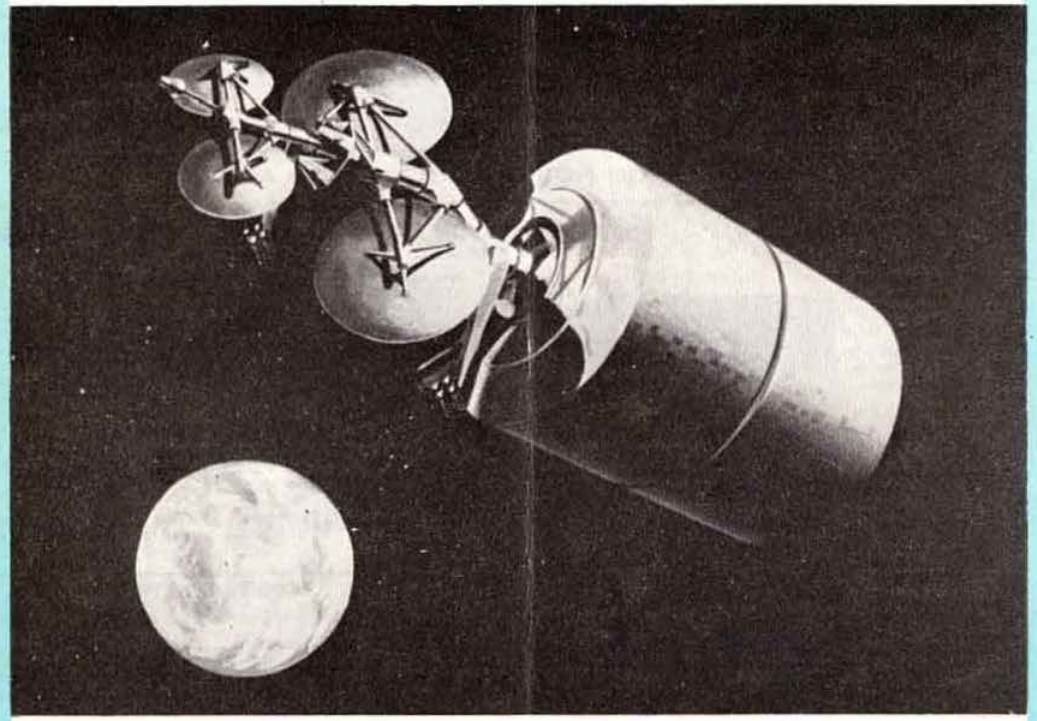
radio communication

June 1974

INTELSAT IV-A



The **INTELSAT IV-A** series of satellites is due to be launched after mid-1975. When operating as the Atlantic primary satellite, one of these will have a capacity of 13,000 one-way telephony channels plus one tv channel. Three of these satellites are being produced by **INTELSAT.** *Photo: Hughes Aircraft Company*

journal of the Radio Society of Great Britain

BURNS
ELECTRONICS

CRYSTAL CALIBRATOR CC-10
Price **£30.80**

High stability crystal oscillator and dividers generate 1MHz-500-100-50-10-5kHz and harmonics to above 600MHz. Heterodyne wavemeter and modulation monitor (AM) facilities. Battery operated.

WAVEMETER TC-101 Price **£24.50**

Absorption wavemeter covering 0·8-480MHz in six ranges with meter indication and insulated probe.

The above two instruments are designed to meet the requirements of the UK amateur transmitting licence for frequency measurements up to 500MHz.

FREQUENCY STANDARD SD-11
Basic **£114.00**

Battery operated, phase locked to Droitwich on 200kHz, with O/Ps of 1MHz and 10MHz. Optional low signal inhibit facility. Internal or external aerial.

FET CONVERTERS

FS2/4 **£18.50**

MOSFET RF stage + Schottky diode ring mixer for low noise and strong signal handling. 9 volt supply. Any IF from 2-30-MHz.

FC70 **£19.00**

Bipolar RF stages + MOSFET mixer for low noise and reasonable gain. 9 volt supply. Any IF from 2-30MHz.

MULTIVERTER MC-3 Basic frame **£11.50** Mains PSU **£4.40** 1-3 converters may be fitted. Separate RF I/Ps with common IF O/P and "thro" position. External DC supply socket. Only supplied with minimum of one of our converters.

COMMUNICATION MODULES—KITS or MADE AND TESTED

—NEW—

SPEECH PROCESSOR SP-1
Kit £6.30. M & T £7.70.

AF I/P 0·5mV (min.) O/P 1 volt RMS at low Z. Contains preamp, limiter, amplifier and active L.P. filter. Suitable for AM, FM, SSB, AFSK etc. May be used with PM-1.

PHASE MODULATOR PM-1
Kit £5.50. M & T £6.80.

Generates NBFM by audio corrected phase modulation. Use on 70MHz and above. Contains crystal oscillator, phase modulator and AF filter. Insert between existing TX crystal and oscillator. State crystal frequency.

NBFM Generator FMT-1 = SP-1 plus PM-1. (add prices).

POWER SUPPLY MODULE PSM-1
Kit **£3.70** M & T **£4.50**

Regulated PSU for driving modules and converters etc. Fixed O/P in steps from 5.0v to 14.3v, at up to 100mA basic or 500mA with an extra power transistor. Contains rectifier (half or full wave, bridge or doubler), smoothing, zener and current amplifier. Short circuit protection. State o/pV.

FM DETECTOR FMD-1
Kit **£7.40** M & T **£9.00**

IC limiter, discriminator and AF amplifier provide 100mV O/P RMS at 3kHz deviation for an I/P of 300μV min. State frequency in range 350kHz to 1MHz (1·6MHz to special order). 6-9 volt supply.

TONE BURST GENERATOR TBG-1
Kit **£5.20** M & T **£6.20**

Generates access tone for UK/European repeater systems. Range of frequencies. Easily fitted to mobile or home station. 8-12 volt supply.

WE'VE MOVED

At last Burns Electronics are installed in their new and larger premises. Our apologies for any inconvenience or delay this may have caused to our customers.

The new works are located just off the Brighton Road (A23) at Coulsdon. Easy access via Southern Region (3 stations) or bus routes 166, 190, 405, 414 and 709.

Shortly to be announced are our first three agents who will be available at evenings and weekends to answer any enquiries.

COMPONENTS

Some examples of components from our issue 4 catalogue are as follows:

Resistors ¼ & ½W 10ohms to 1Meg (E12) **1½p** ea. Polystyrene capacitors 10pF to 4700pF from **3½p**, Disc ceramics 1pF to 10,000pF **2½p**, Polyester capacitors 0·01μF to 2·2μF from **3p**, Miniature electrolytics from **7p.**

3 gang 17pF variable capacitor **£1.10**, special VFO capacitor with built in reduction drive **£3.22.**

BC108 **11p**, BFR90 (ft 5GHz typ) **£3.48**, 2N3819 **37p**, 2N5245 **46p**, 40673 **56p**, 2N3866 **87p**, 2N4427 **92p**, BLY33 **£1.49**, HP2835 (schottky diode) **55p**, HP3080 **£1.59**. 1N4148 **5p**, 1N4001 **7p**.

Send cash with order or **20p** for catalogues detailing these and other products. Export and trade enquiries welcomed.

VAT Reg. No. 218 4215 82. Please add 10% VAT on all orders including post and packing charges

Equipment and kit prices include carriage. Minimum component order 50p. P&P 15p, free over £5 excl VAT

43a CHIPSTEAD VALLEY ROAD, COULSDON, SURREY, CR3 2RB **Tel: 01-668 7766**

radio communication

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CONTENTS

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ABC
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Advertising, other than Members' Ads, should be sent to the above address marked for the attention of Mr C. C. Lindsay. Tel 01-837 8688 (or 01-686 5839, advertising only).

Western

YAESU

We regret that due to cost increases, Yaesu have increased prices and these are now as follows: (EXC VAT).

YAESU PRICES (inc. free delivery by Securicor/Postage):

TRANSCEIVERS	
*FT-75	£138.00
FT-101	£280.00
FT-101B	£330.00
*FT-200	£170.00
FT-401	£310.00
*FT-501	£375.00
*Power supply required.	
POWER SUPPLIES	
FP-75	£32.00
DC-75	£39.00
FP-200	£45.00
FP-501	£53.00
TRANSMITTERS	
FL-50B	£79.00
FL-400	£193.00
RECEIVER	
FR-50B	£67.00
FR-400DX	£155.00
FR-400SDX	£210.00
LINEAR AMPLIFIERS	
FL-2000B	£195.00
FL-2100	£165.00
FL-2100B	£195.00
FL-2500	£130.00
until stocks exhausted	
REMOTE VFO's	
FV-50B for FL-50B	£34.00
FV-50C for FT-75	£34.00
FV-101 for FT-101	£42.00
FV-101B for FT-101B	£48.00
FV-200 for FT-200	£48.00
SPEAKERS	
SP-101	£11.00
SP-101B	£13.00
SP-101P	£26.00
SP-101PB	£29.00
SP-400/401	£13.00
VHF EQUIPMENT	
FT-2 AUTO	£157.00
FT-2FB	£115.00
FP-2AC	£38.00
FP-2AC/B	£71.00
SIGMASIZER 200	£196.00
FT-220	£264.00
FT-620 6m. AM-SSB-CW TCVR.	£170.00
ACCESSORIES	
YD-844 Table Mic.	£14.75
YD-846 Hand Mic.	£5.75
Fan, FT-101	£9.00
FF 50DX L.P. Filter	£12.25
Crystals FT2F/B pr.	£3.50
FREQUENCY COUNTERS	
YC-355 AC only	£99.00
YC-355 AC/DC	£110.00
YC-355D AC/DC	£127.00

NEW! Coming shortly YO-100 MONITOR SCOPE Price £93

455kHz or 9MHz £2.50 extra.

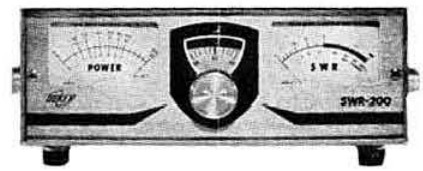
Keep a watchful eye on your transmitter's output or use it to tune-up for maximum p.e.p! Can be connected to your receiver also to monitor incoming signals.

BATTERY CLOCK (£5.92 inc. V.A.T.)

This operates for about 6 months on one battery (provided). Available in red, blue, orange, ivory and brown; list your choice in order of preference.

OSKER POWER METER (Ex Stock)

Features: Switchable for 52 or 75 ohm systems. Each instrument is individually calibrated. Four ranges: 0-2, 0-20, 0-200 and 0-2kW, 3-200MHz. Excellent Styling.
Price £19.50

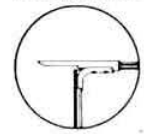


Attention H.F. mobile operators!

Fed-up with having to disconnect resonators/whips before garaging? Fed-up with having to go slow due to inadequate mounting? Then here's the answer . . . the "HUSTLER."

Hustler and only Hustler gives you 12 years of proven performance, mechanically and electrically superior to all others. You get exceptional reports on every band, lowest SWR and broadcast bandwidth. Matching devices are not required. Use any convenient length of 52 ohm feed line. Convenience of fold-over mast for rapid band change or easy garaging, optimized performance on each band and a time proven concept in mobile communications, a concept verified by the overwhelming majority of amateurs, are yours only with the Hustler!

MO2 MAST FOLDS OVER
Rotates 360° in horizontal plane



The original hinge and sleeve clutch mechanism.

NEWTRONICS HUSTLER MOBILE ANTENNAS

Carr. 75p

BM1 Bumper mount	£5.05	RM10 ..	£5.00	RM20 ..	£6.55
MO2 Mast	£7.50	RM15 ..	£5.55	RM40 ..	£7.50
RM75 ..	£8.00	Stainless steel spring	£5.45	Resonator spring	£2.55
Ball Mount £2.00					
Complete antenna BMI, MOZ, RM10-75 £39					
C32 Ballmount £2.00.		SSM3 stainless steel spring	£5.45.	RSSZ resonator spring	£2.55.

W.E. QUAD 10-20m. "boomless" type. Cast aluminium centre, bamboos, etc £30.00 (Carr. pd).
W.E. Trapped dipoles for 10-80m. All are fitted with resin encapsulated traps and a high quality commercial grade centre assembly with cable strain relief.
Type S.500 watts, £15. Type HP for 1kW p.e.p., £17.25. Type P with a special copper/terylene braid element for ease of coiling up. Supplied with winding spools and 70' co-ax, £19.50.

PRICE LIST. Our latest (March) list is available f.o.c. upon receipt of a foolscap S.A.E.

CATALOGUE of Tower, Masts, Antennas, Rotors and Communications Equipment is available at 20p (No S.A.E. required).

All advertised prices exclude VAT and are subject to manufacturers and currency fluctuations.

50p SMALL ORDER SURCHARGE
Due to the increased costs of handling and processing, all orders under **£2.00** will bear this surcharge.

Electronics (UK) Ltd

SOLE AUTHORISED U.K. DISTRIBUTOR FOR

the FDK Multi 2000
2m. SSB/FM/CW TRANSCEIVER

2m. SSB/FM and CW Synthesised 200 Ch. AC/DC. 10w o/p. (SAE for details please).

It has always been this company's policy and it will continue to be not to "run down" our competitors. Indeed, we take it as a compliment that they are so worried that they find it necessary to do so! Let us just say therefore that we are the Sole Authorised Distributor for FDK and those owners of the first batch of Multi 2000's will be aware. We regret that we could not fulfil all the orders which came to us from some prospective purchasers who had ordered elsewhere but we can help from our next batch due this month.

The **WESTERN ELECTRONICS MULTI-2000** has the following features: **1. DUPLEX OPERATION ON ALL CHANNELS**
2. NARROW and WIDE FM FILTERS FITTED AS STANDARD

So no matter on what frequency a repeater comes up, the Multi 2000 will tune it because don't forget that it has VXO control; i.e., you are not limited to 10KHz steps, the VXO allows youto tune *any* frequency. There is a 9-pin socket on the rear to permit switching an external linear relay. All our models are marked "DUPLEX" instead of "I" on the channel switch shown in the above picture.

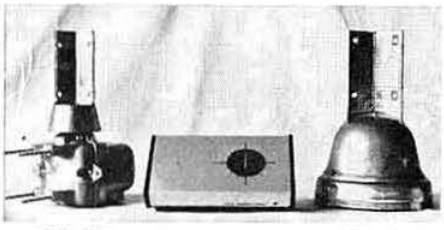
SPECIAL OFFER on ROBOT SLOW-SCAN TV

MODEL 70A MONITOR £199; MODEL 80 CAMERA £199

All you need to add to your SSB Transmitter/Receiver is the model 70 Monitor and model 80 camera in order to send and receive SSTV signals from around the world. Please send s.a.e. for full details (VAT extra).

The NEW SILENT CDE ANTENNA ROTORS ARE ex-stock. These supersede the previous "Clunk-click" models

CDE ROTOR PRICES AR20, **£23**, AR30, **£25**, AR40, **£30**, TR44, **£52**, HAM-M **£79**.



AR30, **£25** AR50, **£30**

APOLOGIES!
We regret that due to the shortage of staff, our service since March has not been that to which our customers have been accustomed. We apologise for any delay in dealing with correspondence and orders but this will be rectified as soon as we can find suitable staff.

VHF-UHF EQUIPMENT

BELCOM.	Liner 2 145·25–·48 or 144–1 0·34	**£132.00**
BRAUN	SE600 Digital 2M AM/FM/SSB Transceiver	**£780.00**
FDK	Multi 2000	**£297.00**
TEMPO	6N2WE 2KW 144MHz SSB/FM amplifier ..	**£385.00**
	12v. DC Amplifiers 502 (50w o/p)	**£62.70**
	802 (80w o/p)	**£107.00**
	1002–3 (100w o/p) ..	**£130.90**

STANDARD. For full details of this range of 2m. and 70cm. equipment please send S.A.E.

WANTED! SERVICE ENGINEER! If you're good at servicing we would be very pleased to hear from you stating qualifications, experience and salary required.

Western Electronics (UK) Ltd

Agents: G3PJR Chesham (02405) 4143 G3ZUL Droitwich (090 57) 4510

OSBORNE ROAD TOTTON SOUTHAMPTON SO4 4DN
TELEPHONE: TOTTON (04216) 4930 ar 2785
CABLES: 'AERIAL, SOUTHAMPTON'
Hours of business: 9-5.30; 9-12.30 (*Saturdays*)

SOLID STATE MODULES

63 Woodhead Road, Solid, Lockwood, Huddersfield, HD4 6ER Phone 0484-23991

Manufacturers and Suppliers of Communications Equipment

MEMBER OF THE A.R.R.A.

We have been designing and manufacturing very high performance electronic units for some 6 years now. We had the necessary skills to design these electronically, our weakness however, has been the mechanical construction element.

Early Europas suffered from inadequate mechanical assembly, which resulted in some damage being caused during postal delivery.

So a year ago we set up our own mechanical engineering side, with men experienced in this aspect of equipment construction. They have sorted out our troubles with the Europa's metalwork and produced much improved boxes for our other equipment.

This has brought our "customer comeback" on Europa sales down to about 2% which is in line with our other products. We keep a record of all faults so that consistent component failures can be designed out as soon as they become evident. This keeps you happy and our service department work down!

STILL THE BEST AND THE MOST POPULAR CONVERTERS

SENTINEL DUAL GATE MOSFET 2 METRE OR 4 METRE CONVERTERS

Don't take my word for it. Ask around. We have the letters from people with several makes of converter telling us that ours out-perform the others. Nothing I can say is more convincing than what the customer says.

Three models to choose from:

SENTINEL Ex Stock

Now with much improved metalwork. 2 metre IFs available from stock: 2-4MHz, 4-6MHz, 9-11MHz, 14-16MHz, 18-20MHz, 24-26MHz, 28-30MHz.
4 metre IF available from stock: 28-28·7MHz.
2-4MHz and 4-6MHz use double conversion technique with two mixers and no crystal oscillator multiplication.
28-30MHz IFs use 116MHz crystals with no crystal multiplication.
Noise figure 2dB. Gain 30dB.
MOSFETS protected against gate failure.
Protected against reverse supply connection and excess voltage.
12 months guarantee.
Size 2½" × 1½" × 3" long except 2-4MHz and 4-6MHz which are 4" long.
Price: £16.50.

SENTINEL X—Ex Stock

A de luxe version of the above converter containing a mains power supply or external battery operation. It has a front panel R.F. gain control. Technical data is the same as the Sentinel. Stock IFs, 2-4MHz, 4-6MHz and 28-30MHz.
Price: £21.45.

THE SENTINEL M.F. DUAL GATE MOSFET 2 METRE TO MEDIUM WAVE CONVERTER—Ex Stock

Receives 2 metres on a conventional M.W.B.C. receiver, very good used with a car radio I.F. output 0·5 to 1·5MHz for 144·5 and 145·6MHz in two switched bands. Size: 5" × 1½" front panel, 4" deep. **Price: £20.62.**

SM70 70CM CONVERTER—Ex Stock

This one uses an I.F. output of 144-146MHz. This has enabled us to produce a very high performance converter with a noise figure of 3·5dB for only **£16.50.**

2 METRE PRE-AMPLIFIERS (2 MODELS TO CHOOSE FROM)—Ex Stock

THE SENTINEL LOW NOISE FET PRE-AMPLIFIER

★ Built in a box which matches our converters.
★ Isolated supply lines make it compatible with any existing supply polarity.
★ Low noise figure 1dB. Gain 18dB.
★ High selectivity tuned circuits. **Price: £7.50.**

THE PA3 DUAL GATE MOSFET PRE-AMPLIFIER

★ Small (about one cubic inch) printed circuit pre-amplifier developed to fit inside transceivers where it can be wired into the receiver aerial lead after the c/o relay.
★ Low noise figure 2dB. Gain 18dB. **Price £5.50.**

SSM EUROPA 10 to 2 METRE TRANSMIT AND RECEIVE CONVERTER

We have seen the same customer reaction about the Europa this year as we were getting from our converters 5 years ago. Lots of people coming up to us at the rallies and saying "I've got a Europa. I'm very pleased with it." This is what sells our gear. Every one we sell produces more customers by recommendation.

SSB has revolutionised 2 metre operation. Co-channel working is normal, and distances covered over poor paths, much greater.

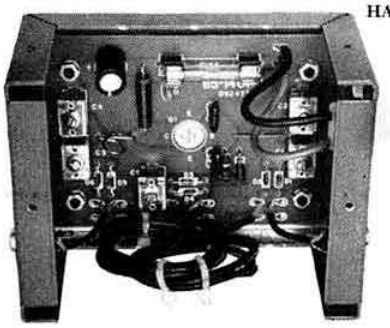
The Europa will give you complete 2 metre coverage with 28-30MHz H.F equipment with all the facilities provided on your H.F. equipment.

The Europa gives you:

★ Well established design with hundreds already in use around the world.
★ Direct plug into accessory socket in Yaesu-Sommerkamp equipment (plugs and multicore lead supplied).
★ High transmit power—up to 200W input—50% efficiency.
★ Excellent receive converter performance 2dB noise figure.
★ Extremely stable operation.
★ Clean output.
★ Attractive appearance—size 9" × 4½" front panel, 4½" deep.
★ Low price: **£78.09** complete. **£64.35** less valves—valves required are 2 off QQV03/10, 1 off QQV06/40A. Additional 12·6V 2 amps transformer for use with 6·3V. A.C. heater Yaesu equipment (FT401, etc.) **£3.30** or in a case to match the Europa, **£6.50.**

To obtain any of our products. We can despatch by return of post. We give same day C.O.D. Service. You can call in here any time to look at the gear. Queries? Write or ring if you have any questions. Normal H.P. terms available. Paul G3MXG.

Heathkit 2 Metre FM Equipment



HA-201

NEW MODEL HA-201. 2-metre amplifier for mobile or fixed use from 12 to 16V DC supply. Operates from 1 to 3 watts FM input in the 144–146MHz band. Output 8 watts for 1 watt input power. All solid state built on single P.C. board and supplied with robust metal case. Available July.
Kit HA-201 £14.30 (incl VAT) + 44p Carr.

HW-202

Heathkit HW-202 2m F.M. Transceiver
All solid-state design. Can be completely aligned without instruments. Multi-channel capability—independent pushbutton selection of 6 transmit and 6 receive crystals 10-Watts Minimum Output—designed to operate into even an infinite VSWR without failure. Includes push-to-talk mike
Kit K/HW-202 £99.00 (inc. VAT) + 66p Carr.

HM-2102

Heathkit VHF Wattmeter, HM-2102
Perfect tune-up tool for 2-metre gear—has built-in SWR bridge, 50 to160MHz range—covers 2-way commercial, aircraft and amateur communications.
Kit K/HM 2102 £19.80 (inc. VAT) + 44p Carr.

Extended credit terms available

HA-202

Heathkit 2-metre FM Amplifier, HA-202
40 watts nominal out for 10 watts in—requires only 12V DC supply. Perfect match for the HW-202 Transceiver—also gives fully automatic operation with any 2-metre exciter delivering 5-15 watts drive. Solid-state design—all components mount on single board for fast, easy assembly.
Kit K/HA-202 £40.15 (inc. VAT) + 44p Carr.

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HEATHKIT CATALOGUE

Contains something for everyone: Hi-Fi Stereo Testers & Instruments, SWL, Metal Detectors . . . even a Battery charger Kit.
Mail the coupon . . . Today!

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LOWE ELECTRONICS

MAIN DISTRIBUTOR FOR YAESU MUSEN EQUIPMENT

Head Office and Service Department (Bill G3UBO, Alan G3MME and John G3PCY)

119 Cavendish Road, Matlock, Derbyshire, DE4 3HE

Tel: 9 a.m. - 9 p.m. Matlock 2817 or 2430

Southern Sales
(Dave G8FAY) Goring Road, Steyning, Sussex.
Telephone: Steyning 814466
Just off the A283 on the Shoreham side of the Village.
Halfway down the road on the left—look for the tower

No problem parking at any branch

Midland Sales
(Peter G3XWX) Soho House, 362-364 Soho Road, Handsworth, Birmingham.
Telephone: 021-554 0708
Just off Exit 1, M5—follow the A41 into town for 1¼ miles to the Regal (Bingo Hall) Cinema. We are directly opposite, on the first floor. Within easy reach of the South West or North East by Motorway.

In addition to the above shops which are open 9 to 5.30 Tuesday to Saturday we have part-time Agents who are available evenings and week-ends:

Alan GW3YSA
35 Pen Y Waun, Efail Isaf
Nr. Pontypridd, Glam
Telephone Newtown Llantwit 3809

John G3JYG
16 Harvard Road,
Ringmer, Lewes, Sussex
Telephone Ringmer 812071

Sim GM3SAN
19 Ellismuir Road
Baillieston, Nr. Glasgow
Telephone 041-771 0364

So, wherever you are, we have a branch or a part-time Agent not too far away. At Matlock, the Branches, or our Agents you will see and can try out the best in both new and second hand, H.F. or V.H.F., along with every conceivable accessory for the complete station.

