V psu and monitor scope, af fault but otherwise OK £30, or would exch for smaller rx such as 9R59DS. Two 5ft dishes £5. Offers? K. Hunter, Dalesview, Gebdykes, Masham, Nr Ripon, Yorks. Masham 353 after 6pm.

Clearing shack. Several BC–221 wavemtrs £11 ea. Withers nuvistor conv 4–6MHz built-in psu £6. Many useful comps. Offers from amateurs and clubs only, no lists. G3OSE QTHR. Nuneaton 67992.

Four new ZM1020 num ind tubes £1.25 ea. Two bases 50p ea. AV08 Mk3 no leads or case. Offers? I. Balloch, 25 Eglington Walk, Eaglesham, Glasgow, G76 0LB. Eaglesham 2369.

Exch LG300 tx for KW E–Zee match and twin-track 3–speed tape recorder for why. G3RFG 60 min of morse instctn on C60 cassette £1. G3RFG QTHR.

Minimitter all band rx MR37 with psu £15. For spares R1155 and HRO junior one coil ea £2.50. SAE details. J. Hudson, 29 The Larches, Esh Winning, Nr Durham.

Swan 350 tx/rx with spkr psu and PTT mic immac cond £135. Burchell, 12 Ravenspurn Road, Patrington, Nr Hull.

RX 152/174MHz £4. Variac 8 amp £7. Airmec millivmtr £9. Fast pulse gnrtr and wide-band scope £35. Solartron CD 1014·2 no case £15. BRS27870 Cobham (Surrey) 3117.

Joystick lightweight VFA and LO–Z match atu £6.50 carr paid has worked W, KV, UA9 with 5W. *Radio Servicing* Patchett vols 2, 3, 4 80p ppd. Livermore, Villa Farm Cottage, Market Weston, Diss, Norfolk.

FT150 inc 160m, built-in cw monitor and trnsvtr terminals as new £160. HT37 in perf order £85. 400W rms output lin to suit either rig, built-in psu £49. G3CYY QTHR. Tarvin 40787.

Lin 2x813s plus spare int psu £17. 2x6HF5s 50p ea. 2x805s plus bases £1.17 set plus mic hd phns £1.50. 10μF 2kV paper capacitor 50p, 3x10μF 1kV paper capacitors 20p each. M. Taylor, 54 Rectory Road, Upton-Upon Severn, Worcs. WR8 0LX. Upton 2564.

Trio 9R59DS with mtchg spkr as new £40. M. J. Horder, 152 Maidstone Road, Southgate, London N11 2JP. 01–368 0218.

Pye Cambridge AM10DV £25. Pye base tx PTC331W £8. TR2002 2m tx/rx £3. Collins 250KHz mech fltrs usb & lsb plus carrier xtal £15. Codar AT5 tx and T28 rx plus dc psu £28. Mercury Minimitter a.m. cw tx 150W £15. G3WXG QTHR. Brighton 553150.

Trio JR5005 £56 or will cnsdr exch with Eddystone EC10. Buyer coll, callers welcome after 6.30 pm. P. Hill, 2 La Belle Alliance Sq, Ramsgate, Kent.

QRP cw rig 80–10m IOW xtal mixer vfo, transistor shaped keying, nice aluminium case, mains fltr, spare valves, has made WAC and 60 countries £15. G3ZZD QTHR. Pembury 2375.

HRO–MX 9GC plus 2BS coils, new valves, psu and spkr. Offers? G3ZYN, 9 Quendon Drive, Waltham Abbey, Essex. 01–972 3820.

Heathkit 32ft galvanized tower £26. Codar PR30X preselector £4. Douglas, 8 Beechwood Road, Camp Hill, Nuneaton, Warks. Chapel End 392830.

Grundig TK14 tape recorder £10 ono. G8DHO QTHR. 01–977 8888 ext 32 (work).

Heathkit SB101/SB600, 6146Bs and built-in speech compressor prof wired mint cond spare valves £145. G3UDR QTHR. Shipston on Stour 61839.