NOTE. **MIDLAND SALES – Peter can be reached at home outside normal hours at 021-784-1318**

For some years we have given the Amateur a wide range of the best in equipment, the fastest possible delivery and the best possible after-sales service. We still do and will continue so. Old timers know this, but the newcomer may need to be convinced—if so, all you have to do is to ask any experienced Amateur. He is our best advertisement.

H.P. A PLEASURE

PART EXCHANGES WELCOME

Our catalogues are free but we would appreciate postage etc. so please send 10p in stamps for our VHF catalogue, 10p for our HF catalogue, 5p for second-hand list, or send us 20p in stamps and we will send the lot.

LOWE ELECTRONICS FOR YAESU

Full range of Yaesu equipment ex stock

LOWE ELECTRONICS FOR 2M SSB

Liner 2, Multi 2000

LOWE ELECTRONICS FOR 2M FM

Yaesu Sigmasizer, FT2FB, FT2AUTO, FDK Multi 7, Multi 8, Multi VFO, Inoue IC210 all ex stock

LOWE ELECTRONICS FOR ACCESSORIES

All accessories for the modern station

LOWE ELECTRONICS FOR ANTENNAS

Wide selection of antennas both H.F. and V.H.F. along with rotators, cable, baluns, etc. etc.

LOWE ELECTRONICS FOR SLOW SCAN

Venus equipment ex stock

LOWE ELECTRONICS FOR SECOND HAND

Always a good selection of mint, fully checked equipment, carrying a meaningful guarantee

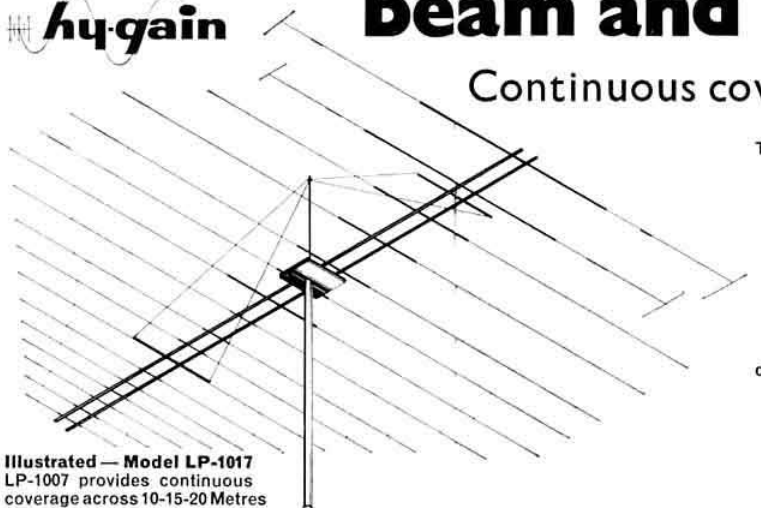
LOWE ELECTRONICS FOR SERVICE

This is what puts us that little bit ahead—ask anyone

Professional performance with beam and KW equipment

hy-gain

Continuous coverage across 10-15-20-40 metres

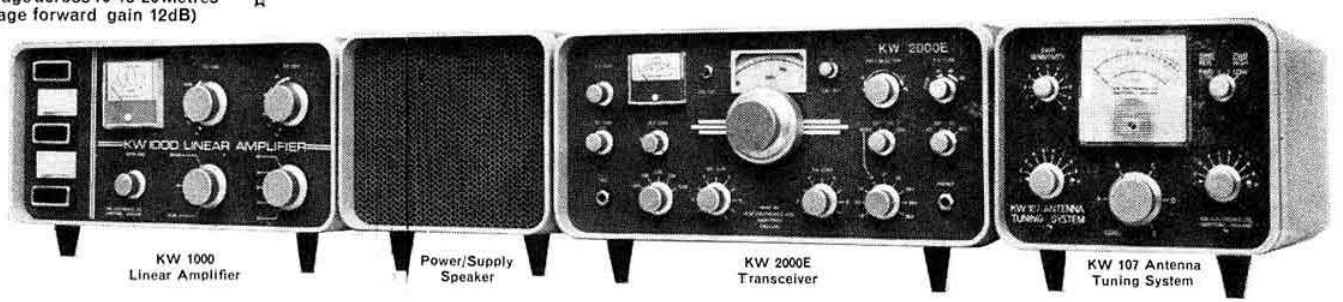


Illustrated — Model LP-1017
LP-1007 provides continuous coverage across 10-15-20 Metres (average forward gain 12dB)

The Hy-Gain LP-1007 and LP-1017 were originally designed as commercial systems for use on marine HF SSB circuits, Embassy and commercial systems. These high performance antennas give the amateur radio operator performance not offered by conventional amateur band antennas.

Frequency coverage is continuous across the frequencies of 13 to 30MHz for the LP-1007 and 6·2 through 30MHz for the LP-1017. The antennas may be operated in or out of the amateur bands with consistent results. Both systems are constructed of lightweight aluminium members, with high impact cycolac insulators for long, trouble-free life.

Either system may be rotated with the Hy-Gain Model R-3501 Rotator. Towers, obstruction lights and other accessories are also available.



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10021 10037 10062 10087 10112 10137 10158 10162 10187 10212 10237 10262 10287 10437 10465 10486 10513 10549 10908 11250 11500 11550 11859 12250 12287 12312 12337 12362 12387 12412 12437 12412 12487 12500 12512 12537 12562 12587 12612 12637 12687 12712 12737 12750 12762 12787 12837 12900 13062 13075 13087 13112 13137 13162 13187 13212 13222 13227 13229 13237 13250 13262 13272 13275 13304 13312 13337 13350 13387 13412 13425 13437 13462 13487 13500 13540 13590 13640 13690 13729 13739 13740 13747 13749 13750 13769 13779 13789 13790 13799 13809 13840 13890 13940 13972 13990 14112 14250 14408 14416 14500 14750 14762 14787 14812 14848 14887 14898 14912 14937 14948 14962 14987 14998 15000 15012 15037 15048 15062 15087 15098 15112 15137 15148 15162 15187 15198 15212 15237 15248 15250 15262 15287 15294 15298 15311 15337 15344 15377 15500 15511 15512 15537 15544 15561 15562 15577 15587 15594 15611 15612 15637 15662 15687 15712 15725 15737 15762 15772 15837 15887 15912 15937 15962 15987 16837 17906 17916 17926 17946 17966 18247 18250 18372 18431 18497 18662 18747 18872 18997 19122 19247 19372 19497 19622 19747 19872 23620 23720 23820 24420 24620 24720 24820 24920 25020 28000 31200 31225 31250 31275 31300 31325 31350 31375 31400 31425 31450 31475 31500 31525 31550 31575 31600 31625 31650 31675 kHz.

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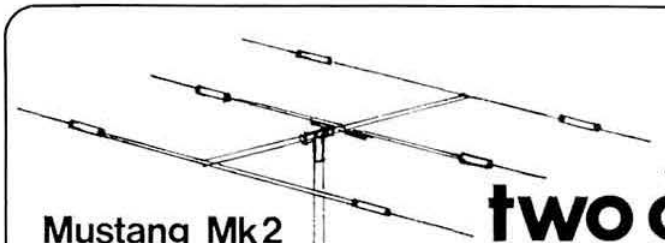

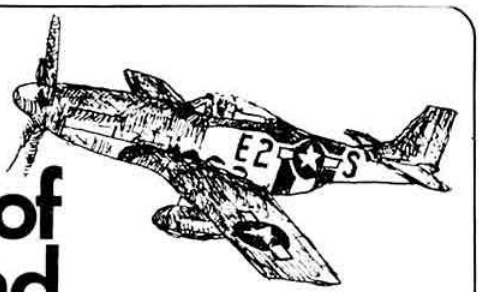

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QTC AMATEUR RADIO NEWS

New prefixes

The ITU announces that in accordance with the Radio Regulations the following callsign series have been allocated provisionally: A9A-A9Z Bahrain; C4A-C4Z Cyprus (Republic of).

Facts and figures

The MPT advises that the following numbers of amateur licences were in force at 31 March 1974:

Class A	15,010	Class B/M	1,256
Class B	4,520	Television	262
Class A/M	3,132		

The latest Callsign Record received from the MPT, dated 27 April, gives the latest callsigns issued in the G4 and G8 series as G4CZZ and G8ISG respectively.

At the end of April RSGB membership totalled 17,168, made up of 14,409 UK corporate members, 1,071 UK associate members and 1,688 overseas members.

Slow-scan television

The MPT have advised that they will consider applications for permission to use sstv in the 3·5 to 3·8MHz amateur band. Such applications should clearly state the characteristics of the equipment it is intended to use.

WARC/MM (A first report from G2BVN in Geneva)

The proceedings have so far progressed smoothly without any disturbances which might affect the amateur service. The powers of the conference are limited and it cannot make major decisions on bands other than those used by the maritime service.

The terms of reference of Working Group 5A are, inter alia, to consider provisions relating to the use of telephony between 1,605 and 4,000kHz. This portion of the spectrum includes the 1·8 and 3·5MHz amateur bands. So far there have been some 120 proposals concerning alterations to existing provisions in the Radio Regulations. These have been examined and do not appear to affect the amateur service. However, many proposals indicate earlier dates for the compulsory change to ssb emissions for both coast and ship stations.

However, this conference has powers to make recommendations to a future general WARC and this is a procedure to be watched carefully.

Mr R. M. Billington of the UK was unanimously elected chairman of the conference. This is seen as a popular choice. Political undertones have been noticeably less than at the Space Conference in 1971.

At the time of writing, 82 nations are represented by some 520 delegates.

F8RU operating 4U1ITU while the Canadian Deputy Minister of Communications, Mr M. F. Yalden, signs the log during the WARC/MM Conference

RSGB GROUPS

In order to up-date the list of RSGB Groups for record purposes and possible publication, secretaries of all such groups are asked to forward to the editor details of present office holders, address for correspondence and venue of meetings.

QSL Bureau

The sub-manager for the callsigns in the series commencing G4DAA is Mr D. Buckley, G3VLX, 17 The Weald, Chislehurst, Kent, to whom envelopes should be sent. All cards must go to G2MI.

Because so many G8 + three-letter stations work each other, many send their outgoing cards to their own sub-manager, Mrs or Mr A. J. Mathews, G6QM, or Mr R. E. Parkes, G3REP. This saves the Society money but such members are asked to remember that G8AAA to G8EZZ and G8HAA to G8IZZ are processed by G6QM and his wife, but G8FAA to G8GZZ are handled by G3REP. Please ensure that cards and envelopes for the collection of cards both go to the correct sub-manager. Other callsign categories should go to G2MI. This notice may be ignored by all callsign groups other than the three-letter G8s and does not apply to G8+ three calls with prefix other than G.

Interference to audio equipment

The March issue of *Hi-Fi News* contained an article by Harry Leeming, G3LLL, of Holdings Photo Audio Centre, Blackburn. A considerable amount of relevant information is contained in this article including a chart showing relative rfi breakthrough on typical amplifiers. G3LLL offers to supply photocopies of his article on receipt of a stamped addressed envelope. Requests should be addressed to G3LLL at Holdings Photo Audio Centre, Mincing Lane, Darwen Street, Blackburn BB2 2AF.

G3FXG and EA5MP

A recent visitor to RSGB headquarters was Alfred (Bob) Benyan, G3FXG. Bob brought with him a framed certificate issued by the Ministry of Posts and Telegraphs in Madrid stating that he was the second operator for the station EA5MP of which his wife, who is Spanish, is the licence holder.

The Spanish authorities have declined to issue temporary licences to UK licence holders although there have been indications that EA licences might be issued to UK licence holders who have taken up permanent residence in Spain.

The certificate issued to Bob Benyan, while not going all the way, is at least a step in the right direction, although the decision was influenced by the fact that Bob's wife has qualified as EA5MP.

Sailing trip to the W Indies

A party of five, probably three men and two girls aged 23 to 41, is planning a sailing trip to the W Indies in an 11-ton steel yacht, starting in August this year and returning in April 1975. An amateur, preferably with sailing experience, is required to join the party and anyone interested is invited to contact John Stothert, 69 Benefield Road, Oundle, Peterborough.

Citizens radio

The president of the United CBers of America has been jailed for 18 months and the UCBA fined $5,000 following conviction on 11 counts of violation of FCC rules and other illegal activities.

Visit of RSGB EVP to Malta

The Executive Vice-President, Cyril Parsons, GW8NP, accompanied by Charles Humphreys, GW8GOL, recently spent a two-week holiday on the island of Malta. Norman Polan, 9H1BX had very kindly arranged a number of visits and social occasions covering the period of the stay, and it was thus possible to meet many 9H amateurs. Included was a visit to the National Radio Club, where the enthusiasm for home construction by the younger members was notable, obviously inspired by 9H1I. The beautiful island of Gozo provided an opportunity to meet Eric Rogers, 9H4G, and his wife, together with members of the Gozo Radio Club.

While on the island, GW8NP recorded two broadcasts on the subject of amateur radio for the BBC Forces Network. Unfortunately lack of time precluded acceptance of other invitations.

The kindness, enthusiasm and hospitality extended made the holiday a most memorable event and while it is not possible to mention in detail all the amateurs met, special thanks are due to Norman Polan, 9H1BX, Eric Rogers, 9H4G, Ron Meachen, 9H1R, and their respective wives, for their hospitality and for facilities to talk back to the UK.

On the island of Gozo, GW8NP and GW8GOL met Eric Rogers, 9H4G; Tony Cefai, 9H4A; George Galea, 9H4F; and George Gauci, 9H4H

ORS33120; Norman Polan, 9H1BX; Law Smith, 9H1BB; Charles Humphreys.GW8GOL; Ron Meachen,9H1R; and ORS-33919 photographed (l to r) during the EVP's visit to Malta.

Some interesting uses for TAA661 integrated circuits

by Dr A. GSCHWINDT, HA5WH*

IN recent years a new family of integrated circuits has been used in the i.f. and demodulator stages of fm receivers. It consists of a wideband limiter and a multiplier circuit, and with an external rf phase shifter the circuit can give a very good fm i.f. amplifier and demodulator arrangement. The following examples describe other applications for this type of ic, concerned with amplitude modulated signal reception and generation.

In general, the advent of the TAA661 ic means that cheaper a.m. equipment can be constructed, with no loss of performance. This ic (and similar types†) has a free input to the limiter section, and its output is also accessible. Between the output and input of the limiter an external frequency determining element, either tuned circuit or crystal, can be located to produce an oscillator circuit.

The inputs to the multiplier section are very useful for demodulator or modulator configurations, although in the ic one input of the multiplier is internally connected to the output of the limiter so that in practice only one input is free.

Product demodulator on 450kHz

Fig 1 shows the circuit diagram. The limiter section works as a crystal oscillator on 450kHz, with the crystal connected between the input and output of the limiter amplifier, as mentioned above. The input signal is received by a tuned circuit, ensuring dc bias between pins 6 and 10. The gain of the stage is about 29dB, and the detector works well up to 10MHz. At higher frequencies a series tuned circuit (using an inductance) is necessary to give good phase shift and ensure oscillation.

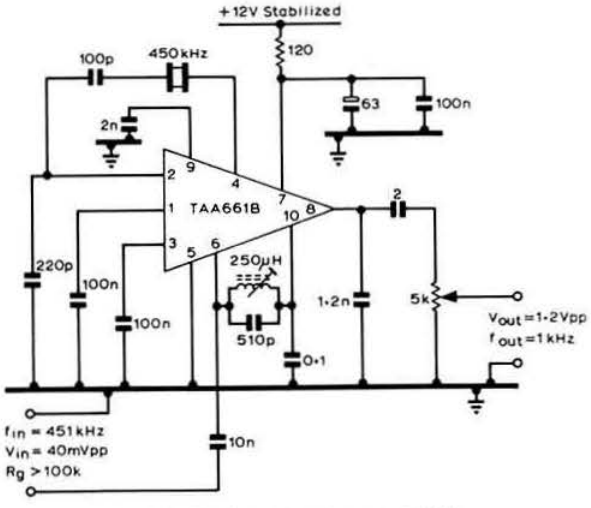

Fig 1. Product detector on 450kHz

Phasing-type ssb demodulator

In most ssb receivers the selectivity is determined by crystal or electro-mechanical filters in the i.f. stages. A cheaper circuit can be built using two TAA661s in the configuration known as phasing-type ssb demodulation. The suppression of the unwanted sideband is determined mainly by the accuracy of the af phase shifter. The carrier phase shift and the amplitude balance are generally stable and reliable.

As can be seen from the circuit (Fig 2) the input signals drive the input of the multipliers. The carrier is applied to two phase shifters (+450° and −450°) giving the 90° phase shift between the two demodulators. The limiters of the TAA661s work as buffer amplifiers. The outputs of the multipliers (or product demodulators) are connected to an active audio phase shifting network which includes two ICs. The af phase shift will have a maximum ±1·1° error in the 270–2,700Hz band.

If the carrier balance and the amplitude balance are good the unwanted sideband attenuation should be between 36 and 38dB. The attenuation of the phase shift network is about 10dB. To obtain upper or lower sideband it is necessary to add or subtract the outputs of the two detectors: in Fig 2 only the summation is used.

To improve the sideband rejection over 2,700Hz it is useful to locate a low-pass filter at the output of the demodulator. The filter should have a cut-off frequency of 2,700Hz.

The af phase shift will have increased the phase error above 2,700Hz, so care must be taken to keep to the given values of components in the phase shift network. The well-known bridge-type af phase shifter could also be used. If the demodulator circuit is located in an a.m. receiver to replace the envelope detector, higher sideband rejection can be reached because the i.f. filters will also improve the selectivity.

The best way to obtain sideband switching is to invert the inputs of the phase shift networks.

DSB/SC generator with sideband filter

Another application of the TAA661A is to use the multiplier section for modulator circuits. Fig 3 shows a circuit diagram where the ic is working as a carrier oscillator (limiter section) and balanced modulator (multiplier section).

The carrier balance is set with a variable resistor located between pins 3 and 6, although the application of an external balance resistor can cause some problems due to the poor thermal coupling between the chip of the ic and the external resistor. The carrier rejection, therefore, varies with temperature, but in practice the circuit is found to work correctly

† Equivalent circuits from other manufacturers include the CA2111AE and CA3065 (RCA); the ULN2111A (Signetics); and the MC1357 (Motorola).

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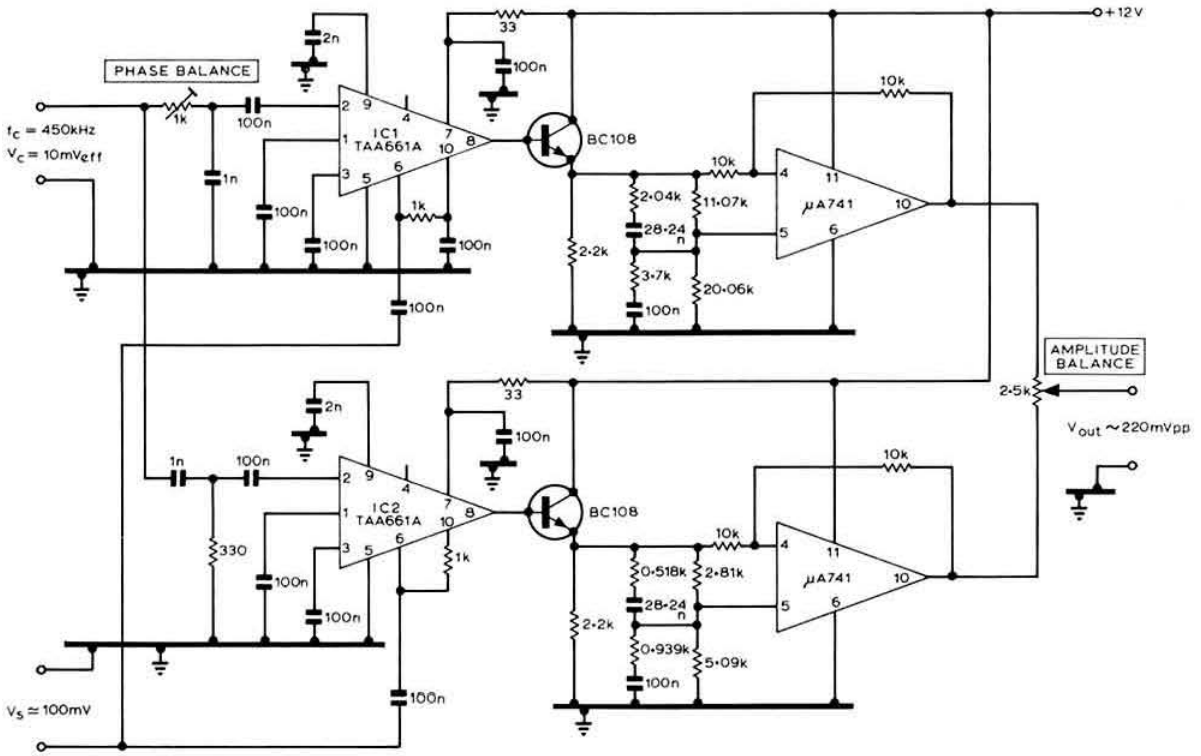


Fig 2. Phasing-type ssb demodulator

in the region +150 to +35°C. The temperature characteristics can be improved by using a carefully selected resistor with the opposite temperature coefficient to the ic. The electrochemical filter is matched to the desired source and load resistances, determined by the parameters of the filter.

Phasing-type ssb generator

Perhaps one of the simplest arrangements is to arrange two TAA661s in the phasing-type ssb generator shown in Fig 4, one ic being a crystal oscillator and balanced modulator. The carrier phase shift is carried out by a parallel tuned LC circuit with its coupling capacitor. The limiter section of the other ic is used as a buffer amplifier driving the second modulator.

The af signal is amplified and shifted by 90° in the 300–3,000Hz band, with a phase error lower than ±1·1°. The resistor networks switched onto pins 6 and 10 are part of the af phase shift circuit. For af band limitation a low-pass filter with a cut-off of 3kHz would be useful on the input of the BFY34. The carrier phase and amplitude control ensure good alignment of the circuit for maximum unwanted sideband rejection.

The outputs of the circuits are added in an LC circuit tuned to 450kHz. If the circuit is controlled with care, a carrier rejection greater than 40dB can be obtained, and the sideband rejection will be 36–38dB below the peak level. The multiplier section of the ic works perfectly up to 1·5–2MHz as a modulator; at higher frequencies the output swing and the stability will decrease, although the arrangement can be used up to 10MHz.