Heathkit OS2 scope, Heathkit electronic switch S3U, Heathkit sine/square gnrtr 1G82U. Heathkit valve millivmtr AV3U. Heathkit distortion mtr IM58U. AVO Multiminor MK4. All £180. Coll. prior telephone, evenings. C. L. Ellis, 9 The Sheraton, St Mark's Hill, Surbiton. 01–399 9807.

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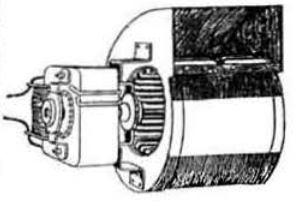

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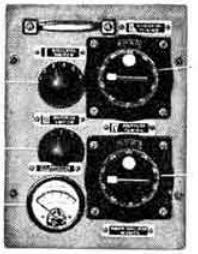

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The number of words in each advertisement must not exceed 32 not including name and address or callsign and QTHR or telephone number Four pages of each issue are allocated to Members' Ads at present, and in order to include as many advertisements as possible licensed members are requested to give their callsign and QTHR instead of their name and address. (QTHR means: "My address in the current call book is correct"). Also to conserve space, please keep advertisements as brief as possible. They will be edited to conform to a set style of abbreviations, so it is unnecessary to submit them in abbreviated form. Any which are not clear will be returned.

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POST TO MEMBERS' ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE

INDEX TO ADVERTISERS

KW 107 ANTENNA
Tuning System

KW 202 RECEIVER, 10-160 metres SSB/AM/CW, with Mechanical Filter, built in 'Q' Multiplier (Peak & Null), 500kHz VFO covering all bands. Two Speed VFO Drive. Excellent Sig/Noise and sensitivity performance. Very attractive (similar in appearance to KW2000B). 100kHz Crystal Calibrator price **£140** carriage extra.

KW 204 TRANSMITTER, 10-160 metres SSB/AM/CW. Successor to the famous KW "Vespa"—Perfectly matches the KW202 Receiver and is similar in appearance. 180 watts p.e.p. from trustworthy 6146's. Built-in Power Supply. Provides "side tone" cw monitoring. A beautiful compact efficient unit. Price **£145** carriage extra.

KW 202
Speaker

2 Great Transceivers

DELIVERY IMMEDIATELY FROM STOCK

KW2000B 10-160 metres SSB TRANSCEIVER: 180 watts PEP 10-160 metres, complete with A.C. P.S.U., VOX P.T.T., I.R.T./I.T.T.

£240 *carriage extra*

KW ATLANTA 10-80 metres
KW Atlanta and A.C. P.S.U.

£210 *carriage extra*

SEPARATE UNITS

Matching **KW1000 LINEAR AMPLIFIER** for KW 204 and KW 2000B—also available. 1200 watt pep max. Pair T160L/572B tubes including 2·5kv Power Unit built-in to KW2000B style cabinet **£135** carriage extra.

KW 101 Standing-Wave-Ratio meter, **£9.25. KW 103** SWR/Power meter 0-100 & 0-1000 watts **£12.50*. KW 103** with Dummy Load and Coax Lead, **£20.50*. KW 107** Antenna Tuning System including E-Z Match, SWR Ind., Dummy Load, Antenna Switch, 5 position, **£40.00*.** Also KW Trap Dipole with twin feeder and 4 other types (only the original Trap from KW is good enough for you). KW E-Z Match ATV, KW Low Pass Filters, KW & HZP Baluns, etc. *Carriage Extra.

KW ELECTRONICS LIMITED

K.W. ELECTRONICS LIMITED

Trade-in equipment & many imported items available. Write for details today

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All equipment available through accredited agents

EASY TERMS ON EQUIPMENT AVAILABLE OVER 12, 18 OR 24 MONTHS

SOLID STATE MODULES

63 Woodhead Road, Solid, Lockwood, Huddersfield, HD4 6ER. *Telephone 23991*

NEW. 2 METRE TO M.W. DUAL GATE MOSFET CONVERTER

So many people have asked us to produce a 2 metre converter for use with a conventional radio on MW. We did this and amazed ourselves with the results. 2 metres is tuned in two sweeps of the medium wave 500-1,500kHz. This unit is supplied with a three position switch to select MW straight through or the 144-145MHz and 145-146MHz. It is ideal for car radio use in a mobile installation and the technical spec. is the same as our Sentinel converter described below. (The dc supply lines are isolated from earth.) The first batch is ready now and we hope that there will be some left from stock when this appears in print. Price **£18.75.**