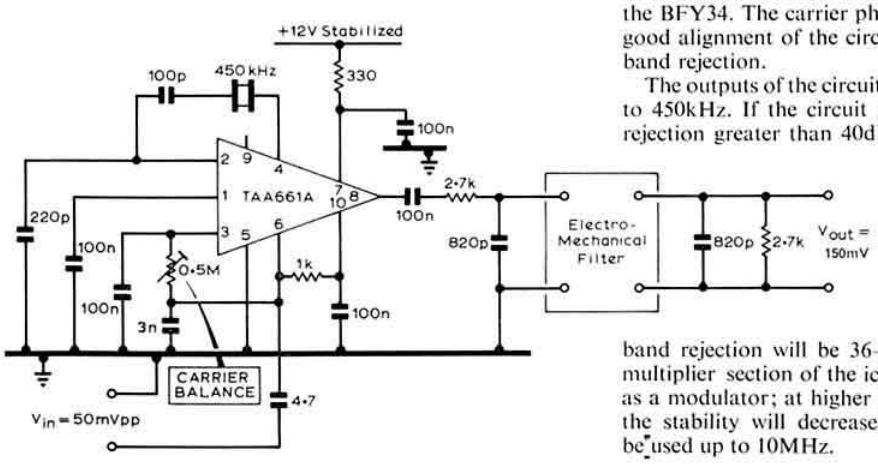


Fig 3. SSB generator on 450kHz with electromechanical filter

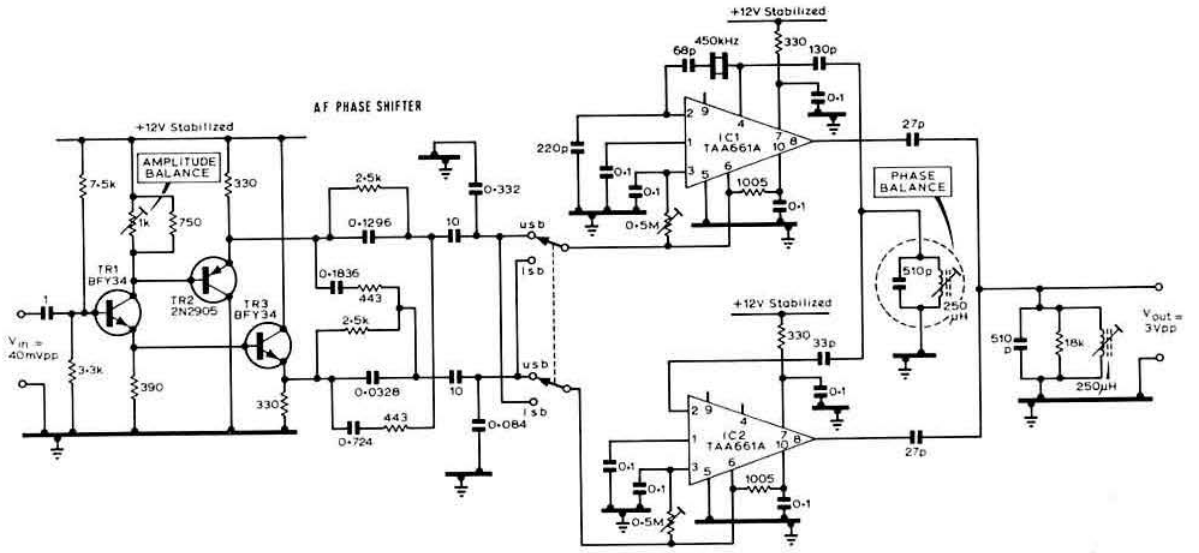


Fig 4. Phasing-type ssb generator on 450kHz

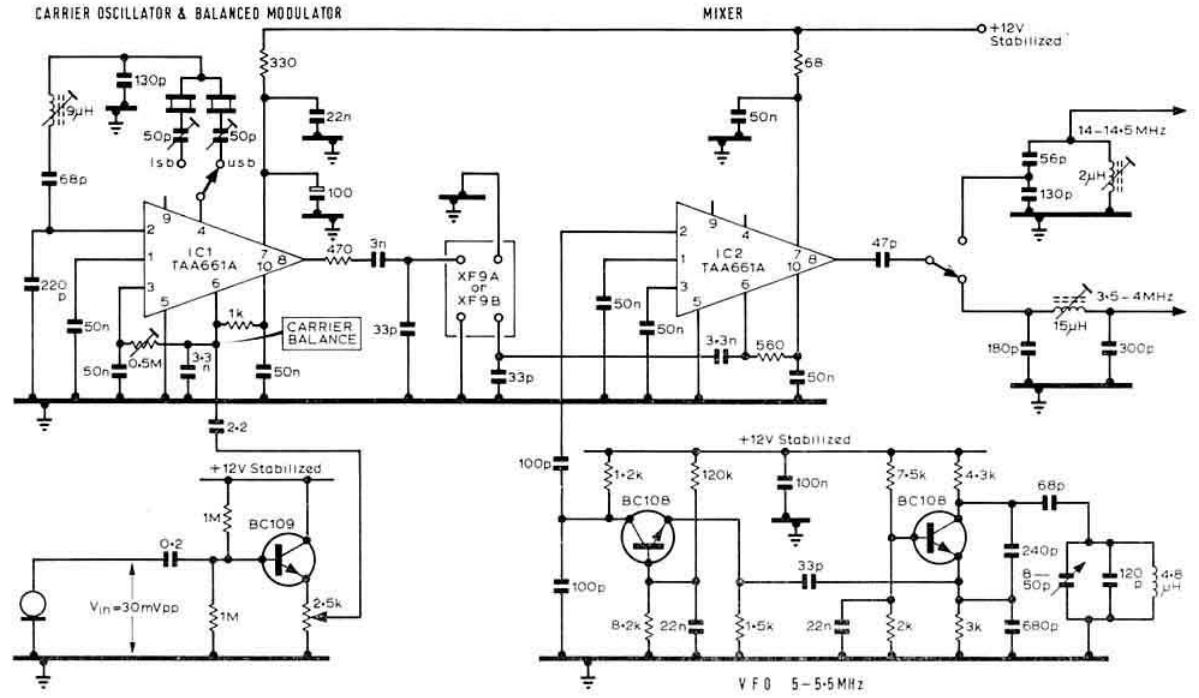


Fig 5. SSB generator and mixer on 3·5/14MHz

SSB generator and mixer

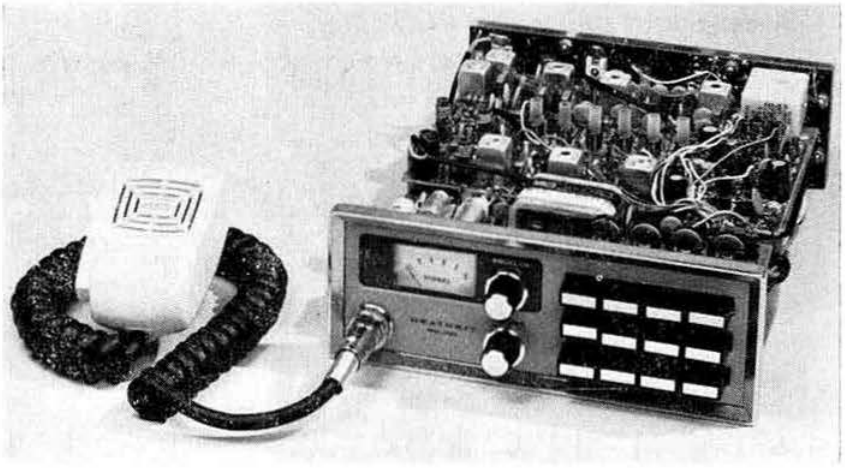
Fig 5 shows the complete driver unit for an hf ssb transmitter. In this example the ssb generator uses a crystal filter for sideband filtering on 9MHz. The construction of the generator is similar to that described earlier. The sideband selection switch chooses the required crystal in the oscillator, and the output of the crystal filter drives the second mixer. The vfo works in the 5–5·5MHz band, and its stability is improved by properly adjusted temperature compensation.

The output frequency of the mixer would be in the 3·5–4 or 14–14·5MHz band. An af input of 30mV peak to peak, as easily obtained from a crystal microphone, is enough for full output swing.

EQUIPMENT REVIEW

by B. ARMSTRONG, G3EDD

The Heathkit HW202 2m fm transceiver



THE pattern of 2m operation has changed enormously over the past five years or so. During the 'fifties and early 'sixties, operation was almost entirely with crystal-controlled a.m. transmitters and crystal-controlled converters in front of a general coverage receiver. The band plan was observed by over 90 per cent of operators who established their own slot in their regional frequency allocation. This period of stability was then upset by the introduction of ssb which brought with it vfo operation and single-frequency working. Then the Japanese, finding saturation in sight on the 27MHz citizen's band, adapted their equipment for operation on 2m and made available, in the main, good-class equipment at very attractive prices. This fm equipment was supplied on standard (to the Japanese) crystal-controlled channels which, together with vfo fixed-station operation, resulted in the effective abandonment of the band plan by many operators. The few fixed-station operators who had previously ploughed a lonely furrow on fm found that they were joined by the ready-made-equipment operator and fm took a firm hold. For some years the only ready-made effective 2m equipment was Japanese, but Heath, no doubt seeing the excellent market opportunities, came on the market with their HW202 which is the subject of this review. It is relatively new and at the moment few are to be heard; this review was in fact delayed for several months waiting for a modification kit.

General description

Heath have done much to improve the maintainability of their equipment, from having a number of printed circuit boards interconnected by soldered-in cableforms, they now use a few large boards and the inter-connections are well-identified plugs and sockets, the latter being on flying leads.

The HW202 uses three main printed circuit boards—transmitter exciter, power amplifier and receiver. A fourth small board is the lt hash filter and regulator.

The front panel carries an illuminated meter calibrated 0–5 which acts as a signal strength meter on receive and power indication on transmit. The only controls are volume and squelch. The fist microphone has a coiled lead and plugs into a front panel socket. The right-hand half of the panel has three rows of push buttons which give separate control of the transmit and receive frequencies on six channels. The third row is an optional tone frequency accessory needed for accessing repeaters such as GB3PI. Four preset tones are available.

The rear panel doubles as a heatsink for the pa transistors, and mounted on it are two phono sockets, one for aerial and the other for an external loudspeaker. A slide switch gives selection of internal or external loudspeaker, and the lt input leads, terminated in a polarized socket, pass through a slot. There are two sets of removable fins which mask several pa variable capacitor adjustments.

The internal elliptical louspeaker is mounted so that the sound comes from the underside front of the case.

Aluminium is used for chassis and case, the front panel being die cast. The external finish is green crackle.

Circuit description

The receiver is double superhet with 10·7MHz first i.f. and 455kHz second i.f. Overtone crystals are used at about 44MHz and are gated by diodes. Three bipolar transistors—oscillator, tripler and amplifier, are used in the oscillator/multiplier chain. A dual-gate mosfet is used as an rf amplifier and a second one as a mixer. Two two-pole crystal filters provide the 10·7MHz selectivity, and all 10·7MHz amplification is achieved in an ic. A dual-gate mosfet is used as second mixer with the injection at 10·245MHz. A second ic provides amplification at 455MHz and incorporates a quadrature detector. No ics are used in the audio circuit which consists of 11 transistors including squelch. The last seven transistors are dc coupled and transformerless.

Fundamental crystals at about 6MHz are used in the transmitter and a varicap diode is used for phase modulation. A tripler is followed by three doublers, one of which is a fet. The power amplifier has a two-transistor line-up with a 2N5589 (or CTC B3-12) driving a 2N5590 (or CTC B12-12). The modification kit related entirely to the transmitter and was to improve stability. The unmodified transmitter was not run up by the reviewer, but the modified transmitter was very tame during alignment. No high vswr protection circuit is used; with modern rf power transistors this is normally unnecessary. As a slight digression, the reviewer has yet to meet a practical vhf transistor transmitter which is unconditionally stable; the difference between a good and poor transmitter in the context of stability is the difficulty or otherwise of producing instability. If anyone claims that his

Manufacturers' specification (at 13·8V dc)

RECEIVER

Sensitivity	12dB SINAD (or 20dB quieting at 0·5μV or less)
Squelch threshold	0·3μV or less
Audio output	3W at less than 10 per cent harmonic distortion
Operating frequency stability	0·0015 per cent or better
Image and spurious rejection	−60dB or greater
Bandwidth	22kHz nominal
De-emphasis	−6dB per octave from 300 to 3000Hz nominal
Modulation acceptance	7·5kHz minimum

TRANSMITTER

Power output	10W minimum
Spurious output	−45dB below carrier
Frequency stability	0·0015 per cent or better
Modulation	Phase adjustable 0–7·5kHz with instantaneous limiting
Duty cycle	100 per cent

GENERAL

Loudspeaker impedance	4Ω
Operating frequency range	143·9–148·3MHz
Current consumption	
Receiver squelch	less than 200mA
Transmitter	less than 2·2mA
Operating temperature range	−30°C to +50°C
Operating voltage range	12·6 to 16·0V dc negative ground only
Size overall	2¾in high, 8¼in wide, 9¼in deep
Weight	2¼ lb
Price	£99 inc VAT, plus 66p p and p
Obtainable from	Heath (Gloucester) Ltd, Bristol Road, Gloucester GL2 6EE

design is stable, what he really means is that he has yet to find the combination of tuning settings and voltage at which it is unstable.

The audio section of the transmitter follows what is conventional practice in professional mobile radio circles where there is pre-emphasis before the limiter and de-emphasis after; the phase modulator has inherent pre-emphasis. The result of this is to produce an audio response which varies with clipping; below clipping the overall result is pre-emphasis and in hard clipping there is no pre-emphasis. This is very effective in making best use of the deviation allowed. The original IARU Region 1 recommendation of 3kHz maximum deviation with a maximum modulation index of 1 showed considerable lack of understanding by those who made the decision since it calls for clipping on a pre-emphasis characteristic resulting in a maximum deviation of 1kHz at 1kHz audio where the peak of speech power occurs. The clipping is followed by four RC roll-off networks to attenuate out-of-band harmonics introduced by clipping, thus reducing sideband splatter.

The early stages of both transmitter and receiver are regulated to 11V, and the It supply to all stages is filtered. A reverse polarity protection diode is fitted across the It supply so as to blow the line fuse in the event of crossed polarity. The HW202 is suitable for negative earth only, which will suit most with fairly modern cars, but those with older cars will need to reverse the polarity of their car electrical system. This latter exercise is generally not nearly so painful or complicated as some may imagine.

THE TESTS

The HW202 was aligned on the repeater frequencies of 145·15 transmit and 145·75 receive and all tests were carried out on these frequencies.

Receiver

Sensitivity

A Marconi Instruments 995A/5 signal generator was used for this and all other receiver tests, except for spurious responses when a TF1066 was used.

With 1μV emf input the quieting was 20dB, and signal-to-noise ratio measured by modulation on-off was 24dB with 3kHz deviation at 1kHz audio. With maximum audio gain the output was just under 4W with some distortion. At 3W the specification limit of 10 per cent distortion was achieved.

Blocking

For this test two signal generators were used—one on 145·75MHz at such a level to give 20dB signal to noise ratio, the second was set to 145·80kHz and its level increased until the signal to noise ratio was degraded by 3dB. At this point the output was +60dB relative to the on channel signal generator. An acceptable performance.

Intermodulation

This was above the blocking level and was not measured.

Signal strength meter

As previously mentioned, the meter is scaled 0-5. There is no zero adjustment.

Scale reading	dB rel 1μV emf
1	+16
2	+19
3	+23
4	+30
5	Not achievable

There appears to be no accepted practice for S-meter calibration on vhf. From observation, the reveiwer considers S9 to be about 4μV pd, ie +18dB rel 1μV emf. This means that S9 would be scale reading 2 on the meter. In practical terms the signal strength meter would not be expected to show much of an indication.

Squelch

The squelch range was from less than 1μV emf to 8μV emf, backlash and effect of modulation was less than 2dB. No problem should be found in practice with squelch chopping with modulation.

I.F. bandwidth

The single signal selectivity was slightly asymmetric, but well within acceptable limits.

Attenuation	Frequency difference (kHz)	
−6dB	+9	−8
−40dB	+17	−20
−60dB	+35	−30

This is considerably more gentle than is achieved in ex-business radio 25kHz channelling equipment where one would normally expect at least 80dB at the ±25kHz points.

Spurious responses

The 10·7MHz image rejection was 60dB—on the limit of specification, and 10·7MHz i.f. rejection was 85dB, 5dB within specification. One spurious response on about 169MHz (4fx−10·7MHz) was only 52dB down, 8dB out of specification. There were plenty of spurious responses above 80dB, but obviously well within specification.

Transmitter

Power output

At 13·8V dc input, the power output measured on a Bird Termaline was 13·5W—well exceeding the minimum power output specification of 10W.

Spurious outputs

With the transmitter fed into a matched load, a Hewlett Packard Spectrum Analyser was used to look at the output purity.

Frequency (MHz)	Level wrt carrier dB
108·86 (18fx)	−56
127·0 (21fx)	−58
163·29 (27fx)	−52
181·44 (30fx)	−56
290·3 2nd harmonic	−35
435·45 3rd harmonic	−40
580·6 4th harmonic	−52
725·75 5th harmonic	−38
870·9 6th harmonic	−42
1,016·05 7th harmonic	−52
1,161·2 8th harmonic	−58

The low-pass filter is obviously not doing a particularly good job, but the spurious levels present are unlikely to be troublesome in the mobile role. As a home station the HW202 gets the additional benefit of a fairly high Q tuned circuit in the shape of a directional aerial. As a comparative standard the professional mobile radio designer has to meet 2·5μW for spurious which, for the HW202, is equivalent to about −67dB.

Under limiting conditions, sideband radiation was 50dB down 15kHz off when the limiter was set to hold the deviation at 3kHz. This is good.

Assembly

Unfortunately no record was kept of the time it took to assemble the kit; no particular problems were found, but there were a number of minor errors in the handbook—probably the most confusing was that the key number of the hardware list on page 58 did not tie up with the pictorial illustrations. Heath assembly manuals are usually very good on accuracy—it is nice to know that they are human!

HWA202-1 ac power supply

The matching regulated ac power supply to the HW202 is built into the same-sized case in order to make a convenient base station, although it should be remembered that repeater operation by base stations is not encouraged. Two mains taps are provided, one copes with 100–130V and the other 220–260V. The output current is 2·2A at 13·8V dc on a 40 per cent duty cycle.

Internal dc voltage adjustment from approximately 10 to 15V dc means that the HWA202-1 could be considered as a general purpose bench supply, although it is only wired for negative ground. Short circuit protection is built in, and in addition a resettable trip is used instead of a fuse. The regulator is an MFC6030 ic controlling a TA2577A series transistor.

The price of the HWA202-1 is £17.60 inc VAT, plus 44p p and p.

Tone burst encoder HWA202-2

As mentioned previously, the tone burst encoder is an optional extra and is necessary only for access to repeater stations. Many of the Continental repeaters use 1,750Hz, GB3PI uses 1,700Hz; the Heath specification states that each of the four push button selected channels is adjustable over the range 1,800 to 2,500Hz with a stability of ± 1 per cent from −10°C to +122°F. The encoder is connected to the 11V dc regulated line of the HW202 and is therefore well isolated from supply variations under normal use.

Burst duration is adjustable from about 250ms to, in effect, infinity but the maximum useable duration is about 2s. Repeat burst facility is not provided. GB3PI needs a repeat burst about every 45s, but this characteristic will be withdrawn in the future in favour of a complete drop-out after 1 min to discourage "channel hogging".

When tested, it was found that only Channel 1 would adjust down to 1,700Hz and the other three would not come down to 1,750Hz. However, a simple resistor change is all that is necessary to suit UK access frequencies. The output waveform was more sawtooth than sinusoidal and no level adjustment is provided.

The oscillatory circuit is an NE566V integrated circuit. Two transistors are used to control burst duration gating of a back-biased diode in the output signal path.

The price of the HWA202-2 is £12.10 inc VAT, plus 44p p and p.

General comments

The HW202 continues the high standard that Heath set themselves and during testing it was a pleasure to work on. The easy removal of a circuit board makes servicing very easy; although no faults as such showed up, the two transistors in the microphone amplifier were inserted incorrectly (certainly not Heath's fault, their instructions could not be plainer). The necessary isolation and repair of the fault was straightforward.

There are two adverse comments with which all readers may not agree. Firstly, using four push buttons for channel change is a bit mean and confusing. Each of three push buttons controls two frequencies by being depressed. The fourth push button of the row is in or out depending on which of the two frequencies are required. For American use (and as supplied loose) small labels are used with channel numbers on to suit their channel numbering convention. Secondly, the signal strength meter is very "lazy" particularly for mobile use.

Conclusion

This should be another Heath winner

Addendum

The review has been read by the Heath Company, USA, who say that the transmitter spurious emission levels are not considered typical and suggest that there may be some fault in either components or tuning. A second equipment is being sent for measurement, and a supplementary report will be made.

A somewhat undesirable characteristic of the access tone oscillator was discovered after the review was complete in that there is a marked chirp which can make accurate tone frequency setting difficult, since it is the first couple of hundred milliseconds of tone which is important unless a very long tone burst is used. This characteristic is considered by Heath UK to be exceptional and therefore will be checked on the second equipment.

Some thoughts on true break-in for cw and ssb

by J. LINFORD, G3WGV/W5*

Reproduced from *Collector and Emitter*, journal of the Aeronautical Center Amateur Radio Club Inc, Oklahoma, by permission of the Editor.

WITH the conditions on today's hf bands so chaotic, with pile-ups on wanted stations and interference generally, a true break-in system can be most advantageous. Break-in, a term originally invented for use in the cw context, may be defined as the ability to hear at full receiver sensitivity in between *each* dot and dash. The effect is as if your own signal was just another rather strong station on the band, and as soon as it is gone you can hear the weaker signals on the channel. Talking for a moment in the cw vein, the absolute "musts" for a break-in system are:

1. Perfectly silent muting of the receiver (very difficult).
2. Most definitely NO relays.
3. A clean transmission with minimum delay time on either rising or falling edges, consistent with click suppression and "good sound".

Dealing briefly with these, the first requirement is far and away the most difficult to meet. Most receivers have an If response down to around 300Hz. For there to be no click as the receiver mutes down, therefore, no part of the receiver may mute down in any less time than, say, about 4ms (reciprocal = 250Hz). It is, however, by no means easy to reduce the gain of a receiver by 110dB in 4ms so the problems have only just begun.

Turning to the second point, no relay capable of switching aerial power moves even remotely fast enough for a break-in system. The low power transmitter and all receiver stages can easily be controlled by cheaply available silicon devices so that poses a minor problem. To overcome the aerial relay problem requires a slightly different approach.

Normally the aerial is switched between the receiver and transmitter, but there is no reason why the transmitter should not be permanently connected and only the receiver switched. It may be asked: but what about the pi-tank sucking out all the hard-earned microvolts? True, it can be a problem, but how about taking off the HOT end of the tank? What solid state device will put up with that?—a 40673 zener protected dual gate fet.

The circuit is quite simple (Fig 1). The 40673 is an "enhancement mode" fet which basically means it has to be biased on, a little like a bipolar transistor. It has an input Z of goodness knows how many Mohms, and each gate has across it two zener diodes wired in series with a breakdown of about 15-20V down to the source pin. As yet, they have proved completely indestructible, though the author admits that he has not tried them on W5 type power yet; the maximum tried was 100W rms o/p. The bipolar device gives added protection. When going to transmit, place some positive volts (between 2V and 50V) on the line called mute, and that transistor goes an effective short, unbiasing the mosfet and pushing most of the rf down to ground.

C1 should be as small as possible, and certainly no larger

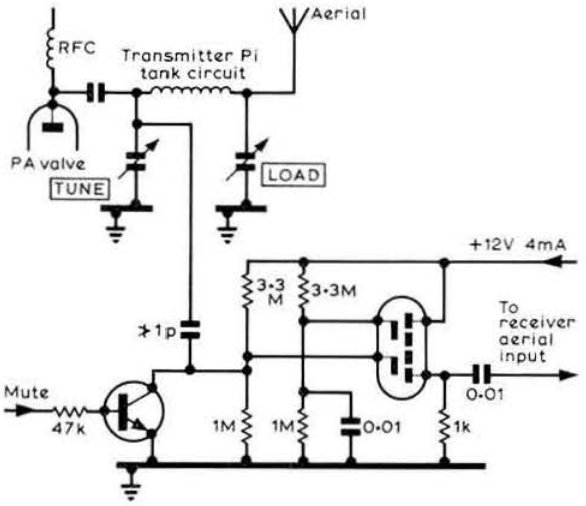


Fig 1. Aerial t-r switch

than 1pF. It must also be able to withstand the pa ht with a safety margin of about four times. Two thick insulated wires twisted for about ½in make a good start. The circuit gives some gain so one can afford to loose some across that capacitor. The gain comes because the Q of the pi tank shoots up when it is not loaded by the pa, so there is some voltage gain in the tank. The high impedance of the hot side of the tank is source followed down to 75Ω again, giving power gain. Note, incidentally, that the pi tank acts as a pre-receiver tuned circuit—another nice thing about this circuit. The only other point is that the bipolar must be a fast switching type as the C-E capacitance under cut off conditions must be very low. Computer core drivers are good for this.

Turning now to the transmitter switching, the first problem is that ht volts cannot be switched quickly. Fortunately in the case of valve type transmitters, a negative grid bias supply of, at most, 150V can be used, and the insignificant current switching involved makes this kind of keying easy.

Some kind of sequencer is required to control the system so

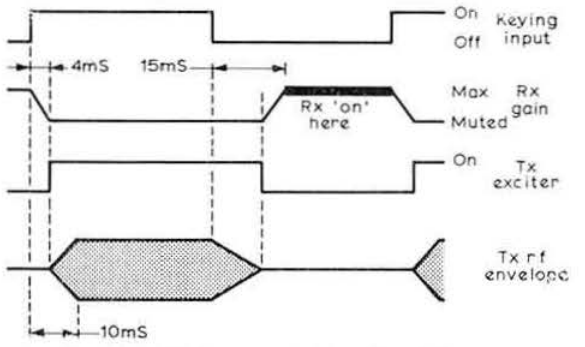


Fig 2. Graphical representation of break-in sequence

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that the receiver mutes down first, followed by the aerial tr switch and the transmitter exciter, and finally the pa is brought up. On releasing the key the reverse order needs to be observed. A graphical description of this appears in Fig 2. A sequencer using ttl circuits is shown in Fig 3. There are, of course, many other ways of doing the same job, but the author favours low level control with amplifiers to drive the larger circuits where necessary.

The sequencer operates as follows. When the key is pressed the input to the NAND inverter is earthed, causing its output to go high, setting flip flop 1, whose Q output causes the 4ms monostable to be started and also begins the receiver mute down. The 4ms delay is to wait while the receiver is muting down to the required level (see Fig 2). 4ms later, by which time the receiver should have settled down, flip flop 2 is set by the Q output of the monostable. This brings up the transmitter exciter and through NAND gate 2, "anded" with the key input produces a low at the gate output which can be used to initiate the pa keying. Note that the pa cannot be brought up until the exciter has been energized.

Releasing the key gives a low out of NAND gate 1. This has no effect yet on flip flop 1, but it degates NAND gate 2, causing the pa to be turned off slowly by the keying circuit. Notice now the Schmitt trigger connected by a diode to the pa cathode. This trigger is operationally like a NAND gate but with positive feedback to give a trigger effect. Its positive threshold is about 1·6V and its negative about 0·8V.

When the pa is turned on, at least 1·6V is developed across the 100Ω resistor, so the Schmitt trigger operates and its Q output goes low. This is immaterial to the operation of the sequencer. However, as the pa decays and when the cathode voltage gets below about 4·3V it starts pulling the trigger's S-line down. There is about a 0·7V drop across the diode which is now forward biased. The set line is thus about 0·7V above the cathode and follows the cathode down as the pa current decays. By varying the forward current through the diode it is possible to alter its forward voltage drop slightly. By adjusting the resistor RV1 it should be possible to arrange that when the cathode pd is zero (ie the pa has been cut right off), the lower threshold of the Schmitt trigger is arrived at. Thus, just as the pa cuts off, a positive pulse is applied to the reset input of flip flop 2, causing its Q output to go low, turning off the exciter. Also flip flop 2's $\overline{Q}$ output goes high, thus resetting flip flop 1, allowing the receiver to start recovering. After 4ms the receiver is back on full sensitivity IN BETWEEN dots! The next dot or dash coming along starts the sequence off again.

No consideration has been given either to the specific circuitry involved in muting the receiver nor that of keying the pa. This is because individual designs of receivers and transmitters vary so widely. However, a few comments would perhaps not be amiss.

1. Notice that all rises and decays, both in the receiver and transmitter, are shown as linear. Theoretically an exponential decay as normally used never reaches its zero level. In practice it takes a long time compared with the rate at which it decays initially. Thus it would take an excessively long time for the receiver to mute down and similarly for the transmitter to rise and decay. A linear waveform overcomes this problem and the resultant cw note is rather pleasant considering the short decay time used. The linear decay is readily obtained using a constant current source such as a field effect diode.

2. If it is intended to use the receiver as a monitor for the transmitted signal (the only true way of doing things!), then no muting can be applied to the af stages. Approximately 110dB of muting is necessary, of which about 50dB is obtained in the tr switch, 20dB in the rf stage and the remainder in the i.f. stages. It is a good idea to make the muting level in the i.f. stages variable so that the monitor level can be adjusted to suit band conditions: It is no good having an S5 monitor level if signals on the band are S9+!

Far and away the most important and most difficult objective of a break-in system is that it should switch between transmit and receive quietly. If the reader has not been impressed by break-in it is probably because this requirement was not met.

So much for cw break-in. A few months ago it occurred to the author that the same principle could be applied to an ssb system. If it could be arranged that the receiver was muted down proportional to p.e.p. output then it would be possible to listen on the channel in between syllables! There are bound to be some problems but it would be interesting to experiment with this idea.

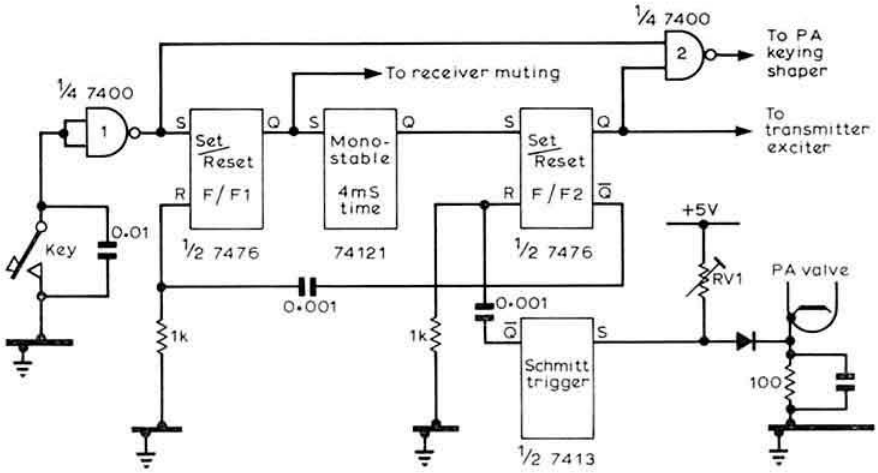


Fig 3. A sequencer to control the break-in system

TECHNICAL TOPICS

by PAT HAWKER, G3VA

AT the press review of the excellent Marconi Centenary Exhibition now open at the Science Museum (well worth a visit for anyone at all interested in the history of radio communication) I got into discussion with the editor of a well-known electronics journal. It was his view that Marconi was perhaps the last of the gifted, one-man inventors and that almost every major invention this century has come—and will continue to come—from scientists and engineers working in teams in professional laboratories. Emphatically this is *not* my view; *development* yes, that comes from teams but the really great innovations always from individuals (who may be part of a team)—and usually individuals who do not just have one isolated flash of inspiration but with a string of discoveries to their credit; yet who are not, at least to begin with, the orthodox academic experts in their subjects.

Understanding creativity

Although talent for innovation is possibly man's greatest asset, relatively little has been written about it, or about how one can encourage it. But there is an exception. I have recently been reading a fascinating 36-page booklet *Understanding creativity—a lightning course for executives* by Jack Nickle Smith (Mantec publications 1973) who happens to be a colleague of mine at the IBA and who has thought pretty deeply about the subject.

He points out that if you suggested that inventive genius is a combination of intense concentration and pure logic many people would believe you. In practice it is more often the exact opposite. Logic sticks to the rules and inhibits new ideas. This is not to say that orthodox minds are not necessary to society. But innovation is finding a new, creative solution to a problem; not all problems require such solutions, some *can* be solved logically but these are not the really great innovations.

Jack Smith suggests that the moment of illumination happens when the innovator is not consciously applying himself to the problem. Rather than "an infinite capacity for taking pains" a genius has "an infinite capacity for curiosity and daring thought". Innovators need comprehensive knowledge of their subjects, but not disciplined knowledge. "The classic idea of the mad inventor suggests he is crazy because he is an inventor—how about suggesting he's an inventor because he is mad?"

He believes that the would-be innovator should amass facts, "Just absorb, be curious, be fascinated, dabble with simple, childlike curiosity, be sceptical and regard scientific laws and social rules as gauntlets, not guides—collecting facts is 99 per cent of the process".

His mnemonic for innovation is *CLIC*: *c* for collecting facts; *l* for "letting it simmer"; *i* for inspiration from the subconscious mind; *c* for critical analysis—"Finally come back to common sense *after* you have ideas committed to memory or to paper, then apply cold savage judgement to see if they are any good".

In all this, he says, "Forget about method and discipline and the rules they hammered into you at school; indulge your imagination, pretend to be slightly mad—but keep a notebook not for solutions but for phrases, queries and doodles; become curious about people and things. You can't overload your brain with facts and fancies—your subconscious mind (where the new ideas are formed with virtually no reference to outside environment) will remember them: the bigger the ragbag the more surprises it contains."

Jack Smith emphasizes that "great discoveries are never accidental—although many are called accidents. If innovations were accidental they would happen at random and only once in a lifetime: all great innovators have a string of substantial discoveries to their credit: all were deeply involved in the spheres in which they made great breakthroughs but were not considered academically sound until their achievements became recognized: they were odd-balls, every one."

Of course we cannot and would not all wish to become great innovators, even in the field of amateur radio. But if we had more understanding of (and sympathy for) the process of creativity we would perhaps be less resentful of innovators

Receiver performance and wide-range mixers

In the April *TT* we referred under the above heading to an article "HF receiver reception failure factor" published in the January 1974 issue of *Point-to-Point Communication*. Subsequently, in common with all other recipients of that issue of *Point-to-Point Communication*, we received the following letter from the editor of that journal:

"*In the edition of* Point-to-Point Communication *dated January 1974 in an article entitled 'HF receiver reception failure factor', an account was given of the specification and performance of various types of receiver as compared with the manufacturers' specifications.*

"*We are now informed that certain of the specifications in relation to the receivers listed in the graphs and in Table 1 as A and B respectively, and in fact manufactured by Racal Communications Limited, were incorrectly quoted to the disadvantage of such receivers.*

"*Further it was suggested that those receivers did not reach the performance claimed for them in the specifications. We are glad to take this opportunity of withdrawing this imputation which was unfounded.*

"*We have now obtained directly from Racal Communications Limited the relevant specification figures for a revised article which will be sent to you as soon as possible. In the meantime we ask you as a matter of importance to withdraw the existing edition of* Point-to-Point Communication *totally from circulation.*

"*We apologise for the inconvenience and the embarrassment which has been caused.*"

(and most of us are) and less opposed to their ideas: opposition to innovation is almost always very real and very intense.

And if you want to check these ideas against a list of some of the important innovators in the fields of radio and electronics, here is one you may or may not agree with (it is an amalgam of several lists). At least two of these on the list were radio amateurs (Armstrong and Megaw):

E. H. Armstrong; J. L. Baird; H. Barkhausen; A. D. Blumlein; K. F. Braun; Sir William Crookes; Lee De Forest; T. L. Eckersley; T. A. Edison; Sir Ambrose Fleming; C. S. Franklin; W. W. Hansen; O. Heaviside; H. Hertz; I. Langmuir; R. von Lieben; Sir Oliver Lodge; H. A. Lorentz; G. Marconi; E. S. Megaw; A. Meissner; A. S. Popov; V. Poulsen; M. I. Pupin; A. H Reeves; H. J. Round; C. P. Steinmetz; N. Tesla; Sir J. J. Thomson; the Varian brothers; Sir R. Watson-Watt; V. K. Zworykin. Several other names probably need to be added to this list, for example in the semiconductor area.

Another look at swr

Last November I drew brief attention to the spread in recent years of a number of myths about standing wave ratios on aerial feeders, and included four comments from G8GI, though suggesting that really these needed some qualification in order to get a fuller understanding of swr. So this month we return to what is for every amateur a really vital subject.

For, unfortunately, there is little doubt that many amateurs still reject good aerials as bad on the basis of a moderate swr reading and conversely accept some poor aerials as good provided that they obtain a low swr reading. It cannot be said too often that it "ain't necessarily so".

And today there can be little real justification for any of us continuing to elevate the swr meter to a position it was never intended to occupy: since April 1973, *QST* has been publishing a series of long articles on "Another look at reflections" by M. Walter Maxwell, W2DU/W8KHK

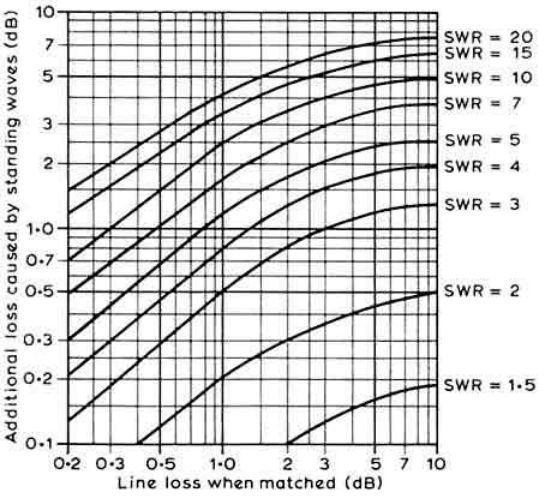


Fig 1. This graph shows by how much (or at hf usually how little) additional feeder loss occurs with a moderate vswr on the line compared with the same line having an accurately matched 1 : 1 swr

(April, June, August, October 1973, April 1974 and still continuing) that really goes into the whole subject in great detail and with tremendous expertise. He hammers away at all the serious misconceptions, including the one that there is a direct one-for-one relationship between a reduction in reflected power and a resulting increase in radiated power —in other words the idea that if you can stop any power from being reflected by improving the match between aerial element and transmission line (as indicated by a lower swr reading) then you get that much extra power radiating. It is just not true.

There are, as W2DU fairly points out, some good and valid reasons to be concerned with swr and reflected power in questions of voltage breakdown, power-handling capability, efficiency and losses, although for the amateur the more important question is how it relates to his line input impedance and transmitter coupling. But it has far, far less influence on how much power is being radiated than most of us believe.

In the second of his articles, W2DU provided a long check list of statements which he suggested readers should answer on a "true" or "false" basis. In fact all his statements required a "true" answer. His very revealing test list is abridged below—and most of us will find that some of the statements conflict violently with preconceived ideas. So remember these are "true" statements:

(1) Reflected power does not represent lost power except for the (usually modest) increase in line attenuation over that of matched line attenuation; in a lossless feeder line no power would be lost by reflection *no matter how high the swr.* Note that both the attenuation of the transmission line and the swr must be quite high to incur substantial additional loss. On all hf bands with low-loss coaxial or balanced cable, reflected power loss is usually insignificant; at vhf it may become significant; at uhf it may be extremely important. It is worth studying Fig 1 carefully.

(2) Reflected power does *not* flow back into a transmitter and cause excessive dissipation and other damage. The damage that is often blamed on a high feeder swr is usually caused by improper output-coupling adjustments and *not* by the swr. Valve/semiconductor pa overheating is caused by either or both overcoupling and reactive (mistuned) loading. In fact a transmitter does not "see" an swr but only the impedance that results from the swr: this means that the impedances can be correctly matched without concern for the swr on the feeder.

(3) *Efforts to reduce swr below 2 : 1 on any coaxial line generally represents wasted effort from the viewpoint of increasing the radiation from the aerial.*

(4) A low swr is *not* evidence that an aerial system is a good one or that it is working efficiently. On the contrary *a lower than normal* swr over a significant bandwidth is reason to suspect that a dipole or vertical aerial (not designed for broadband operation) is being affected by resistance losses. These may arise from poor connections, poor earthing systems, lossy cable or other causes.

(5) The radiator of an aerial system need *not* be of self-resonant length to achieve maximum resonant current flow, nor need the feed line be of any particular length. A substantial *mismatch* at the junction between feeder line and radiator does *not* prevent the radiator from absorbing all the real power that is available at the junction. Where suitable matching (atu, transmatch, etc) cancels out the reactance

presented by a non-resonant radiator and a random length of feeder, mismatched at the aerial junction, then the system *is matched* and all the real power may be radiated effectively. Relatively few mf broadcasting aerials are of resonant length; yet these radiate very effectively.

(6) The swr on the feed line is not affected by any adjustment of an atu or transmatch at the transmitter end, and a low swr achieved by this means is usually an indication of a mismatch between the transmitter and the input to the atu.

(7) With an effective matching unit and good open-wire feeder, a 132ft centre-fed dipole does not (contrary to general belief) radiate significantly more power on 3·5MHz than an 80ft dipole fed with the same transmitter power. Again, a dipole self-resonant on, say, 3,750kHz does not radiate significantly more power on 3,750kHz than it does on 3,500kHz or 4,000kHz with any normal length of feeder, although it is to be expected that the swr will rise to about 5 : 1 at these outer frequencies and that a coaxial feeder would then, in effect, be working as a tuned feeder. But note that proper coupling between the transmitter and the coaxial feeder, in these conditions, requires the use of a matching arrangement between transmitter and feeder.

(8) If the coaxial feeder of any aerial system requires to be a specific length to satisfy a specific matching condition, the same input impedance can be obtained regardless of the length of the coaxial feeder by the provision of a simple L-network of only two components (either two capacitors two inductors, or one of each).

(9) High swr in a coaxial feeder resulting from a severe mismatch at the aerial junction does not in itself produce common mode currents on the outer screen, nor cause the line to radiate provided that the feed currents in each wire are balanced and the spacing is small relative to the operating wavelength (this is equally true at vhf provided that sharp bends are avoided in the line).

(10) SWR meters do not provide a more accurate measurement of swr by being placed at the aerial/feedline junction.

(11) The swr in a feedline cannot be adjusted or controlled in any practical manner by varing the line length. If a meter provides significantly different swr readings when moved along the line, it may indicate "aerial" (common mode) current flowing on the outside of the coaxial, or an unreliable swr meter, or both; but *not* that the swr is varying along the line.

(12) Any reactance added to an already resonant (resistive) load of any value for the purpose of compensation to reduce the reflection on the line feeding the load will, instead, only increase or worsen the reflection. Lowest feedline swr occurs at the self-resonant frequency of the radiating element it feeds, completely independently of feedline length.

(13) Of the various types of dipoles (thin wire, folded, fan, sleeve, trap or coaxial) none will radiate more field than another, provided that each has insignificant ohmic losses and is fed the same amount of power.

Note that when an aerial element presents to the transmission line an impedance other than its characteristic impedance, the impedance offered to the transmitter at the input end of the line may be quite different from either the characteristic impedance of the line or (unless the line is an exact multiple of an electrical half-wavelength) the impedance at the aerial junction. The impedance represented by the line then depends on the length of the feeder (which acts as an impedance transformer). In such cases, unless a suitable

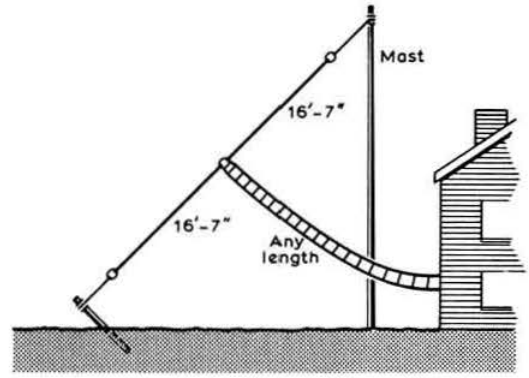


Fig 2. The simple "guy-wire doublet" which can make an effective aerial for 14, 21 and 28MHz. The balanced transmission line can either be a home-made spaced line or 300Ω feeder

matching network is interposed between transmitter and transmission line, the impedance may be of a value (in the form R + jX) with which the transmitter output circuit cannot cope: in other words it may not be possible to load the transmitter properly without changing the length of the transmission line: it is this factor, rather than any losses associated with swr, which leads to some wrong thinking.

If I could sum up all this block-bursting information in a sentence I would say that it should always be possible to make any centre-fed aerial of any length, with any feeder, radiate quite effectively provided you have a good matching atu between a transmitter that is intended to work into a low impedance and the feeder. This is why the old so-called centre-fed Zepp (really a centre-fed dipole) was such a dependable aerial.

Multiband dipoles

An example of how an understanding of the correct handling of swr in transmission lines can be put to practical use appears in a beginner article by Ed Tilton, W1HDQ, (*QST*, reprinted *Old Man*, No 4, 1974). This is a "guy wire doublet" with a sloping 33ft top making use of an existing mast or

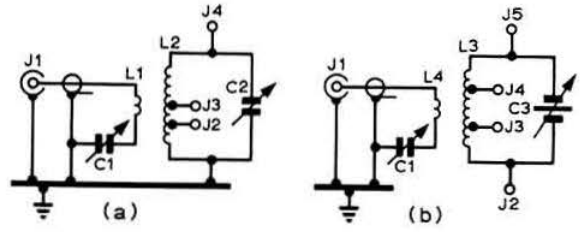


Fig 3. Typical atu or "transmatch" circuits. (a) for end-fed wires and (b) for either balanced feeders or end-fed wires, with balanced feed plugged into J2 and J5 or J3 and J4. The following values are those suggested by W1HDQ for 21 and 28MHz operation. C1 140pF, C2 as C1 but higher voltage type, C3 100pF per section split stator. J1 coaxial jack. J2-5 insulated tip jacks. L2 8 turns No 20 tinned 1¼in dia, 1¼in long, tap J2 at 2 turns, J3 at 4 turns and J4 at top end. L1 2 turns insulated hook-up wire, wound over bottom end of L2. L3 8 turns No 20 tinned, 1¼in dia, 1¼in long. Tap J2 and J5 at ends and J3 and J4 at 2 turns in from each end. L4 like L1 but wound over the middle of L3

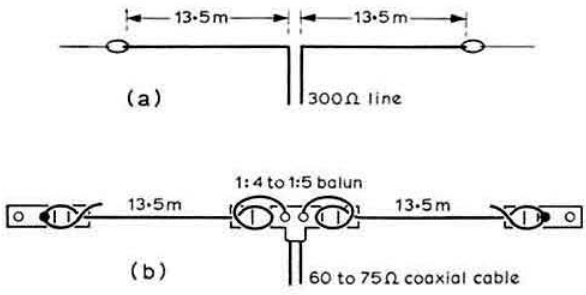


Fig 4. (a) The DL2ZF multiband dipole (element can alternatively be 2 × 27m). (b) The DJ4EL modification for use with coaxial feeder

tower, nothing fancy. But W1HDQ points out that with a suitable matching circuit at the transmitter end (eg Fig 3) it loads up nicely on 14, 21 and 28MHz: and if it loads up correctly it will radiate regardless of the swr and the conventional belief that the same dipole or doublet will not work on all these three bands.

Or again, the DJ2ZF multi-band dipole (included in *ART* and also *Radio Communication Handbook*) using a 2 × 13·5m element and fed with 300Ω line will work quite well on all bands from 3·5 to 28MHz (feed impedance is pretty near 300Ω on all bands from 7 to 28MHz, except for 21MHz where it is about 800Ω, but no matter). A recent version of this aerial but using 60–75Ω coaxial feeder with a 1 : 4 or 1 : 5 balun between feeder and element is described by DJ4EL in *Old Man* (No 3, 1974), see Fig 4.

Broad band travelling wave dipole

A new design for a dipole which when fed with 300Ω cable (or coaxial via a balun transformer as above) will maintain a vswr of less than 2 : 1 continuously from 3 to 15MHz and does not exceed 2·6 : 1 all the way from 2·3MHz to at least 30MHz was the subject of one of the papers at the Australian IREE Convention in Melbourne in August 1973 (an outline of some of the other papers was given in the April *TT*). This contribution was by Dr R. J. F. Guertler and G. E. Collyer and a digest has appeared in *Amateur Radio* (April 1974), the journal of the WIA. The aerial (Fig 5) consists of four sections: two 12·2m lengths of two wires spaced 1·8m apart by means of 25mm diameter aluminium tubes. A feedpoint tapering section brings these two wires to the feedpoint. At the other end of these sections are inductor/resistor networks connected to another line section 6·4m long. The networks consist of 16μH inductors in parallel with 330Ω resistors. Overall length of the aerial is 40·6m.

It is stated that the value of neither the resistors nor the shunt inductors used in the networks is critical: the inductor has a small effect on swr at the lf end of the range; but reduction of resistor values to 150Ω caused the swr to fluctuate considerably with frequency. No indication is given in the paper of how the wattage of the resistors should relate to transmitted power, but since these are in shunt with 16μH this could be fairly modest. So if you are still worried about swr readings here is one design that keeps it below 2·5 on all bands from 3·5 to 28MHz; and should provide omni-directional radiation.

AM/FM synchronous demodulator

Rick Sterry, G4BLT, adds to the recent ideas for using television integrated circuits for synchronous demodulators. This is based on the Motorola MC1351p which is essentially a low cost tv quadrature detector not unlike the better-known TAA/SAA570. By adding a switch it can, he suggests, be used also as a synchronous demodulator on a.m. (see Fig 6).

He writes: "In the fm mode, the input i.f. signal is limited and fed to one side of the product detector directly, and to the other side via a tuned circuit to give the 90° phase shift. With the MC1351p the C of the tuned circuit acts as a coupling capacitor from the limiter output, while the L is connected from the (phase-shifted) input of the product detector to a dc bias point. Thus, if C is removed from circuit, the L now forms an rf choke, dc biasing the product detector input without shunting any of the i.f. signal fed into it. The unlimited i.f. signal is now taken to this input, the limiter chain providing a synchronous bfo signal to the other product detector input. Adjustment of the input signal level will result in compatible af outputs on a.m. and fm, and this is best done by altering the tiny capacitor from the receiver i.f. output. Too large a value will detune the receiver i.f., so some sort of buffer would be required. The i.f. signal should be taken off the next-to-last i.f. stage of the receiver to avoid distortion of the fm.

"The beauty of the product detector is that by suitable tailoring of the af output, the *effective* i.f. bandwidth is reduced to something more respectable for a.m. Using a hi-fi amplifier, with treble turned fully down, the synchronous detector still outperforms the receiver's built-in diode detector one i.f. stage further on!