THE SENTINEL 2 AND 4 METRE CONVERTER

★ Low noise figure 2dB.
★ Gain 30dB.
★ Dual gate MOSFETs in the RF amplifiers and mixer for excellent overload and cross modulation characteristics.
★ Size only 2½" × 3" × 1½" aluminium case—silver hammer finish with black trim.
★ Stock IFs: 2-4MHz, 4-6MHz, 9-11MHz, 14-16MHz, 18-20MHz, 23-25MHz, 24-26MHz, 27·7-29·7MHz, 28-30MHz.
★ 4 metre IFs: 4·7MHz, 25-25·7MHz, 28-28·7MHz.
★ Price: **£13.75.**

THE SENTINEL X DUAL GATE MOSFET CONVERTER

This new 2 metre converter is a deluxe version of our well established Sentinel converter. It has the same basic specification but may be used with an internal mains P.S.U. and with battery supplies. It features an RF gain control to reduce cross modulation and overload of the main receiver and may be switched between mains and battery. Size 5" × 1½" front 4" deep. IFs from stock 28-30MHz and 4-6MHz. Price **£16.50** less mains P.S.U. **£19.50** including P.S.U. The Power Supply unit may be added easily in future.

Want to pep up your present 2 metre receiver?

THE SENTINEL LOW NOISE FET 2 METRE PRE-AMPLIFIER

★ Low noise figure 1dB. Transistors selected for low noise figure.
★ Gain 18dB.
★ Size and appearance to match the Sentinel Converter. Price **£6.50.**

Want to receive 70cm cheaply but well?

SM70 70cm CONVERTER

★ Low noise figure 4·5dB.
★ IF output 144-146MHz. By using the 70cm converter with a 2metre converter you can have a high performance 70cm unit at a low price—**£13.75.**

THE SPITFIRE 2 METRE A.M. TRANSMITTER AND MODULATOR

★ 5 watts input. At least 2 watts output. 12 volts operation.
★ Modulation wave shaping gives good, clean 100% audio.
★ Audio monitoring point for headphones.
★ Size 4½" × 2½" × 5½".
★ Front panel meter indicates R.F. output and modulation. Price: **£22.00.**
★ The Spitfire Modulator is the same size and appearance as the transmitter.
★ 100% modulates our transmitter. Price: **£10.00.**

SOLID STATE 9MHz SSB GENERATOR

★ Selectable USB, LSB and CW.
★ 0·2 volts into 80Ω.
★ Sideband suppression 45dB. Carrier suppression 50dB.
★ A sound basis for your SSB transmitter.
★ Price **£11.00** less filter and carrier crystals.
KVG 9MHz crystal filters. XF-9A SSB **£11.00.** XF-9B SSB **£15.00.** XF-9C AM **£15.00** XF-9D AM **£15.00.** XF-9M CW **£11.50.** Carrier crystals **£1.50** each.

T.B.C.1. CONVERTS TOP BAND TO MEDIUM WAVE 600-800kHz

★ Internal battery—switches straight through when OFF. Ideal for car radio use when mobile. Price: **£7.50.**

YAESU MUSEN GEAR FROM STOCK

FT101 **£240,** plus top band, **£225.** FT200 Transceiver **£134.** AC supply **£38.** FT401 Transceiver **£215.** FR400 Super de Luxe receiver **£160.** Loudspeaker unit **£10.** This we offer with service facilities at our premises—often carried out while you wait, as we do with our own equipment.

SECONDHAND GEAR

KW202 as new **£115.** KW77, not many available these days, **£67.50.** SL600 series ICs and components as previously advertised. We believe that all the units advertised will be ex-stock but you can always ring for confirmation.

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