"This circuit should be handy for modifying, for example, a Pye Cambridge receiver which has rather wide i.f. bandwidth to start with. Such a modification would give an f.m. facility and improve signal-to-noise ratio on weak a.m. signals. The MC1351p has a built-in zener diode and can be

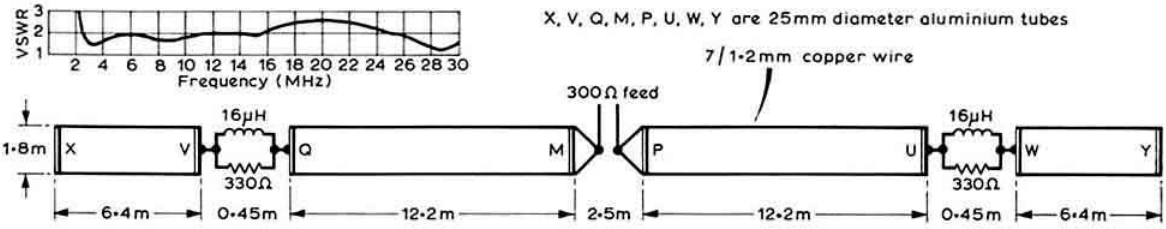


Fig 5. Broad-band travelling-wave dipole due to R. J. F. Guertler and G. E. Collyer showing magnitude of vswr over the range 2·3 to 30MHz

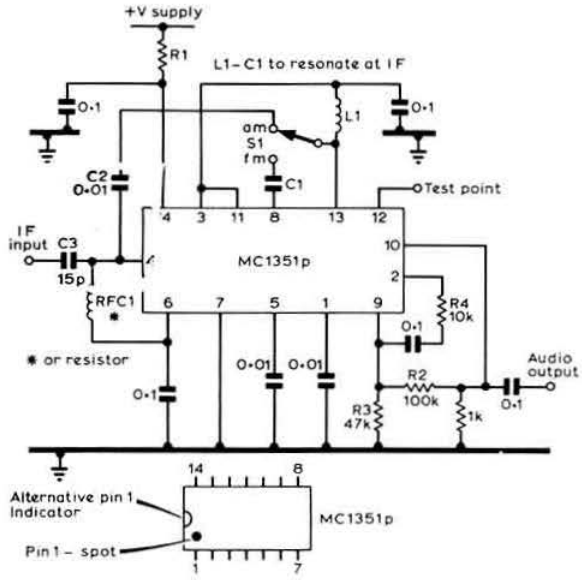


Fig 6. The combined a.m./fm synchronous demodulator by G4BLT based on the Motorola MC1351p integrated circuit. An alternative device is the National Semiconductors LM1351. Pin 14 is internally zener regulated at 11·6V so that R1 is given by:

$$R1 = \frac{V(supply) - 11{\cdot}6\Omega}{0{\cdot}031}$$

where the total current (including 5mA zener current) is 31mA. Audio stage gain is set by R2/R4, and R3 should be ½R2 for correct biasing. Connections to MC1351p are: Pin 1 vias decoupling point; Pin 2 product detector output; Pin 3 bias point for Pins 11 and 13; Pin 4 limiter input (internally connected to one product detector input); Pin 5 bias decoupling point; Pin 6 bias point for Pin 4, decoupled; Pin 7 negative supply; Pin 8 limiter output; Pin 9 audio stage input; Pin 10 audio stage output; Pin 11 zener bias point; Pin 12 test point; Pin 13 product detector input (*not* connected to limiter); Pin 14 positive supply

used with virtually any voltage; the af stage is a simple op-amp but with a level shift between input and output, so the gain is set by the ratio of two resistors."

G4BLT notes that there are problems in using a TAA/SAA570 in this way although G8FEV has successfully used one to provide synchronous demodulation on a.m.

The half-square aerial

In *TT* (July 1972) we included an aerial that had originally been described by PA0ZN as long ago as 1934 consisting of a $\frac{1}{2}\lambda$ top section and two hanging-down $\frac{1}{4}\lambda$ vertical sections. It was then pointed out that this arrangement had very close affinity to the Bobtail array (*ART* etc) with high-voltage points at the bottom of the two vertical sections. This particular design was voltage fed at the middle of the top section by means of the rather dubious unbalanced Zepp feeder arrangement.

It is rather interesting that this same configuration—now called a "half-square"—turns up in an article by Ben Vestler, K3BC, (*QST* March 1974) but with a different feed system and shown either by itself or with additional driven elements to form a very effective 3·5MHz dx aerial. K3BC

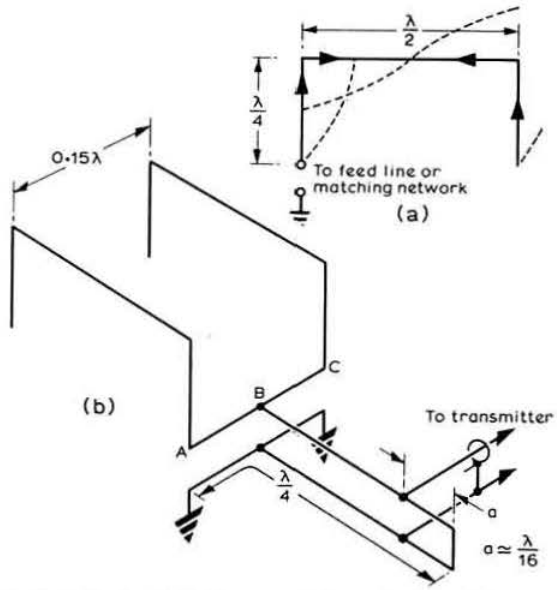


Fig 7. (a) The basic "half-square" element voltage fed at one end. (b) Two-element half-square with matching network giving greater gain and broader bandwidth

started using this arrangement when one section of his Bobtail (which once again is confirmed as a good dx aerial) had broken away without greatly affecting the feedpoint impedance and the remaining part was still giving good results.

Getting interested in this "half-square" configuration, K3BC then went further and added one (and then two) additional driven elements spaced about 0·15λ: see Fig 7(b). He found this gave consistently better results than the original Bobtail. This would seem to confirm the suggestion made by Fort Monmouth (*TT* March) that ground losses of vertically polarized aerials can be reduced by using additional elements. It would also be interesting to discover the relative proportions of vertical and horizontal polarization; in the Bobtail the horizontal radiation is partially cancelled out (at least in some directions). On the other hand, as we have noted before, there seems to be a lot to say for having dual polarized signals.

Intermodulation and semiconductors

In many items on semiconductor receivers of wide dynamic range we have stressed the importance of third-order and other intermodulation products (ip) developed in the front end. Two or three very strong signals passing through an amplifier can produce a fantastically large number of spurious ip signals unless the amplifier has impeccable linearity: see Fig 8. It has also been noted that the conditions on board naval vessels, where many transmitters and receivers are working in close proximity, are about the most demanding of any radio service, and of direct interest to amateurs subjected to a number of strong local signals.

A paper in *Proc IEE*, Vol 120, No 11, November 1973 by Dr J. A. Betts and Dr D. R. Ebenezer of Southampton University, "Intermodulation interference in mobile multiple-transmission communication systems operating at high frequencies (3–30MHz)", describes some highly relevant

investigations carried out in conjunction with the Admiralty Surface Weapons Establishment.

The paper, for example, deals in some detail with methods of reducing intermodulation products generated in steel and other ferromagnetic materials (this is, of course, the "rusty bolt" effect that can be a difficult-to-trace cause of tvi). It has been shown for instance that a non-linear ferrous material can be screened completely by cold spraying the surface with about a 0·004in coating of zinc, and that in other situations an improvement can be realized by optimizing the chemical composition of the steel.

But it also discusses the ip characteristics of a number of devices used in single-stage rf amplifiers as part of an investigation into "active aerials" to be used near to several transmitters. A succession of single-stage amplifiers using currently available low- and medium-power FETs, bipolar transistors and valves were built with input impedances that are high compared with the source impedance of the short monopole aerial; these were subjected to two-frequency excitation with each source developing an input level of 1V rms. The results are shown in the table.

3rd-order inter-mod levels for various single-stage amplifiers

Circuit configuration	Average 3rd-order inter-mod level Relative to fundamental level dB	Relative to 1μV dB
Source follower: BFS28	−50	+70
Emitter follower: BFR36	−80	40
Source follower: CP651	−80	40
Cathode follower: 807	−100	20
Emitter follower: 2N4128	−105	15

It will be seen that the only two amplifiers that emerged from this extremely severe test with flying colours were the 807 and a multi-emitter vhf power bipolar transistor type 2N4128, both of course being devices more commonly associated with transmitters than aerial pre-amplifiers (though I do recall 807 valves being used in aerial distribution amplifiers in certain receiving stations over 30 years ago). The 2N4128 in this test significantly outperformed the power fet type CP651.

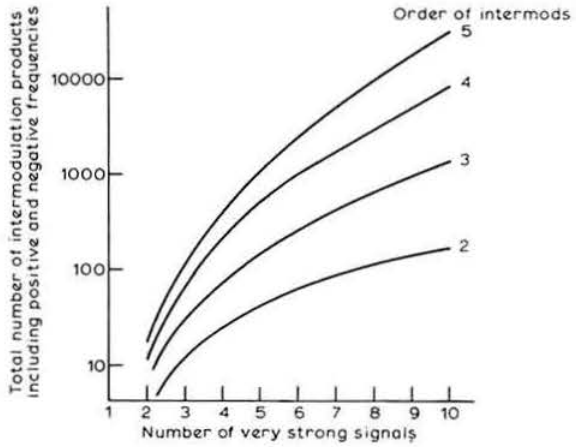


Fig 8. The effect of the number of extremely strong signals on the total number of ip products generated. Even these large numbers of IPs rather underestimate the position since it has been shown that orders as high as the 11th may be only 20dB below the 3rd order components. Lower order inter-mods are larger than the wanted signals

Another recent item for those interested in improving the dynamic range of vhf and uhf receivers is a note by Ed Tilton, W1HDQ, in *QST* (April 1974). He warns against too-casually assuming that a hot-carrier-diode doubly-balanced mixer in uhf front ends will always be suitable for weak signal reception. Oscillator injection *must* be adequate and spectrally pure, and the following i.f. stage must have the lowest possible noise figure (do not operate such a mixer directly into a hf communications receiver without a low-noise intermediate amplifier). Similarly the rf amplifier that is needed to get lower than about 8dB noise figure is important "Don't skimp on the quality of the rf transistor". It should also be added that it is no use having a wide dynamic range mixer if this is preceded by a high-gain amplifier of restricted dynamic range.

Here and there

Sven Weber, G8ACC, is very unhappy about the circuit diagram of the SM6DTN morse practice oscillator (*TT*, February 1974, Fig 8) and feels there are errors in this. A couple of alternative arrangements are shown in Fig 9.

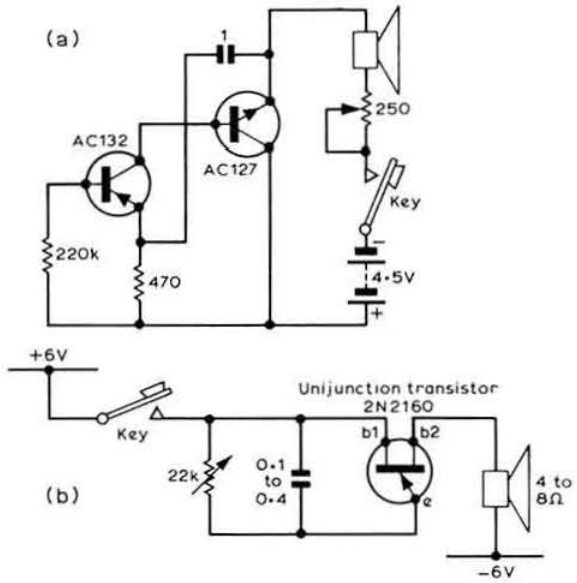


Fig 9. Two morse code practice oscillators. (a) described by ON6GB using complementary pair of transistors; (b) described by OH0-110 using unijunction transistor in relaxation oscillator

INTERFERENCE PROBLEMS

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

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

Building blocks for the novice

by SVEN WEBER, G8ACC*

Diodes, diodes and diodes — and some experiments with them

(Part 3)

Rectifier circuits

The simplest diode rectifier circuit is shown in Fig 15: an alternating voltage being applied to the diode and a load of 1kΩ. When the direction of the voltage is plus on the anode and minus on the cathode, a current will flow, but not the other way. This is called rectification, in this case half-wave rectification. This also means that the sense of voltage across the load is plus on the terminal joined to the cathode and minus at the other end, which explains why diodes are often marked with a + or a red band at their cathodes (see Part 1).

The maximum reverse voltage that can be applied to this diode (1N4001) is 50V and, because in this circuit there is next to nothing to store the charge, the rms input multiplied by $\sqrt{2}$ can equal 50, giving 35V rms approximately (the ratio of rms to peak voltage in a sine wave is 1 : $\sqrt{2}$ or 1 : 1·414). Measuring the voltage across the load, it may be rather surprising to see its low value if an ordinary voltmeter is being used. With roughly 50V peak input or 35V rms, only one half of the cycle is used and the peak voltage appears across the load only at a certain instant in the conduction time. But the effective mean output voltage because of that would be only half the average ac voltage, which would be $\frac{1}{2} \times \frac{2}{\pi} \times V_{peak}$ or $\frac{V_{peak}}{\pi}$, making 15·9V minus the voltage developed across the diode. The peak current would be more or less $\frac{V_{peak}}{R_{load}}$ or 50mA, but the average current would be only 15·9mA. In this circuit the regulation would be quite good as there is only the diode resistance and transformer characteristics in series with the load. But the voltage/current output is not in a form that can be used, or at least not often; although the pulsating dc can be used for small electric motors where it seems to have more control than smooth dc at low speeds. Try the above circuit and those following. To be safe, use a transformer that has two similar windings rated at 12V rms maximum.

The circuit in Fig 15 can be altered by putting a capacitor across the load of sufficient size not to have discharged to any extent by the next conduction period. If the load were not in circuit, the voltage across the capacitor would soon build up to the peak value of the input voltage, and the small load that is there will not affect this too much. In other words, the full peak voltage is across the capacitor all the time, and at the peak of the non-conducting part of the cycle the inverse peak voltage is added to the positive load voltage across the diode. So the diode has to stand 2 × V_{peak} or $2\sqrt{2}$ rms, which means a maximum rms input of 17·7V for a diode like the 1N4001. This gives an output voltage of 25 (taking 12V rms input, 17V appears on the load). This is more efficient than the circuit shown in Fig 14 considering the input/output voltages.

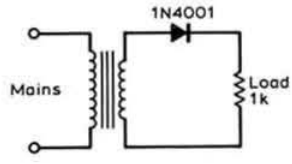


Fig 15. Basic half-wave rectifier

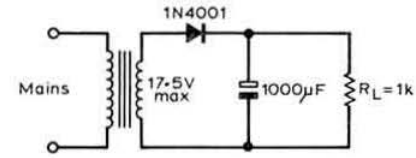


Fig 16. Half-wave rectifier with reservoir capacitor

But there are a few disadvantages: the diode current flows through the transformer and the peak current is considerably larger than the mean current. This can cause problems due to magnetization and, as one switches the circuit on, the diode sees the capacitor as a short circuit for a time, which may be long enough to burn the diode out. So a surge limiting resistor has to be included if the transformer winding resistance is not enough.

The regulation of this circuit is variable, depending on the load, the capacitor, the source resistance, the transformer and the frequency. But generally the regulation will stay within 10 per cent of V_{peak} if $2\pi f R_{load} C > 100$ (R in ohms and C in farads) assuming that the ratio of load to source resistance is above 100 : 1.

If an rms voltage of 35 were available and it was divided into two by a centre tap on the transformer, each separate half would go positive with respect to the centre tap at

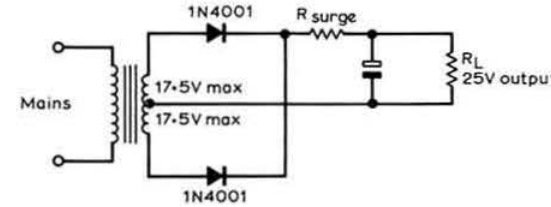


Fig 17. Full-wave rectifier circuit

* 132 Murray Road, Rugby, Warwickshire.

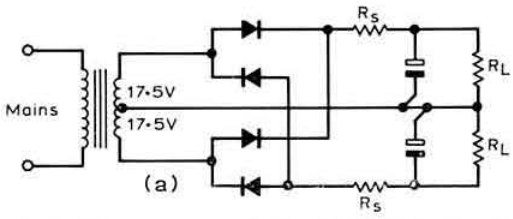


Fig 18a. Two back-to-back full-wave rectifiers make a bridge

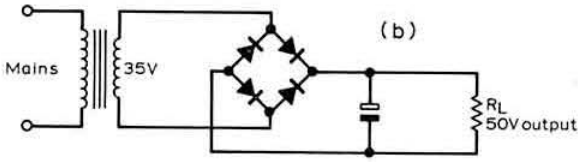


Fig 18b. Bridge rectifier

alternating times in each cycle. So Fig 16 could be doubled and the outputs added (Fig 17). Here the diode currents are considerably reduced compared with Figs 15 and 16, but the limitations on rms voltage still stand at $\frac{1}{2\sqrt{2}}$ times the diode piv rating (0·35piv). This circuit is called a full-wave rectifier. The dc currents in the transformer work in opposition so there is more than a possibility of making the transformer smaller for the same power output. Also the regulation is considerably better than that in the half wave circuit as the reservoir capacitor is charged up twice in each cycle. The output voltage will stay within 10 per cent of peak if $2\pi fCR_{load}$ is above 15 and the $\frac{\text{load}}{\text{source}}$ resistance ratio is above 50 : 1.

Using the circuit of Fig 17, add on another pair of diodes

TABLE 1

Type	Max rms input V related to piv	Vmean output	Imean output relative to diode rating
Half wave, no capacitor	$1/\sqrt{2}$	$\frac{V_{peak}}{\pi}$ or 0·445rms $-V_{diode}$	100%
Half wave, with capacitor	$1/2\sqrt{2}$	$\sqrt{2}$rms $-$ Vd	80%
Full wave with C	$1/2\sqrt{2}$	$\sqrt{2}$ rms -2Vd	160%
Bridge with C	$1/\sqrt{2}$	$\sqrt{2}$ rms -4Vd	160%

the other way round to get a negative supply (Fig 18a). As the mid-point on the load and the transformer are at the same potential, no current will flow along the link joining them so it can be removed; that is, assuming that everything is balanced. The resulting circuit is the standard bridge rectifier (Fig 18b). The total voltage across the load will be almost 50V and the peak inverse voltage across any diode can be doubled. This can be seen by putting back the centre tap link and considering it as a pair of full-wave rectifiers. Each has half the total rms voltage applied to it, and for half- or full-wave rectification the peak inverse is $2\sqrt{2}$ times that, and thus $\sqrt{2}$ times the total rms voltage.

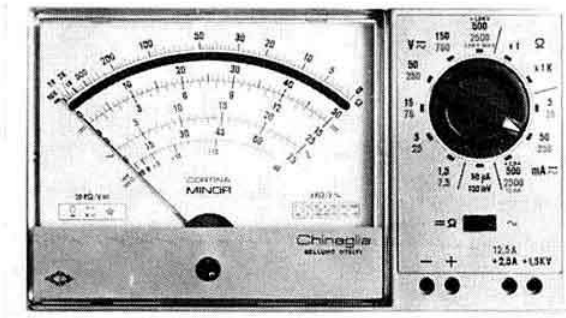
The current is also shared through the four diodes: $1\frac{1}{2}$ times the rated current can be drawn. This applies to the full-wave rectifier also, and similarly the bridge has inherently better regulation than the half-wave circuit. One other feature about the bridge is that it can be used as a dc switch. Many units using transistors are "reverse polarity protected", which means they have a diode in series with the supply line. If a bridge were used, it would not matter which way round the supply was, the result would be the same. Portable gear used in cars would be more versatile—unless the equipment had, say, a metal case connected to one rail of the supply, when things could get a bit awkward.

Part 4 will deal with voltage multipliers.

New product

Another multimeter from Chinaglia

The Chinaglia Cortina Minor multimeter is a pocket-sized multimeter providing 24 ranges for the measurement of dc and ac voltage and current with two resistance ranges. The input sensitivity is 20kΩ/V on dc and 4kΩ/V on ac. The maximum voltage that can be measured is 1·5kV on both ac and dc. For ohms measurements two 1·5V batteries are required. The Cortina Minor is housed in a tough plastic carrying case and is complete with combined test leads and probes.



Priced at £13, including VAT, further information on this multimeter can be obtained from Chinaglia UK Ltd, 19 Mulberry Walk, London SW3. Tel: 01-352 1897.

Catalogue received

The publishers of *VHF Communications* have produced a catalogue setting out the details of their kits and components offered in connection with the designs featured in articles which have appeared in the magazine. There are, in addition, details of modules, aerials and converters obtainable from VHF Communications. Copies of the catalogue are available from the UK agents, VHF Communications (UK) Ltd, 11 The Broadway, Kingston Road, Staines, Middlesex.

MICROWAVES—1,000MHz and up

by DAIN EVANS, G3RPE*

3cm activity

The generally pleasant weather over the Easter period certainly stirred up activity on this band. While G3KSU on the Isle of Wight and G3WJG/P on Guernsey were winning their Microwave Awards the hard way, as reported last month, parties were up the Welsh and Scottish mountains also working the dx.

GW4AMV, GW3PPF, G8FGD and GW3WBU took equipment up Pen-y-Fan in Breconshire to test with G2RY and G3VPF on Beaminster Down in Dorset, a land path essentially of about 130km. Good-strength signals were exchanged: G2RY's signals were still readable even with a 20dB attenuator in the aerial line, and G3VPF's with a 40dB attenuator. The Welsh party intend to return to the site for the June contest: for those who wish to plan paths, the NGR of the site they will use is SO 229 288, and the height is 2,600ft asl. GW3WBU is described as a newcomer to microwaves but an old hand at mountains. With the sort of weather we tend to get for contests, he clearly has his priorities right.

After a number of tests over increasingly long paths, the Edinburgh group went for the double top on 21 April. GM8BKE, GM3DXJ (who is known as our Scottish correspondent) and GM3FYB, together with GM4BWT and GM8HEY, all went north to Cairn o' Mounth (1,488ft asl), and GM3OXX came south to The Cheviot (2,676ft asl) turning himself into a G in the process. All three stations worked G3OXX over the 165km path at signal strengths ranging from 5/4 to 5/8, whatever that means, and so can claim their Microwave Awards. According to my sums, that makes six award claims in three weeks!

An important feature of all this activity is that the equipment used, with perhaps one exception, can only be regarded as being of low power. The GMs used Gunn oscillators of 10mW nominal output to 15in or 2ft dishes, and G2RY a Gunn oscillator to a 20dB horn. The largest equipment used was that by G3VPF, and this was a 1W klystron to a 20dB horn. Of special interest was the transceiver used by GM3OXX which uses a Gunn oscillator as a transmitter/self-oscillating mixer. This is as simple an equipment as can be conceived: he is already under pressure to write up the design.

Background material on microwaves

WIDTY of *Ham Radio* particularly recommends *Very High Frequency Techniques* which was reprinted by Boston Technical Publishers, Cambridge, Mass, in the early 1960s, especially for frequencies up to 4GHz. He also has found useful the *Microwave Engineers Handbook* referred to in an earlier column.

G8FCP has found two books to be most usable in the design of filters: *Impedance Matching Networks and Coupling Structures*, McGraw-Hill, and *Handbook of Filter Synthesis*, Zverev, John Wiley.

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

A simple preamplifier for 23cm

Conventional diode mixers used at this frequency tend to be rather difficult to optimize without elaborate test equipment, and consequently many converters employing this stage as the front end may have noise factors several decibels worse than the nominal value of the mixer diode. A preamplifier, even if it has the same noise factor as the mixer diode, can pick up most of these decibels if it has moderate gain. If the preamplifier has a lower noise factor and is mounted at the aerial it is quite possible to improve the overall noise factor of even a quite good receiver by more than 10dB, a very worthwhile improvement for a modest outlay.

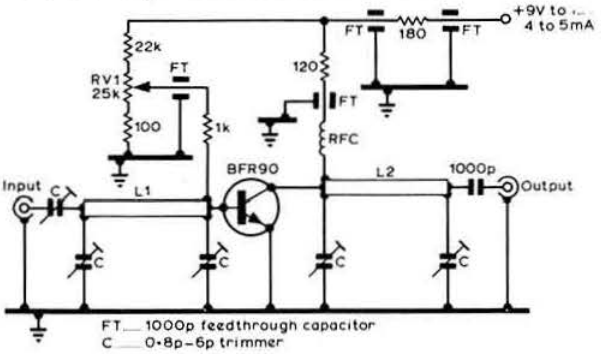


Fig 1. A simple 1,296MHz preamplifier circuit

G4BEL has sent in details of the preamplifier he has used recently, and with which he gained the coveted Supreme Award. It is based on the BFR90 transistor which is available currently for under £4. The noise factor is nominally 5dB at this frequency, and the preamplifier gain is about 8dB. The circuit and layout are shown in Figs 1 and 2. The transistor is mounted in a slot in the screen at the same height as the trimmers to ensure that its leads are as short as possible. It is important that the trimmers should have the low minimum capacity specified. RV1 should be adjusted to set the current taken to 4–5mA.

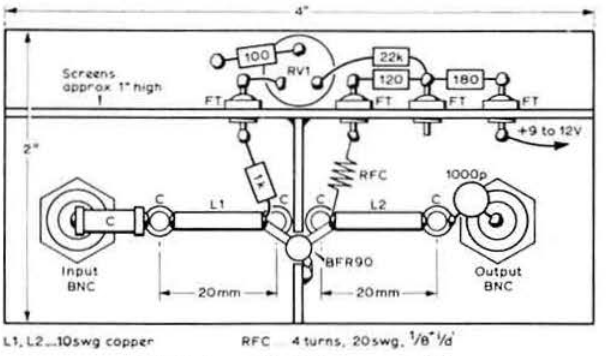


Fig 2. Layout of the preamplifier

New UK 10GHz record

On 11 May, GW4BRS and GM3OXX set a new UK record distance of 243km which beats by a handsome margin the existing G8AZU/G8CKT record of 212km set up last September.

GM3OXX with GM3DXJ again defied the weather, rain, hail, sleet and fog, to get themselves and their equipment up Cairnsmore of Carsphairn (NGR NX595 980, 2,614ft asl). At the same time the Barry Radio Society group, GW4AMV, GW3PPF and GW8FGT made their way through more continuous rain and fog to the top of Snowdon. Quite reasonable signals were exchanged: the Scottish signals were reported as being about 10dB over noise, and the Welsh as S2 with QSB.

The equipment used was quite small, nominally 10mW Gunn oscillators to dishes 2 or 2½ ft in diameter. A rough check on the sums suggests that the equipment had a path loss capability of 165–175dB. The calculated path loss for the distance assuming the free-space value is 161dB, so the calculated reserve is 4–14dB. This predicted value agrees quite well with the actual signal strengths reported and this implies that both the equipment must have been working well and that the actual path loss could not have been much greater than the free space value.

GB3PI Mk 2

by J. R. EASTEAL, G8AYS, for Pye Telecommunications Repeater Group

AFTER 18 months' operational experience of the GB3PI repeater experiment it has been decided to replace the repeater with a second version with slightly different operating procedures. The number of people using GB3PI having progressively increased, the Pye Telecommunications Repeater Group believe that it has become necessary to introduce a little more discipline on operating procedures: at times it has become difficult to call in due to lack of gaps between overs and at other times people have almost fallen asleep listening to monologues! An explanation of the new operating system follows; in very few cases will modification to equipment be necessary.

After an initial tone-burst of 1,700Hz for 200ms the new repeater will relay a user's signal for 1min; after that minute it will stop relaying the modulation, send its callsign and close down. If the repeater does shut down for this reason, a pause of 1s with no carrier on the input frequency is necessary before it can be re-accessed.

When one user has finished his over, the next has a choice:

(*a*) to transmit immediately, in which case only the remainder of the previous user's 1min is available, after which the repeater will close down. The repeater has not recognized that a different station is now transmitting despite the tone-burst; or

(*b*) to wait 1s for the repeater to send K (– . –), when a tone-burst can reset the repeater for 1min. This enforced gap is to enable other stations to call in.

After the K bleep there is a 6s time-slot during which the repeater may be re-accessed for 1min, after this 6s the repeater callsign is sent and the repeater closes down. From this it can be seen that a second tone-burst while a user is transmitting will have no effect, as the user can only have 1min each time.

These are the only changes in operating procedure for a station equipped with a tone-burst, but for stations without a tone-burst there is another change. In the past some stations new to the repeater have whistled into the microphone to access GB3PI, some can whistle 1,700Hz but many use a gliding whistle; in future a gliding whistle will not access the repeater. A tone notch is included in both the Mk1 and Mk2 repeaters to stop the access tone annoying listeners and as an aid to setting up the access frequency. Stations without a tone-burst will still be able to use the repeater by asking another station to finish an over, wait for the K and access again, to give the unequipped station a full minute.

GB3PI Mk2 Specification

Receiver		
Frequency	145·150MHz	
Sensitivity	27dB quieting for 1μV emf	
Squelch setting	0·3μV emf	
Recommended deviation	5kHz	
Audio inhibit deviation	6kHz	
Access tone	1700Hz ± 10Hz at 2·5kHz deviation	
Transmitter		
Frequency	145·750MHz ± 200Hz	
Output power	30W (10W on battery power)	
Peak deviation	5kHz	
Hum and noise	<−45 dB relative to 5kHz deviation	
Tone frequencies	K	2,184Hz
	Callsign	1,092Hz
	Battery operation	546Hz

Many stations do not have access to a deviation meter and consequently a variety of deviations can be heard on the air. GB3PI will now include an over-deviation detector which inhibits the relayed audio for 1s if the peak deviation exceeds 6kHz; this will prevent re-radiation of signals distorted due to high peak deviation and hopefully the transmitting station will be quickly informed. Users are asked to keep their deviation below this level; most deviation controls being linear it is easy to set deviation to the correct level.

Occasionally GB3PI has been off the air due to power failures, as after even a short power break the repeater has to be switched on again because of the fail-safe circuitry. The new repeater will change to battery operation in the event of a power cut, and in this condition a 546Hz pulsed tone will be sent and the transmit power will be reduced from 30W to 10W to conserve battery life.

As part of the experiment the repeater may occasionally revert to its present mode of operation with repeat tone-bursts resetting the 1min timer and no K bleep in operation.

The actual date of the changeover has not been decided at the time of going to press and it is unlikely that advanced notice of the change will be possible, except perhaps through GB3PI and GB2RS. It will, however, be obvious that the change has been made; the callsign will be sent as de GB3PI, it will be slightly faster and higher in frequency and the K will be included, and the user will probably run out of time at first.

FOUR METRES AND DOWN

by JACK HUM, G5UM*

Ledger lines

In the ledger kept by the VHF Awards Manager to record the issue of FMD Certificates there is a section called "Microwaves" which has pages for 13cm contacts made beyond 500km, 9cm contacts beyond 400km, 6cm (over 300km), and 12mm contacts exceeding 150km range. On none of these pages is there an entry to date.

Between the 6cm and 12mm pages is one headed "Microwave Award 3cm (for contacts beyond 150km)" on which appear 15 entries—five of them added this year.

The absence of claims for 13, 9, 6cm and 12mm may be because some of the path lengths to be covered before an FMD claim can be made are off-putting or perhaps concentration on 3cm has precluded attempts at dx on the other centimetric bands. Or both.

What is evident from the lines in the ledger is the popularity of 10GHz. Here activity has bred activity, and success has led to success as enthusiasts put others on to likely sources of equipment and information, and the overall illumination provided by Dain Evans in "*1,000MHz and Up*" has shown paths ahead which, without this guidance, might seem obscure to the amateur about to have a go at microwaves.

It is for the G3RPE column to discuss the detail of recent successes; it is the job of this column to record them. Here they are, all for portable operation (as is each of the 15 entries in the 3cm page of the ledger): 3cm Certificate No 11 to Alan Williams, G3KSU/P, for working GC3WJG/P on Guernsey, operated by G. D. Lean, over the path length of 161·7km, believed to be the longest two-way non-optical contact yet established in the UK (probably in Europe) on 3cm. Just before this contact took place at 1015gmt on 31 March, GC3WJG/P had worked G3RPE/P on the S Devon coast to notch the first GC-to-G record on this band over a QRB of 114·4km. To GC3WJG/P goes 3cm Certificate No 12 for the contact with G3KSU/P. This was set up by rotating the 4ft dish from the G3RPE/P bearing round to the Isle of Wight bearing, an operation requiring precise alignment.

Less than a month after the above G-to-GC record was set up, a group of microwave enthusiasts further north attempted to break down the GM-to-G path. This is how their successes, achieved on 21 April, appear in the awards register: 3cm Certificate No 13 to GM3DXJ/P for working G3OXX/P; No 14 to G3OXX/P for working GM3DXJ/P; No 15 to GM8BKE/P for working G3OXX/P and No 16 to GM3FYB/P for working G3OXX/P.

More about moonbounce

Prompted by "Lunar reflections" (*FMD* April) and by the news last month of G3LTF's e-m-e world record, G8ISD of the North Staffordshire Polytechnic wrote in about a large constructional job which one of the members, G8CJN, has been engaged upon these last eight months.

As part of his final year project, G8CJN has been building a 20ft diameter dish for e-m-e work. Tough plywood strips form the ribbing, and chicken netting the reflector, the whole mounted on a wide triangular structure of aluminium scaffold poles to raise it well off the ground, and at the same time to impart great rigidity. Technicians in the college workshop built the array in five weeks, complete with a mount to enable it to be orientated to the correct skyward bearing. In spite of its size the weight is not excessive, an important factor to consider when moving it from site to site.

G8ISD tells us that the gain of the dish is about 26dB. Incoming signals pass through a high-Q filter into a low-noise pre-amplifier ahead of a Microwave Modules 432MHz converter and so to an FRDX400 i.f. strip. It was appropriate that among the first e-m-e signals to be heard were those of G3LTF, for the group were indebted to Peter Blair for much help and advice and, as they put it, ". . . the use of his magic fingers in curing instability in the pre-amp".

Now a G8CJN strip-line pa is coming along, using a couple of 4CX250 valves, in the hope that an e-m-e contact will be realizable before too long.

Contest commentary

As if stung by the reproaches of the VHF Contests Committee about "old hat" standards on 4m, the fraternity turned out in force for the April contest wearing a lot of new ones. And the heavy occupancy, enhanced by the good conditions, gave a foretaste of how it is likely to be on the next VHF NFD.

Crowds of sidebanders were on, happily working cross-mode. Even more telegraphists were on—and plenty of them asserted afterwards that the quantity of contacts made would have been halved if no key had been available.

To many, the sensation of the day was GI3FFF/P, working well down to the Home Counties from a site near Larne and notching 50-up by lunchtime, nearly all A1. And a couple of GW portables were offering the new counties of Powys and Gwynedd.

Most of the portables conformed well with the Code of Practice for VHF Contest Operation (p 36, January issue), at least so far as signal quality was concerned; but there is reason to believe that at least one group blissfully used a prime site ignorant that another group already held a permanent booking for it. Luckily group two had decided to go elsewhere that Sunday, but if they had not. . . .

This month there is another chance to show what 4m is made of; following the 2 June portable event three weeks later come the 432MHz Summer Cumulatives; "seventy centimentalists" have been known to arrange their summer holidays so as not to miss them.

Last year's VHF NFD record (by GW3PYE/P) of 375 stations worked on 2m in one contest was handsomely exceeded in the 144MHz Open last month. Well over 400-worked were on the RSGB logsheets of some of the GW portables when they pulled switches at 5pm on the Sunday afternoon. There was one reason for this: the tremendous increase in the use of ssb. One of the groups visiting Wales reported afterwards that of their 400-plus contacts, more

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

than 350 were on A3J all at the low end. A prominent S Yorkshire station which almost reached 200-worked notched 118 of them on ssb again all at the low end. And so the tale could be repeated nationwide. What is more, time was saved and QSO-rates greatly speeded up, because with almost all the ssb in the new A3J area at the bottom of the band, there was no need to waste valuable contest minutes by shifting to the old 145·41 spot. Truly, the band plan of the 'seventies had established itself with a bang, and things on 2m can never be the same again—only better.

Interested in a "Worked all Britain" certificate? You could rate for one by entering the WAB VHF Phone Contest on 30 June, 0900–2100gmt. A copy of the rules may be had by sending an sae to G3ULH or to G4BRY, R. L. Senter, 10 Toll Bar Av, Bottesford, Nottingham NG13 0BB.

"Now where was I ?"

Further to the May 144MHz Open event, Doug Abbott, G6TA, makes a trenchant point about the way people identify themselves in contests. He says: "While it is reasonable for a portable station perched on the top of a Welsh mountain to give his QTH as, say, 6km west of Wrexham, it seems to me quite pointless for an operator working from his home QTH not to say where he lives but instead to say he is some distance from somewhere else."

He goes on to cite several instances overheard during the 144MHz Open where fixed station operators used up a lot of syllables and wasted valuable contest seconds by identifying datum points which were many kilometres away from the *Callbook* address. "I always give my QTH as Streatham, London, and never experience any trouble," adds "Toc Ack".

Many years ago the VHF Contests Committee knocked QTH absurdities firmly on the head when they denounced stations which gave their locations as, for example, 392 miles south of Edinburgh when they meant London. That, of course, was in the dear dead days before the concentric circles formula introduced precision into contest calculations. These considerations may well be borne in mind by VHF NFD planners when they decide what QTH they will give during the September operations. There is nothing to beat a clear and unequivocal statement of one's position related to the nearest large object (eg Leicester) if one is in fact not already in it (eg, Streatham).

Expeditionary time

Few operators have done more than Peter Lennard, G3VPS, to help others collect the more difficult counties for the 70MHz Transmitting Award, itself not easy to attain because of low occupancy in those areas (no G8-plus-three men around). Last year his well-planned expedition and unfailing QSL policy brought rare GW cards to many who were awaiting them.

This year he will be GM3VPS/P with operation in **Angus** on 10/11 July, **Kincardine** on 13/14 July and **Aberdeen** on 16/17 July, primary frequency 70·33 with 70·16 as alternative, cw and A3, from 1830gmt onwards. Schedules are offered: drop 'VPS a line at 20 Salternes Drive, Hailsham, Sussex. On the way north he will stop over in Cumbria and/or Northumberland to activate 4m during the Jubilee Contest of 6/7 July, on the band that Saturday evening and all day Sunday.

VHF BEACON STATIONS

Callsign	Location	Nominal frequency	Emission	Aerial direction
GB3ANG	Angus	145·95MHz	A1	SSE
GB3CTC	Redruth, Cornwall	144·13MHz	A1	ENE
GB3DD	Dunstable Downs	1,296·05MHz	F1	N
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
GB3LDN	S. London	1,297·950MHz	F1	E/NW
GB3SC	Sutton Coldfield	432·025MHz	F1	N/S
GB3SU	Sheffield (temporary location)	70·695MHz	A1/F1*	Omni†
GB3SX	Crowborough	70·699MHz	A1	N
GB3VHF	Wrotham, Kent	144·15MHz	F1	NW†

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

† Temporarily inoperative.

Just a word about sked spots: 'VPS welcomes them on any of the above evenings but could fit in a few during the day if operators wish, and will state their preferences.

Another out-of-the-ordinary expedition in Scotland is a one-day stand on 16 June on 2m, organized by Bill Jarvis, GM8APX, who is head of physics at Rannoch School. In company with GM3PTI, GM3WFJ and several of the young SWLs from the school, he proposes to test the coverage that would be achieved if a repeater were to be set up just off the A9 near Blair Atholl on a 1,000ft site. He hopes also to have 70cm facilities available that day, and adds: "In particular, we want to collect evidence to confirm the belief that vertical polarization suffers more attenuation in wooded areas because of the greater average conductivity in the vertical direction". He invites any users of 2m who might be in that part of Perthshire on 16 June and would find the experiment interesting to contact him for a schedule (tel 08822 379). It is worth adding that Rannoch School has a grant from the Royal Society for the investigation of the propagation of weak signals in mountainous areas.

During the Jubilee VHF Contest on 6/7 July the Oxford University Radio Society will have GM3OUR/P operational in one of the counties of SW Scotland with 100W of A3J as well as a.m./fm/cw in the 2m band. In the following days they will activate Kirkcudbright, Dumfries and Selkirk and welcome skedspots at any times. Write to D. D. Price, G4BIX, St Edmund Hall, Oxford.

Right now the GM3JFG/8AGU expedition should be in full swing through to 7 June. The operating schedule is: evenings 1900–1930 on 144·17 ssb, 1930–2000 on 144·05 cw, 2000–2030 ssb and 2030–2100 cw once again, all transceive only. Then QSY to 70cm at 2100 until 2300 for A1/A3/A3J on 432·15. Early morning operational times are (excepting Sundays) 0700–0715 cw on 144·05, and 0715–0730 ssb on 144·17, then over to 70cm for cw/ssb on 432·15 from 0730–0745. Says Paul Widger about this latest in an always well planned annual series: "On 70cm we can listen on our own frequency continuously and simultaneously tune 432·0–433·5. If calling on our frequency do so on any mode (cw or ssb preferred) and net as accurately as possible as our rit range is restricted on 70cm. We can transmit a.m. on 70cm for operators having trouble in resolving ssb. When operating on 70cm we will keep 144·17 open as a talk link."

Four members of the University College of North Wales Amateur Radio Society are planning a 70cm dxpedition to the Scottish border counties in late September. It is hoped to use at least 10kW effective radiated peak envelope power, and a masthead pre-amplifier having a noise temperature no worse than 200°K. The aerial system will be four 46-element Multibeams. Calculations suggest that, without any lift in conditions, ssb communication should be possible with reasonably-sited stations in the south-east of England who can muster a couple of kilowatts of erp and a respectable receiver. More about this ambitious project, which should certainly give a shot in the arm to 70cm long-haul, will be released well before the actual dates.

A further airing for 70cm is to be given by GW8IMB, who with GW8COP will be operating from the new county of Clwyd (you turn the beam on to Flint) during an extended period of the University vacation. Every Wednesday night 8pm to midnight from 3 July until 25 September GW8IMB/P will be on 432MHz a.m., and there is a distinct possibility that 23cm will be available later in the session. Skeds are welcomed via GW8COP, QTHR, who himself will operate 144·2 sideband during the same expedition.

Far to the south Peter Wallis of Walton-on-Thames will be found on Guernsey as GC3YJI/P during the Jubilee VHF Contest of 6 July and thence through until 18 July, both dates inclusive. He is taking an FT101 and a Europa, so look for his A3J from the bottom end of 2m upwards.

The good QSL returned promised by all the foregoing expeditions should assist the flow of FMD Certificate claims and issues.

Too uniform ?

During a year's collecting of pasteboards (only 25 per cent returns, sad to say), Mike Cook, G8HBR, of Manchester, found a certain sameness about QSL designs that prompted him to have a go himself. He used a bleached-out close-up portrait of himself to make an inexpensive line block to go on the front of the card alongside his callsign. All station details go on the back. He believes that a departure from standardization will brighten up QSLs and perhaps increase the volume of returns.

He offers the practical suggestion to members who do not feel they possess sufficient artistic expertise to design their own that the art and design departments of many local technical colleges might well show themselves keen to take on such a project.

Hill-top forays earn parchments

Of April issue's reported FMD certificate awards no fewer than five related to portable operation. This month, another: Mike Diprose earned himself Certificate No 386 in the 144MHz Transmitting bracket by putting G4AKA/P out on to the Surrey hills in a sustained effort to acquire the five-plus-30 cards in short order.

How short? A matter of 13 weeks in the summer of 1973; and eight forays did the trick. But it was seven months later before enough verifications had come through to enable the claim to be made. Some trickled through the bureau. Many came in direct response to an sae and, as 'AKA puts it, ". . . a polite request on the card explaining why I would like a QSL".

The reaction to this request was unanimously favourable. It disclosed that many operators do not trouble to have QSLs of their own printed, but were quite prepared to verify contacts by letter. Among the "QSLs" turned over by the VHF Awards Manager were half a dozen letters, not cards, of confirmation. And almost everyone wished Mike Diprose the best of luck in his attempt to win the award. Some even returned the sae. "I would be grateful if you would thank all those who QSLd for the claim," he adds.

Going out portable like this is not by any means wholly a card-collecting exercise. The G4AKA/P operations disclosed much useful data about propagation conditions on 144MHz, notably an evening lift that started an hour or so after sunset, when the band would suddenly come alive with northern stations engaged in local contacts. Twenty minutes later they had all faded out, as the temperature inversion which brought them into audibility itself dispersed.

Good sites and a gainy 8-element aerial were the recipes for success, not blockbusting QRO machines. In fact, the Pye "Cambridge" sender mounted in the car boot took no more than 12W dc input. Unlike many users of this device who condemn themselves to fixed channel working, Mike Diprose disconnected the receive strip and used a variety of separate converters with either an EC10 or a Heath GR78. The same philosophy is observed with a newly-acquired Liner 2: although its built-in co-channel facility will be useful, especially in sideband-to-sideband contacts, it is to operate in the split-frequency mode for much of the time during this summer's operations out on the hills, in conjunction with the existing separate converter and tunable i.f. strip. And if this technique fails to produce a large number of cross-mode contacts then the fault will lie with operators who cannot receive A3J through lack of bfo, as was observed here last time.

A final point relating to the QSLs sent to portable operators: always ensure that the significant "Stroke P" is added to the addressee's callsign. Mike Diprose showed us three QSLs that addressed him simply as "G4AKA" and consequently were not valid for his claim for G4AKA/P—which is a different station. He had taken the precaution to send plenty of spares for his five-plus-30!

. . . and the rest of the parchments

A nice "double" for John Reed of Luton: two claims in respect of G3ZMD for Senior Awards arrived simultaneously. Now the 70MHz Senior Transmitting No 16 and the 144MHz Senior Transmitting No 52 have been dispatched to G3ZMD, who, with eight-plus-42 already collected on 432MHz, is well in the running for a "Supreme". All contacts towards the 4m and 2m Seniors were made on cw and

a.m. using modest transmitters (40W and a 4-el and 60W with a 10-el) from a good site. And as a commentary on contemporary operating techniques, John Reed says: "I found some means of variable frequency control pretty essential . . . a 12MHz vfo on 2m and a vxo on 4m. By this means many ssb stations were worked, often using cw, co-channel." He pays special tribute to the expeditions of and unfailing QSLs from G3FDW, G3VPS, GM3JFG and G8AGU, to which many readers will be inclined to add "And so say all of us".

Another Senior, No 51 for 144MHz Transmitting, goes to John Matthews, G3WZT, who found himself in the remarkable position of holding cards for 21 countries (15 required) but not enough cards for counties (60 needed) until at last the final straggling UK cards turned up. Why so many countries? Because G3WZT is a great meteor-scatter man, and HG, I and OK were collected by that mode. Another seven were by Ar. Signal source is an ssb/cw transverter 14/144MHz into a single 4CX250B into a 10-el.

Standard awards go to another Lutonian, G4BMM, who receives 70MHz No 109; and to G3YOZ (383), G4BYP (384), DK4QE (385), G4AKA/P already mentioned (386), G8EYV (387), all for 144MHz. On 432MHz No 106 to G3XJS, 107 to G8CKV. And a special word in reference to No 108 which goes to G8GNE: the performance of Vernon Cracknell, out on a metre-wave limb at March in north Cambridgeshire, gives the answer to the people who so often ask: "Is it worth my while getting going on 70cm?" From a site only 11ft asl he collected the needful three-plus-20 using nothing more than a 3/20A tripler and nbfm feeding about 5W of rf to the 46-element Yagi at 52ft up. Undeterred by site and remoteness he now plans to have a go not just at the 432MHz Senior Transmitting but at the 23cm award into the bargain. At the risk of repeating what has been said in *FMD* many times in the last half-dozen years: "Has *your* club considered transferring net activities from 2m to 70cm?" More of this next time: but one would be glad to hear from groups and clubs which have already done so. The example of G8GNE shows how easy it is.

What they say

"G3WPO and I had a busy day at our stall at the Whitton Convention on the Saturday, gave out many thousands of sheets of paper on Oscar operation and talked ourselves to a standstill. Quite a worth-while weekend, we thought"—G3IOR.

"VHF Convention went all too fast . . . many visitors looking at the BRS15744 propagation model recalled the work done by G6DH and G2YL in the early vhf days on the hissing phenomenon and its association with band conditions from 28MHz up. I am at present writing an article on these early amateur achievements and would appreciate any comments from members who can tell me anything about the phenomenon and the activities of the pre-war Research & Experimental Section on this topic"—BRS15744, Ron Ham, of Storrington.

"Just had a QSL from UA1-149-23 who gives me a signal report from the aurora of 1 April 1973 while I was working UR2BU. Seems too good to be true . . . he is in RI02J . . . so I am checking"—G3WSN.

Here and there

Happily the dilemma of the 4m portable contest clashing with HF NFD, referred to last month by G3SHY, was resolved by bringing forward the first of these events to 2 June. A sensible decision welcomed by all "four meteorites".

A fine programme of technical and social meetings has been organized by the Glamorgan VHF/UHF Group right through to May 1975, usually on the second Tuesday of each month. All information from Joe Ludlow, GW3ZTH.

June 8 (plus or minus a bit) should bring the Arietids into range, not commonly a favoured ms target . . . but you never can tell. Next, and more promising, is the Perseids of end July/early August.

25 YEARS BACK

"April 26 saw the first two-way QSO on two metres between Edinburgh and Glasgow when GM6LS established contact with GM5VG on phone . . . on May 15 G2WS carried out the first of a series of tests from Crowborough, Sussex, 650 feet above sea level . . . a noticeable feature was the gradually increasing strength of reception towards evening, presumably due to refraction of the signals over the hills by the slight temperature inversion to be expected at such a time".

Around the VHFs by G2UJ, *RSGB Bulletin*, June 1949

MARCONI CENTENARY

To mark the centenary of Marconi's birth, over the Easter weekend the City of Belfast YMCA Radio Club, GI6YM, reactivated GB3MKB at Ballycastle and operated GI6YM/P from nearby Torr Head.

This group outside GB3MKB, with Rathlin Island in background, includes: Bob Barr, GI5UR; Bill Snodgrass, GI3CVH; Frank Campbell, chairman GI6YM; Ian Kyle, GI8AYZ; Tommy McKeown, GI3UHL; David Brown; GI8FLQ (kneeling); Jim Cullingworth; Ken McGonigal, GI3ZSC. *Photo: GI3GTR*

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

BY courtesy of *Amateur Radio* we show on this page a picture of the Society's distinguished patron HRH Prince Philip talking to the crew of the *Las Balsas* raft expedition from VK4TC, the station of Townsville Amateur Radio Club. Had a similar event taken place in the UK it would not have been permitted for anyone who did not hold an amateur licence to do this! The *JOTA Handbook and 16th Jamboree-on-the-Air Report* indicates that Scouts in Iceland, the Cook Is, Canada, New Zealand, Australia and the USA were able to talk to their fellows throughout the world via jamboree stations. The writer feels that it is more than time that the terms of the amateur licence in this country were restored to compare more favourably with licences issued in most of the rest of the English-speaking world.

Tonic train on 200 . . .

How many present-day amateurs realise that half a century ago their "experimental transmitting licence" only permitted them to communicate with stations in Great Britain or Northern Ireland which were actually co-operating in their experiments—shades of calling "Test" instead of "CQ"!

The conditions printed on the back of a 1924 licence have been brought to our notice by G3KPO, who is curator of the Wireless Museum. Power was restricted to 10W maximum, and transmission to "waves from 150 to 200 metres, for tonic-train, cw or telephony, or on a fixed wave of 440 metres".

While messages might be sent at any time of day or night, the actual period of transmission could not exceed two hours in any 24. The so-called "wave" of 440 metres was not to be used between 5pm and 11pm on weekdays, or when the British Broadcasting Company was on the air on Sundays. Note that this was before the days of the "Corporation".

And to top it all, your aerial could not be longer than 100ft, including the down-lead! Those were undoubtedly the "Good old days"!

USSR callsigns

According to the latest "P-150-C" list received from the Central Radio Club, stations using UK prefixes may be identified and located in their various countries of the Soviet Union by the letter immediately following the numeral as follows:

UK2A, C, I, L, O, S and W—White RSSR (UC2)
UK2B, 8—Lithuania (UP2)
UK2F—Kaliningrad (UA2)
UK2G, Q—Latvia (UQ2)
UK2R, T—Estonia (UR2)
UK6I, J, P and X—European Russian SFSR
UK6D, K—Azerbaijan (UD6)
UK6F, O, Q, V—Georgia (UF6)
UK6G—Armenia (UG6)

UK8E, H, W, Y—Turkoman (UH8)
UK8A, C, D, F, G, I, L, O, T, U, Z,—Uzbek (UI8)
UK8J, R, S—Tadzhik (UJ8)
UK8M, N, P, Q—Kirghiz (UM8)

DX news

A large number of American stations with unusual prefixes have been in evidence recently. They include WF8HOF (Professional Hall of Fame, Canton, Ohio) who will be active until 31 July. QSLs for this one go to W8OYV. Others are KT5ITU (WA5LES), KD2ITU (Buffalo Area ARC), WF6ITU (W6AQ), KR5ITU (K5PFL), and KE3ITU (Pennstate ARC, K3CR), who all celebrated World Telecommunication week, WH4DOC (operated by Atlanta ARC), KS2RPI (Rensselser Polytechnic Institute ARC—QSL to WA2EAH), KE0CSM (QSL to K0DSD), WQ0KSU (QSL to W0QQQ), and WM5BIL (QSL to K5YIN).

Readers will be sorry to learn that the USA citizen who was attacked and seriously injured by bandits in Cordoba, Argentina, on 12 April was none other than Fred Laun, LU5HFI (also W9SZR, ex-XV5AC, HS3AL, HS5ABD and HI8XAL). When last heard of he was in hospital in the Canal Zone and making good progress.

The visit to China predicted for W1GEY did not result in any amateur radio activity. It seems that FCC issued a public notice on 10 April stating that at this time the commission "cannot allow communications between its licensees and any station or stations situated in or over the territory of the People's Republic of China". Article 41 of the international regulations is cited as the basis but the situation is complex, with concern in Washington that "independent unauthorized operation might jeopardize future chances for the support of the amateur service by the People's Republic of China". It seems that this notice does not affect the validity of the BY4SK operation of several years ago. *West Coast DX Bulletin* forecasts that AC4, Tibet, which is now part of China, will be deleted from the DXCC Countries List very soon.

* 10 Knightlow Road, Birmingham B17 8QB

Two USA oil companies are showing interest in further developing their fields in the Saudi Arabia/Kuwait Neutral Zone. This may result in more amateur activity from this elusive area.

The Japan DX Association says that two of its members, JA1SWL and JH1AHR, hope to mount an expedition to Tonga, Fiji and Samoa during the summer. They also say that QSLs for JD1s ACA, ACG, AEW, ACT, AIZ, YAI, YAJ and YAK may be sent to the address given for JD1YA1 in *QTH Corner*.

Two new and authorized stations have come on the air from Vietnam. Both XV5AA and XV5AB have been "cleared" by the local authorities and may contact amateurs outside Vietnam. It is rumoured that Father Moran, 9N1MM, is having difficulty in getting his licence renewed.

Karl, VE8RA, commences a two months leave during June and is hoping to visit Lord Howe Is, VK2, during that month or in July. Both VK9JA and VK9NI are active from Norfolk Is, the former has been worked on 14MHz ssb around 14,220kHz.

QSLs for HC8GI for contacts after 31 January 1974 should be sent direct to the address in *QTH Corner*.

News from overseas

G3WIX is now in Canada and has obtained his Canadian Advanced Operator's Certificate but at the date of writing had not received a VE call. He has an HW101 transceiver and long wire aerial and hopes to put up a trap vertical. Until his VE3 call arrives he will be signing as G3WIX/VE3, and he may be reached at 7165 Shallford Rd, Mississauga, Ont, L4T 2P6, Canada.

G4AFJ has received VP8NO's logs up to 25 March and now schedules him at 1915 on Tuesdays, Thursdays, and Saturdays on 14,125kHz. Only three contacts are listed on 3·5MHz but more radials are being added to the 14AVQ. Mike also appears on 21,350kHz between 1600 and 1740. Due to poor propagation it may not be possible for G4AFJ to copy more logs before November, but all contacts up to 25 March have been QSLd via the bureaux.

Top Band news

The fifth annual *Transequatorial Tests* are scheduled to take place daily throughout June and July between 0000 and 0030 (or later if conditions are suitable). Stations in Europe transmit in the "dx window"—between 1,825 and 1,830kHz and South Americans in the segment 1,800 to 1,808kHz. Stations in South Africa will use 1,930–1,935kHz. Participants are asked to keep contacts short if others are waiting, and the stronger stations to avoid repeat contacts when others are known to be calling. The tests are organized by PY1RO who points out that dx can be worked nearly every day but that there are some very good days which generally do not occur consecutively. Rolf himself will not be able to take part until about 10 July but before this date can be contacted for additional details or schedules at the following address: Rolf Rasp, c/o Digital Equipment Corp, Parker St, Bldg PK-2 Educational Services, Maynard, Mass, 01754, USA.

VK6HD says that he will be active every week-end (Friday, Saturday and Sunday) on about 1,803kHz. He will be on at sunset time in VK6—this will be about 0920 on 1 June, 0919 on 11 June, 0920 on 21 June, 0923 on 1 July, 0927 on 11 July, 0934 on 21 July, and 0940 on 1 August.

G2CIL reports that new county hunters may be interested to look for GI3YFY (Antrim), GM4CXP (Roxburgh) and GM3ANO (Sutherland) who have all put good signals into southern England.

Dxpeditions

The Royal Signals ARS announce an expedition to English Cay (17°20′N, 88°2′W) which is located 15 miles off the coast of Belize (formerly British Honduras). Mike Taylor, VP1MT, and Jim Rayment, VP1JR, hope to operate from 2359 14 June to 2300 17 June and their callsign will most likely be VP1B. Frequencies are given as 14,130kHz ± 10kHz, 21,150kHz ± 10kHz, and 28MHz as requested if conditions are suitable. Special QSL cards will be provided by the Belize Ministry of Information and may be requested via G4RS (see *QTH Corner*).

The Oxford University Radio Society's summer expedition will take place between 8 and 14 July, and this year they will be visiting south-west Scotland. Kircudbright, Dumfries, or Selkirk are mentioned as likely locations and they will be on 160m and the other hf bands using cw, ssb and a.m. Schedules will be made for evenings on 1·8 and 144MHz, and activity may cover other counties as well as those mentioned. The society's secretary is D. D. Price, G4BIX, St Edmund Hall, Oxford.

Contests

The All Asian DX Contest

1000 15 June to 1600 16 June (phone).
1000 24 August to 1600 25 August (cw).
All bands up to 28MHz. Single-band single-operator, multi-band single-, and multi-band multi-operator categories. Exchanges consist of RS/T and two figures indicating the operator's age (YLs send "00"). No crossband contacts allowed. Non-Asian stations work Asians and score one point per completed contact. The multiplier is the number of Asian prefixes worked on each band. Note that KA stations do not count. JD1 (Ogasawara Is) is in Asia but JD1 (Minamitorishima) is in Oceania. Multiband entrants add the points × multipliers scored on each band together to arrive at a final total. Send a summary sheet and use separate log sheets for each band. The latter should show date, time, station worked, number sent and received, if multiplier, and points claimed. The usual declaration that contest rules and licence regulations have been adhered to must also be enclosed and entries should be posted to JARL, PO Box 377, Tokyo Central, Japan, to arrive by 30 September (phone) or 30 November (cw). Leading stations in each country will receive certificates, and to celebrate the occasion of a phone section all entrants in that event will receive a commemoration pin from JARL.

The Massachusetts Amateur Radio Week

0001 9 June to 2400 15 June.
Exchange reports and locations with at least two stations in Massachusetts during this period and send details (before 31 July) and large sae and IRCs to William C. Holliday, WA1EZA, 22 Trudy Terrace, Canton, Mass, 02121, USA. A certificate signed by the state governor will be awarded.

In the **1973 All Asian DX Contest,** UK entries were **G3VDW** (3,444 points) and G2AJB (860) on all bands, **G4AMJ** (741), G8KU (260) and G6GH (242) on 21MHz, **G2DPY** (3,366) on 14MHz, and **G3OCA** (96) on 7MHz.

QTH Corner

A6XT	via G4BDC, 6 Deer Leap Close, Hythe, Southampton, Hants.
FO8EG	via CN8CG, J. Roux, PO Box 22, Ouarzazate, Morocco
GC5AGA	via K4II, 1018 Woodburn Road, Spartanburg, SC, 29302, USA.
HC8GI	E. C. Divine Jr, Isla Santa Cruz, Galapagos Is.
JD1YAI	Box 42, Chichi-Jima, Ogasawara Is, Tokyo, Japan.
KG6RA	via JA2KLT, 204 Gonaka, Shinozuka, Kozakai, Hoigun, Aichi 441-01, Japan.
KS2RPI	via WA2EAH, 43 Beacon Av, Albany, NY, 12203, USA.
KV4CI	via G2MI.
KW6HG	via WA6QFO, Geraldine Cooper, 15861 Rose Lane, Westminster, Cal. 92683, USA.
TA2QR	via DJ0JO, Ibrahim Delici, Schellingstr 58, 8000 Muenchen 13, Germany.
TA2SC	via WA3HUP, Mary Crider, 212 Clark St, Lemoyne, Pa, 17043, USA.
TU2DV	via WA6NFC, 1127 Pioneer Av, Turlock, Cal. 95380, USA.
VK9JA	J. G. Anderson, Box 19, Norfolk Is.
VP1AJ	via W0ELT, 8109 Carlsbad Drive, St Louis, Mo, 63123, USA.
VP1B	via G4RS, School of Signals, Blandford Camp, Blandford Forum, Dorset DT11 8RH.
VP1MT	via W3FYC, Box 108, Plymouth Meeting, Pa, 19462, USA.
VP2LAT **VP2LF** **VP2LI** **VP2LX**	via WA9UCE/6, J. Rafferty, 333 1st St, Apt D314, Seal Beach, Cal, 90740, USA.
VP8NS	via G3PUU, R. Atkinson, 5 Elmete Hill, Roundhay, Leeds 8, Yorks.
VS5LH	Box 91, Kuala Belait, Brunei.
WH4DOC	Atlanta ARC, PO Box 11555, Atlanta, Ga, 11555, USA.
XT2AP	BP 112, Bobo Dioulasso, Upper Volta.
ZL4NJ/A	via ZL3IT, J. D. MacDonald, 42 Buchanan St, Timaru, New Zealand.
3D2GK	via K7DVK, 9999 SE French Acres Drive, Portland, Oregon, 97266, USA.
3D6AE/A	PO Box 283 Mbabane, Swaziland.
5Z4OG	via VE2GS, 93 Jean Brillant, Roxboro, Que, Canada.
5X5NK	(after 1.4.74) via DL1YW, Untertorstr 6/1, 7023 Echterdingen Wuerlt, Germany.
5Z4OM	PO Box 280 Nakuru, Kenya.

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

Apologies to **G3NSY** whose score in the **1973 SP-DX Contest** was given in April *MOTA* as 19,567 points. In fact he scored 49,567—a very commendable score for a one-band (14MHz) entry.

Awards

Please note an amendment to the details of the **PACC Award** given in April 1974 *MOTA*: PA0AAC was noted as award manager but it has since been learned that PA0MOD has taken over the task and may be reached at Dashorst 18, Leusden, Netherlands.

Readers may be interested to know that G3NSY has received his special award for gaining the **Budapest III Award** for five consecutive years from 1967 to 1971.

The Certificado Estado de Sao Paulo

Issued by the Sao Paulo section of LABRE for those who have proof of contact with stations in the Sao Paulo state since 31 December 1964. European applicants require 30 QSLs and should submit a certified list of these (two licensed amateurs or a radio club official) plus 10 IRCs to: LABRE Awards Manager, PO Box 22, 01000 Sao Paulo, SP, Brazil. The award is also available to listeners.

The DL-Z 100 Award

This is issued by the VFDB (the Society of Federal German P & T Amateurs), which is affiliated to DARC. European stations outside Germany need 100 points which include contacts with at least 15 different Z-DOKs and at least five different VFDB club stations. Each contact counts one point. Stations outside Europe require 100 points but only need 10 different Z-DOKs and three club stations. A list of the relevant QSL cards, certified by two licensed amateurs, and containing dates, callsigns, frequencies, and Z-DOKs of all contacts, together with 10 IRCs should be sent to G. Heinzen, DL6EN, D655 Bad Kreuznach 1, Auf dem Kuhberg, Germany. Listeners may also apply. Note that all contacts/reports must have been after 1 January 1972.

The Pronto Award

For proof of contact with 20 different SM6 stations since 31 December 1949. All four *laens* must be represented. A certified list (as in the previous award) plus eight IRCs should be sent to: SK6AW, Award Manager, PO Box 53055, 400 14 Gothenburg 53, Sweden.

The Diplome des 100

This award was announced by the Secretary General of the ITU on 1 September 1973 and the administration is under the care of the International Amateur Radio Club (4U1ITU) in Geneva. It is available to licensed amateurs and listeners who submit proof of contact with (or reception of) amateur stations in 100 different ITU member countries. There are presently 145 members, and stickers will be issued for each 10 contacted over 100. Further information may be obtained from : Mr L. M. Rundlett, K4ZA, Award Manager IARC, 206 East Amhurst Street, Sterling Park, Va, 22170, USA.

The Diploma Guglielmo Marconi

Full details of this award were given in March 1973 *MOTA*. A letter received from the Award Manager says that it has been decided that a special plate will be given to the first applicant for the DGM from each of the six continents.

"QSL Managers Directory"

This new DX Publications directory lists the managers of over 4,000 dx stations and full addresses of each. By special arrangement with the publishers the directory can be obtained from Geoff Watts, 62 Belmore Road, Norwich NOR 72-T, price (for European purchasers) £2.50, $6, or 46 IRCs. Buyers outside Europe should send £2.75, $6.50 or 50 IRCs. The *Directory* (and three supplements during the year) will be air-mailed direct from the USA.

Band reports

Conditions on all bands have been very much as was to be expected except that in a most interesting letter G3USF has pointed out that 28MHz has been open five days in six—in fact practically every day when not actually affected by an ionospheric disturbance. Some days signals have only been present for a few minutes and others for up to 12 hours, but two to three hours would be a fair average. Paths to the eastern side of south seem to be better than those to the western side. By early June the Es season will be under way and short skip may be available until midnight. Odd openings by F2/Es into the USA between 2200 and 2300 should be looked for. In fact, newer readers may usefully be reminded that when 28MHz does open it can produce dx for the alert operator who may only have low power and simple aerials—and during the Es season some high angle radiation can be useful!

Very many thanks to the following for supplying the information listed below: G2CIL, G2HKU, G3HB, G4RZ, G5JL, G6GH, G3GVV, G3NSY, G3USF, G4AFJ, BRS-17567, BRS17991, ORS31026, BRS31301, BRS34775, A7511, A7785, A8298, A8306, A8312, A8431, A8564, A8568 and A8587.

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

1·8MHz. 0200 *W1HGT, W2ZEX.* **0500** *W1BB/1, W2UEG.*

3·5MHz. 0400 HI8EJH. **0500** OA4OS, TG8KY, TI2AJF, VP7DY, ZLs. **0600** VP2EEC. **1900** EP2VJ, ZLs, 2BT, 4NH.

HF BEACON STATIONS

Callsign	Frequency (MHz)	Location	Reports to
DL0AR	29·000	Hiddesen	DL6TC, Paul Nipkow Weg 5, 4930 Detmold, FR of Germany
DL0IGI	28·195	Mt Predigtstuhl near Salzburg	DJ5DT, Kollwitzweg 1, D 6100 Darmstadt, FR of Germany
GB3SX	28·185	Crowborough, Sussex	G3DME
VE3TEN	28·175	Ottawa, Canada	VE3QB, 59 Westfield Crescent, Ottawa 5, Ontario, Canada K2G 0T6
VP9BA	28·165	St Catherines	VP9BY, PO Box 73, Devonshire, Bermuda
ZC4CY	28·180	Limassol	CARS, Box 216, Famagusta,Cyprus
3B8MS	28·190	Signal Mount, Mauritius	3B8DG, PO Box 44, Port Louis, Mauritius

Reports for any of the above may be sent to RSGB HQ (Attn IBP). At present only DL0IGI switches to 28·200 at 00-05 and 30-35min past each hour.

2100 VO1GK, VP8NP, 5T5DY. **2200** CR3WB, CX2AX, EA9EU, JY3ZH, PYs, VP1TC, VP9GE, 9G1DY, 9J2EP, 9M2FX. **2300** CR4BS, KV4FZ, 9L1JT. **2400** TF3SB.

7MHz. 0400 HKs. **0600** *KL7FA, LUs, PYs,* VP1AJ, *VP5CW, W7YTN.* **0700** TIs, VKs, ZLs. **1400** *TZ1AQ, 7X3VW.* **1800** *VQ9D, 4S7AB.* **2000** CR7TB, ZS6ME. **2100** *CP8PY, CR6AI, 5T5FP.* **2200** *KV4CI.* **2300** *DL7RT/HB0, KV4CI, M1C,* YN8JES.

14MHz. 0600 *FO8EG, KL7HRY,* TU2DV, *UA0YAD.* **0700** HB9VP/P/KH6, KH6s, KL7s, KS6EZ, VS5LH, W7HQC, XT2AP, 5W1AU, 5X5NK. **0800** KJ6DI, VK4AD/KS6, M1D, TY1UW, ZK1DX, ZL4NJ/A (Campbell Is), 3D2s *FC,* GK, 5W1AN. **0900** FO8DH, KB6CU, *JA8KMJ/KL7,* KW6HG, KM6DZ, YJ8BL. **1000** 3D2s, CC, ER. **1100** TA2SC. **1200** *JT1KAA,* JX6DS. **1300** A6XB, *JT1AM, ZL1HA*(S9+), 9M8DA. **1400** A9XO, *FL8CE, KL7MF.* **1500** HZ1SH, *JT1s AS, AU,* KC6CW, SM2DWH/S2, ST2SA, XV5AB, *YB7ATU,* 3B8DX. **1600** AP2KS, KG6SW, JY5KR, KG6SR, P29MC, VS5MC, ZL1AJI, *4S7JU,* 9M8NK. **1700** A51PN, FH8CI, HM4GF, JD1ACH, KH6OR, *4K1D* (Antarctica), 8Q6AR. **1800** CR3WB, *FR7ZW,* KS2RPI, *VS6EY, YK1KAS* (Box 35, Damascus), ZS2MI, 8Q6AC, 9M2s. **1900** FY7AQ, HS4AJW, TA3QR, *VK8HA,* VP8s *NN,* NO, NP, 4S7DB, 5V4GE. **2000** CR3AH, OA8OR, P29AA, VP1MT, VP8NS, VR4BS, 4W1GM, *4W1GW.* **2100** VP2LBH, VP8LP, VU2MX, WA7OWN (Nev.), *ZD8MF,* 5H3JR, WA3SVW/6Y5, 9X5NA. **2200** *VP5CW,* ZF1JA, ZL4BX. **2300** ZL4KF.

21MHz. 0800 *9R1A* (?). **0900** JAs. **1000** *JD1ACH,* KX6LA, *UA0YT.* **1200** A4XFD, VR4BS, *3D6AE/P,* 4S7AB, *9M2CN.* **1300** VE3CBJ/P/SU, VK6s, 3B8AX, 5R8CO. **1400** FR7AB, KC4AAC, VU2GDG, *XW8s BP, ET.* **1500** *CE8AA, FG0BAR,* SV0WGG (QSL K4EKJ), *VP1MPW,* VP8KF, VS9MB, *ZS2MI, 3B8DP,* 4W1GM, 5X5NK, 7P8AZ, *9X5PT.* **1600** DU1EJ, *VS5MC,* XT2AJ. **1700** *EA9EX, HK0BKX,* VP8LP, VP8NO, W6s, ZD7FT, *ZP9BG.* **1800** VP8FL, VQ9D, 5U7AZ, 9G1AR. **1900** CR4BC, KC4AAC, TR8VE, VQ9MC.

28MHz. 0800 OE2SJL/MM (Red Sea), 4Z4BK, RD6DFV, CR7KK, 5B4ES. **9000** ET3FF. **1000** CR6IO, IT9ZEW, OD5HU, 4X4s. **1100** CR6s, *UF6FAX,* VQ9BP, ZE1EI, ZC4s, 9G1DY, ZS1FH. **1200** JY3ZH, ZSs. **1300** PY, ZE, ZS, 3B8DG, 9J2s. **1400** *FR7AW,* OD5GC, 5N2ESH. **1500** CR7s, PYs, ZP5AN, 9X5PF. **1700** FH8BM. **1800** CR6. **1900** 7Q7JD. **2000** PYs.

Once again, many thanks to all correspondents and especially to the authors of the following publications for items copied: the **29 DX Club Newsletter** (*George Allen*), **World Radio News**, the **DX'ers Magazine** (*W4BPD*), **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0INA/PA0TO*), the **Ex-G Radio Club Bulletin** (*W3HQO*), and **DX News Sheet** (*Geoff Watts*).

Please send all items for the **July** issue **to reach G3FKM no later** than **5 June**, and for **August** issue by **10 July**.

Propagation Predictions

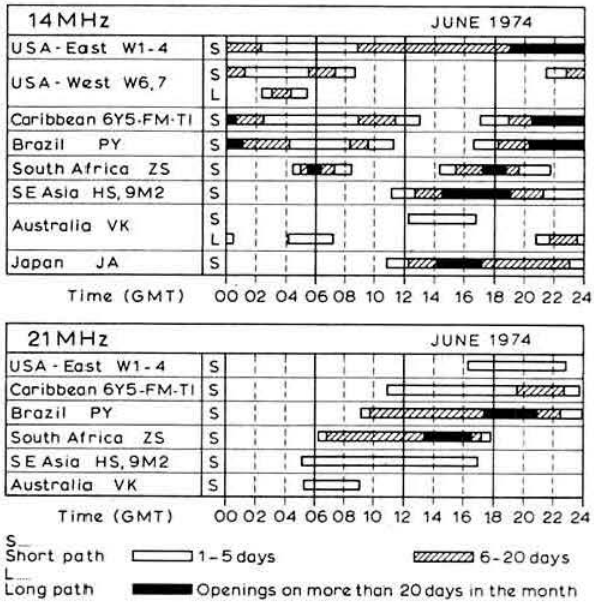
The typical summer months of June, July and August are of little practical use on the hf bands. Because of the present low solar activity **28MHz** is of little importance to dx, although in very exceptional circumstances the band may be open from about 1400 to 1830gmt for traffic to Africa, and from about 1800 to 2100gmt to South America. Sporadic short skip conditions will liven up this band as well as **21MHz** over distances of about 500–2,000km.

DX traffic will only be possible with certainty for a few hours on **21MHz** with South America and Africa. North America will be heard very seldom. No traffic will be possible with western North America and Japan.

14MHz will be the main dx band especially during the afternoon and evening, but quite often also during the night and early morning. Summer conditions will make dx via the indirect path possible, especially to western North America, Japan, Australia and South America; in exceptional circumstances also to South-East Asia and Central America. Favourable conditions for traffic with Hawaii should be between 0500 and 0930gmt via the indirect path.

DX will be possible on both **7** and **3·5MHz** if the greater part of the path lies in darkness; this applies especially to 3·5MHz. Local traffic on 7MHz will be interrupted frequently by the dead zone. It will be possible to use 3·5MHz for local traffic during night and day without interruption by the dead zone at night.

The provisional sunspot number for April 1974 from the Swiss Federal Observatory was 44·4 with activity peaking around the middle of the month. The predicted smoothed sunspot numbers for August, September and October are 21, 20 and 19 respectively.



COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 4 March 1974

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

Apologies for absence had been received from Dr J. A. Saxton.

Date of Council meeting
It was decided that the meeting arranged for 5 December 1974 would be cancelled and a meeting will be held on Monday 18 November 1974 at 6pm.

Trophies Manager
Mr P. Carey had decided that he would be unable to continue with his duties and it was agreed that the general manager should endeavour to obtain the services of another member. The Council's thanks for his past services were extended to Mr Carey.

Future of amateur radio
The President had arranged for a memorandum to be circulated to all Council members asking for their views on the future of amateur radio, and he felt that he should ask the members present to put forward their views.

During the discussion that followed it was made clear that every effort must be made to ensure that the amateur service continued into the 1980s. It would, however, be essential to put forward an irrefutable case for the retention of amateur bands, both nationally and internationally. Although very valuable work had been carried out by amateurs in the past there was unfortunately an attitude of mind among some amateurs that there was no further scope for initiative and development. It was true that professional and commercial development of communication techniques had largely taken the place of amateurs' efforts but even so there were still branches of the science in which amateurs could conduct original research.

The points made during the discussion were covered by the following summary put forward by G2BVN:

The amateur service had official status in the Radio Regulations and was covered by definition.

In the UK we were fortunate that our administration (MPT) looked favourably on the amateur service and had frequently advocated the case for the amateurs. The most outstanding example of this had been on the occasion of the Space Conference in 1971 when other national administrations had shown that they were not prepared to accept proposals for the use of parts of the frequency spectrum by the amateur service.

The amateur service must show that it is a responsible and worthwhile service whose members were making an effective contribution to the work of the ITU. Amateur radio was a national resource which could provide a fund of knowledge in many ways, including emergency communications, techniques and propagation studies on both the hf and vhf parts of the spectrum. To achieve international recognition all national amateur radio societies must put forward concerted ideas to their national administrations; numerous small plans would not be successful.

We, for our part, must assist in formulating plans acceptable to other national societies so that these may be put to the MPT as an international effort to show the amateur service as one worthy of encouragement. We must produce plans to ensure that there is a programme of increasing technical development among amateurs in the UK.

Above all it is essential to keep in mind that a planned advancement, nationally and internationally, is our only hope of success in the future.

There was a need to increase membership and it was confirmed that only approximately 55–60 per cent of licence holders in the UK were members of the Society. It had been suggested that the Corporate Member's subscription of £5 (plus 50p VAT) was a deterrent to many students just over the age of 18 and it was agreed that this matter would be referred to the Finance and Staff Committee.

Finance report
The Honorary Treasurer commented on the provisional figures for the six months to 31 December 1973. A surplus of £1,918 was shown at that date and it seemed likely that the results for the year to 30 June 1974 would be satisfactory.

Membership and affiliation
It was resolved:

(i) to approve the applications for membership, transfers and reinstatements for January and February 1974 and accordingly elect 183 new members.
(ii) to accept reduced subscriptions from 11 members.
(iii) to waive the subscriptions of two members on the grounds of blindness or other disability.
(iv) to grant affiliation to University of Bradford Union Radio Society, and the RAF Gutersloh Amateur Radio Society.

IARU and ITU conferences
WARC/MM, Geneva 22 April 1974 for six weeks.
WARC/General (all services and frequencies), Geneva 1979 for 10 weeks.

The IARU is a recognized international organization entitled to participate in ITU conferences without cost. This is a valuable privilege. The IARU will participate in the WARC/MM and G2BVN has been asked by IARU HQ to lead the delegation.

The UK MPT has indicated that it will not commence serious preparatory work concerning the 1979 conference until later this year after the WARC/MM. However, Mr D. E. Baptiste has written confirming that in due course the RSGB will be asked to participate in discussions. It is probable that later the MPT will invite RSGB to nominate a person to serve on the UK delegation to the 1979 conference, in the same way as G2BVN served on the 1971 Space Conference delegation.

It is vital that there shall be continuing close liaison between RSGB, MPT and the IARU. With so much at stake every effort must be made to present a co-ordinated worldwide case for the amateur service.

Council agreed that the present arrangements were satisfactory and that provision should be made each year so that the requisite funds would be available. Mr Stevens pointed out that the WARC/MM Conference this year was not expected to consider any matters directly affecting the amateur service. It was necessary, however, that IARU should be represented at the conference as there was always the possibility of matters being raised which would have an indirect effect.

Region 15 ORM, 11 May 1974
The Belfast and Mid-Ulster RSGB Groups requested permission to hold an ORM in Northern Ireland on 11 May 1974. Council approved the proposal and it was agreed that the President and general manager should attend.

IARU VHF/UHF/SHF band plans
Mr Baker gave a brief report on the reaction of members to the revised IARU Band Plans. Mr Stone confirmed that the response to the revised band plans was satisfactory.

Repeaters
Mr Stone reported that he had attended a meeting at Kidlington, Oxfordshire, at which some 30 amateurs interested in the operation of repeaters had been present. The meeting had discussed all aspects of repeater operation, including operation in the 70cm band, and it had been confirmed that RSGB would co-ordinate repeater activity. Mr Stone confirmed that there were still three of the original proposals awaiting approval by MPT and that some 11 more groups had indicated interest in repeater operation, including two for the 70cm band.

Mr Stevens pointed out that the MPT had indicated in discussion that a limit should be placed on the number of repeaters and that those authorized would have to be located so as to give a wide geographical distribution.

Committee minutes and recommendations
Council received the minutes of the following committee meetings: Raynet (3/11/73), (19/1/74), Finance & Staff (28/11/73), Scientific

Studies (10/12/73), IARU Working Group (13/12/73), Membership & Representation (3/1/74), MPT Liaison (24/1/74), VHF Contests (24/1/74), VHF (26/1/74), Mobile & Exhibition (31/1/74).

VHF Committee. Council considered the country status of Jersey and Guernsey and agreed that they could be classed as separate countries for award purposes. Council also accepted the recommendation that the "Fraser Shepherd Prize" should be awarded to Mr P. K. Blair, G3LTF, in recognition of his pioneering work in connection with microwaves.

International Amateur Radio Club Station 4U1ITU
Mr Stevens reminded Council that the refurnished amateur station in the ITU Building in Geneva, 4U1ITU, would be formally opened by the Secretary-General of ITU, Mr M. Mili, on World Telecommunication Day, 17 May 1974. Council had agreed to defray the cost of two clocks for the station.

OBITUARIES

The society records with regret the deaths of the following:

Mr G. E. Bingley, G3WGO
George Bingley died suddenly on 16 April aged 58. Although seldom heard on the air, he was a keen and reliable member of Derby & District ARS.

Mr R. E. Griffin, G5UH
Reg Griffin died suddenly on 19 April. He was one of the oldest members of the Bristol RSGB Group, having obtained his licence in 1932. Reg was TR for Bristol in the '50s and RR of Region 9 from 1960 to 1968. Before retiring, he lectured at Brunel Technical College and helped many young men to obtain their amateur licences.

Mr H. Hazelden, G8FR
Harry Hazelden died on 6 April, aged 67. He was first licensed as G5AZ in 1929, which lapsed during the war years, and then allocated the G8FR call. He was a cw mode enthusiast and was active on 80m.

Rev A. W. Shepherd, G3NGF
Arthur Shepherd died on 18 April. A devoted Christian and Methodist, he founded the WAMRAC (World Association of Methodist Radio Amateurs and Clubs) in 1957, and since then had been its secretary and pastoral administrator. He could be heard each Sunday afternoon on 3,665MHz with the Wamrac Net—using the callsign G3NJB—the Wamrac HQ call. Arthur believed in Christian fellowship through amateur radio.

We have also been advised of the deaths of:

Mr B. Moon, G8HWC, of Keynsham, Bristol, aged 54, on 16 April.
Mr Cyril Cummings, G3FIM, of Trowbridge, Wilts, on 26 April.
Mr Craig Hatfield, of St Anthony's Cheshire Home, Wolverhampton, and
Mr W. H. Pouncey, G4BQP, of Elton, Chester.

Special event stations

Tavistock Millenium Year celebrations
In connection with these celebrations the Kelly College Amateur Radio & Electronics Society will run two special exhibition stations: GB3KCT from 1 to 20 June, and GB3TMY from 1 July for four weeks, on all bands 160 to 10m and 2m. Full-colour QSL cards will be issued by G3ZYE, via QSL Bureau or direct if stamps received, including replies to all swl reports.

Stevenage Borough celebrations, 8–9 June
To mark the occasion of Stevenage being made a borough, the Stevenage & District ARS will be operating an exhibition station. G3SAD will operate /P on the hf bands, and on 2m and 70cm. RTTY and 3cm will also be demonstrated.

Event 74, Nottingham, 15 June
The Nottinghamshire Scouts are presenting "Event 74" at Wollaton Park from 10.30am to 5.30pm, in connection with the Nottingham Festival.

A special station, GB3NS, will be operational on bands 160 to 2m. Further details from G3UXH, 1 Coach Drive, Eastwood, Notts.

Broughton Astley Village Gala, 15 June
The special call GB3BA will be in use during this event, operation being on bands 160 to 2m. All swl reports accompanied by an sae will be acknowledged. Further details from G32FQ, QTHR or G3TWY, QTHR.

Torbay ARS exhibition stations
The Torbay ARS will operate the stations being set up for the Newton Abbot Trades Fair and Davenport Home for Children and included in this column last month. The Newton Abbot station will have the call GB2NTF, not GB2NFT as previously advised.

Mobile rally news

Elvaston Castle Mobile Rally, 9 June
Organized by the Nunsfield House Community Association ARG, this rally will commence at 10am at Elvaston Castle country park, five miles south-east of Derby on the B5010. Talk-in stations: G3EEO/P on 160m, G3ZBI/P on 2m. Further details from P. Neal, G3WFU, QTHR. Tel 0332-700265.

Upton Mobile Rally, 30 June
This rally will take place at the Hill Secondary School, Tunnel Hill, Upton-upon-Severn, Worcs, on the A4104 one mile west of the River Severn. It is being organized by the Worcester & District ARC. Talk-in stations: G8JC, 3·75kHz ssb; G3GJL, 144·2MHz ssb, 145MHz a.m., 145·5MHz fm.

All the usual stands and junk stall, and sports and fancy dress for children. Further details from B. A. Jones, G8ASO, QTHR. Tel Worcester 29208.

Mobile Rallies Calendar

9 June—Elvaston Castle MR, Elvaston Castle, Nr Derby.
16 June—Mobile picnic/bucket and spade party, arranged by Spalding & District ARS. Two miles north of Skegness on the A52 near Butlin's Holiday Camp. No trade stands. Talk-in by G3THX on 160m and G4CYS on 2m.
16 June—Exeter ARS mini mobile get-together, Woodbury Common, Exeter, from 1330. Details from J. Bawden, 232 Exwick Road, Exeter EX4 2BA.
16 June—East Kent MR, Westgate Hall, Canterbury. Talk-in stations: GB3EKR, 145MHz fm; G3LTY/A, 1·98MHz a.m. (Details in May issue).
23 June—Humberside MR, Goole High School. (Details in May issue).
30 June—Upton MR, organized by Worcester & D ARC. (Details in June issue).
7 July—Longleat MR.
14 July—South Shields MR, Redwell School, Prince Edward Road, South Shields. Organized by SS & D ARC; details from G3SFL, QTHR.
14 July—Anglian MR, Stanway School, Colchester. Organized by Colchester Radio Amateurs; details from E. T. Jacobs, 26 Pondfield Road, Colchester, Essex.
21 July—Cornish Radio Amateur Club MR, Cornwall Technical College, Pool, Redruth. (Details in May issue).
21 July—Polegate Steam Engine Rally. No trade stands. Details from G4BCO, QTHR.
4 August—RSGB National MR, Woburn Abbey.
11 August—Torbay MR, Newton Abbot Rugby Club ground. Organized by Torbay ARS; details from L. H. Webber, G3GDW, QTHR.
11 August—Derby MR.
18 August—Saltash MR, Saltash School, Wearde, Saltash. Organized by Saltash & D ARC; details from G3XWA, QTHR.
18 August—Preston ARS MR. Details later.
18 August—Bromsgrove Mobile Picnic. Organised by Bromsgrove & DARS. Avoncroft Museum of Buildings.

NOTE: The Wessex rally scheduled to take place on 21 July has been cancelled.
NOTE: The date of the South Shields Rally has been changed to 14 July.

CONTEST NEWS

70MHz Portable Contest, 2 June

The VHF Contests Committee apologizes for the non-appearance of the rules for this contest. We hope that all the prospective entrants will have learned of the timing and rules of the event via GB2RS. Please send your entries to: VHF Contests Committee, c/o G3XHU, 94 Hermon Hill, South Woodford, London E18. And once again, sorry!

RSGB 7MHz DX Contests 1974 rules

Radio amateurs and short wave listeners throughout the world are invited to take part in the 13th RSGB 7MHz Contests for single-operator stations. Suitable contest log and cover sheets for this and other RSGB contests may be obtained from: The General Manager, Radio Society of Great Britain, 35 Doughty Street, London WC1N 2AE. UK members should enclose a large sae.

TRANSMITTING SECTION

1. The General Rules for RSGB HF Contests, published in the January 1974 issue of *Radio Communication*, will apply.

2. When. CW contest. From 1800gmt Saturday 19 October 1974 to 1800gmt Sunday 20 October 1974.

Phone contest: From 1800gmt Saturday 2 November 1974 to 1800gmt Sunday 3 November 1974.

3. Eligible entrants. Licensed amateurs in all parts of the world. British Isles entrants *must* be members of the RSGB.

4. Contacts. CW contest—cw(A1) only. **Phone contest**—a.m. or ssb.

Serial numbers must start at 001 for each contest.

5. Scoring. British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles stations (G, GC, GD, GI, GM and GW).

Each contact between a British Isles station and an overseas station will score as follows:

Location of overseas station	Points
Continent of Europe	5
Continent of North America	15
Continents of S America, Asia and Africa	25
Continent of Oceania	50

Bonus points. British Isles stations may claim a bonus of 20 points for the first contact with each country. For the purpose of scoring, the RSGB Countries List will apply with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas stations may claim a bonus of 50 points for the first contact with each British Isles country-numerical prefix, ie G2, G3, G4, G5, G6, G8, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with stations using GB prefixes will not score bonus points.

6. Entries must be addressed to: The HF Contests Committee, c/o J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, West Midlands, England. Overseas logs must be posted to arrive no later than Monday 16 December 1974 for the cw contest, and Monday 30 December 1974 for the phone contest. British Isles logs must be postmarked no later than 4 November and 18 November respectively. Logs must include a check list showing the areas for which bonus points are claimed.

7. Awards. The Thomas (G6QB) Memorial Trophy will be awarded to the leading British Isles entrant in the cw contest. Certificates will be awarded to the leading station in each country, and to the leading station in each VE, VK, W/K, ZL and ZS call area.

RECEIVING SECTION

These rules should be read in conjunction with the General Rules for RSGB HF Receiving Contests published in the January 1974 issue of *Radio Communication*.

1. Eligible entrants. All short-wave listeners throughout the world. British Isles entrants *must* be members of the RSGB.

2. Entries. As transmitting section.

3. Scoring. British Isles entrants may only log overseas stations working British stations during the contest. Overseas entrants may only log British Isles stations in contact with overseas stations during the contest. For British Isles entrants, each complete log entry of a contact between a station in the following continents and a station in the British Isles will score as indicated:

Location	Points
Continent of Europe	5
Continent of North America	15
Continents of S America, Asia and Africa	25
Continent of Oceania	50

For overseas entrants, each complete log entry of a contact between a British Isles station and any station in the contest will score as follows:

Location of listener	Points
Continent of Europe	5
Continent of North America	15
Continents of S America, Asia and Africa	25
Continent of Oceania	50

Bonus points. British Isles entrants may claim a bonus of 20 points for the first station logged in each country-numerical prefix (see transmitting section). Overseas entrants may claim a bonus of 50 points for the first station logged in each British Isles country-numerical prefix.

5. Awards. A certificate of merit will be awarded to the leading entrant in each of the British Isles countries, and to the leaders in each overseas country and VE, VK, W/K, ZL and ZS call area in each contest.

It is extremely important that entries are sent only to the address given in transmitting rule 6—those sent elsewhere may suffer delay or disqualification.

Jubilee VHF/UHF Contest rules

Unless superseded below, the following General Rules, as published in the January issue of *Radio Communication*, will apply:

1. Date. 6–7 July. **Time.** 1600–1600gmt.

2. All entries and check logs to: VHF Contests Committee, c/o G3VPK, "Maple Leaf", Great Braxted, Witham, Essex CM8 3EJ.

3, 4(b). Unchanged.

5. (i) Operation will be on the 70MHz, 144MHz, 432MHz and 1,296-MHz bands, using one callsign only.

(ii) On the 70MHz, 144MHz and 432MHz bands, contacts will be scored according to General Rule 5a (radial rings).

(iii) On the 1,296MHz band, points will be scored at one point per kilometre.

(iv) Separate logs and cover sheets should be made out for each band. Claimed totals should be multiplied by the following factors:
70MHz–2, 144MHz–1, 432MHz–5, 1,296MHz–1.

(v) After multiplication the scores should be tabulated, *with the callsign*, and name of group if applicable, on a Multiband VHF/UHF Contest Summary Sheet (available from any contest adjudicator on receipt of an sae).

6a, 7a, 8c, 9a, 10a, 11–26. Unchanged.

July 432MHz Open Contest rules

Date. 21 July.

Times: 0900-1700gmt.

All entries and checklogs to: VHF Contests Committee, c/o G2HIF, 20 Harcourt Road, Wantage OX12 7DQ.

The following General Rules, published in the January 1974 issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10a, 11-26.

July 70MHz Open Contest rules

Date. 28/29 July.

Times. 1600-2300 Saturday, 0500-1600 Sunday.

All entries and checklogs to: VHF Contests Committee, c/o G5HD, 100 Shirley High Street, Southampton SO1 4FB.

The following General Rules, published in the January 1974 issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10a, 11-26.

432MHz Summer Cumulative Contest rules

Dates. 25 July, 2, 10, 18, 26 August, 3, 11 September.

Times. 1900-2130gmt.

All entries and checklogs to: VHF Contests Committee, c/o G3SEK, 11 Rington Avenue, Poulton-le-Fylde, Blackpool FY6 7NR.

The following General Rules, published in the January 1974 issue of *Radio Communication*, will apply, 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9a, 10b, 11-26.

DF Qualifying Round—Slade

Date. 16 June 1974.
Map. OS Sheet 139 Birmingham, new 1 : 50,000 series.
Assembly. 1300bst for start at 1320 bst.
Location. Barr Beacon NGR 061971.

This event is being organized by members of the Slade Radio Club, and intending competitors are asked to notify Mr J. E. Drakeley, 186 Conway Road, Chelmsley Wood, Birmingham B375LD, telephone 021-770 3474, of the numbers in their parties requiring tea, as soon as possible and not later than 10 June.

DF Qualifying Round—Derby

Date: 30 June 1974.
Map. OS Sheet 128 Derby and Burton upon Trent, new 1:50000 series.
Assembly. 1300bst for start at 1320bst.
Location. Rolls Royce car park on Victory Road, Derby, NGR 361325; this is the large car park on the north-east side of the road.

This event is being organized by members of the Derby and District Amateur Radio Society, and intending competitors are asked to notify Mr D. Bosworth, G8BAV, 57 Livingstone Road, Derby, tel Derby 21782, of the numbers in their parties requiring tea, as soon as possible and not later than 22 June.

7MHz Contest results

Conditions for the 1973 contest in the cw section and particularly the phone section were considerably better than on previous occasions, resulting in a big increase in scores. It is interesting to note the aerial changes made by participants and it is becoming apparent that this is becoming the deciding factor. The standard of log keeping was again very high indeed, with very few logs having to be re-scored.

Our congratulations go to the leaders in the various sections who will, in due course, receive their certificates, Finally, the HF Contest Committee would again like to thank the stations written to for verification of QSOs and particularly for check logs received.

Station	Aerials (phone)	Receiver
GI3OQR	3-element rotary at 90ft	75A4
G3WJN	Full-size gp at 60ft	R4B
G3VMW	Sloping dipoles / Inverted-V	TS510
	(CW)	
G3KDB	Sloping dipoles	SB101
G3MXJ	Delta loop	SB301
G6CJ	Long wire and gp	FRDX400 + BC453
G3VMW	14AVQ $3\frac{1}{2}\lambda$ wire	KW2000B

PHONE TRANSMITTING

Posn	Station	Points	Posn	Station	Points
1	*GI3OQR	4,815	27	I3BBZ	575
2	*G3WJN	2,590	28	I3ASK	565
3	*G3VMW	2,180	29	OK3PEQ	535
4	G3WHK	1,625	30	UL7IAF	525
5	G3TR	1,560	31	OZ4HW	490
6	G4BUE	1,520	32	HB9UD	485
7	G2QT	1,465	33	HB9DX	470
8	GW4BLE	1,325	34	SM4CMG	450
9	G4ACQ	1,310	35	F3IJ	445
10	*DL8JS	1,285	36	ON6NW	440
11	*UK9ABA	1,215	37	UD6DER	425
12	EP2TW	1,100	38	SP5CQJ	420
13	SM6CKS	995	39	UK5ICD	415
14	G3UAS	840	40	SP2CMB	395
15	G3MCA	825	41	SM4AZD	390
16	SP5PWK	805	42	GC3YIZ	380
17	G3KSH	790	43	LA3UQ	350
18	G3MWP	755	44	SP9KRT/9	320
19	OZ1RH / DL9XN	750	45	LA9CQ	275
			46	G2AVC	210
21	DK7ZJ	685	47	SM0BDS	195
22	DK5GX	680	48	OH2LU	180
23	DJ9CB	650	49	UA3GM	175
24	DL1YA	605	50	SP3YG	135
25	LA5QK	600	51	*ZS6ZE	115
26	GW4BVJ	590	52	OZ6PI	55

PHONE RECEIVING

Posn	Station	Points	Posn	Station	Points
1	*BRS32525	2,730	17	A8211	730
2	*A7460	2,350	18	I5-50661	710
3	BRS26431	2,260	19	SM5-2735 / I0-51038	705
4	A8482	2,090			
5	BRS18461	1,870	21	SM3-5384	685
6	BRS33823	1,565	22	IS0-20249	665
7	A8415	1,555	23	OK1-15689	565
8	BRS31172	1,540	24	I1-54056	560
9	BRS33442	1,210	25	OK1-17825	505
10	BRS28201	1,140	26	LA-M5605	495
11	BRS20249	1,035	27	SP 515 54	485
12	*I1-12387	920	28	IT9-14257	455
13	DE-G07/42453	900	29	UP2-038-283 / BRS34032	420
14	A8179	875			
15	BRS33915	865	31	I0 550 48	315
16	A8306	845	32	I4-15407	170

Check logs acknowledged from W3AZD, SM7FYM, SM5BKI, GM5BCV, G3WFT/A.

CW TRANSMITTING

Posn	Station	Points	Posn	Station	Points
1	*G3KDB	3,965	73	UY5LO / *PZ1CQ / OH2DN / OK1KZ	475
2	*G3MXJ	3,595			
3	*G6CJ	3,430			
4	G3VMW	2,930			
5	G3PDL	2,810	77	SM0DJZ	470
6	GM3CFS	2,280	78	UQ2PN	460
7	G3ZZD	2,050	79	OK1AEH / YU1SF	455
8	G3TLK	1,825			
9	G3FZG	1,815	81	PA0VB / UB5TQ	450
10	G3TBK	1,805			
11	G3KHH	1,620	83	OZ3ZR	435
12	G3TVW	1,600	84	OH7NW	430
13	G2QT	1,530	85	UA9CDT	425
14	G3XWZ	1,475	86	OK1FSM	420
15	G3VDW	1,250	87	SM0BDS / HA8VX	410
16	G3MWP	1,240			
17	GM3PIP	1,175	89	YO2BBB	405
18	G3VIP	1,140	90	UK5MAZ / UB5ZBB / SP6CQO	395
19	*HG5A	1,105			
20	G4CNY	1,050			
21	G3SRQ	1,020	93	SP7CKF / YO2RA	380
22	G3JKY	970			
23	G3VDL	950	95	SM4CJY / HA1ZD / SM7EH	375
24	*K2LWR	940			
25	*UD6DHU	925			
26	DJ3XK	870	98	DJ5QK	355
27	SM0CCE	845	99	PA0FIN / UQ2PAR	350
28	LA8O	835			
29	G3KSH	820	101	LA2Q	340
30	HA0KLE	810	102	UA3GM	335
31	ON8KO	805	103	UF6QAC / UA2FBC / UJ8JAS	325
32	OK1MPP	785			
33	SP1BHX	770			
34	OK1BLC	765	106	YO6MK	315
35	UK5LBJ	750	107	G3UJG / SM6CYZ	305
36	ON6NW	745			
37	OK2BDE	735	109	OK3EA / YO7ARZ / UY5TE / YO7ARZ	295
38	UQ2GCB / UA9WS	725			
40	HA1SB / DJ0WJ	700	113	SP2KFQ / W4WSF	285
42	DJ8IZ / G8KU	690	115	SP9FTK / G3PLI	270
44	OZ6PI	680	117	HB9UD	265
45	YO2AYD	675	118	UC2WP	255
46	OZ4HW	665	119	UB5GBD / SP6TQ / UH8BX / OH2LU / OK1AOU	250
47	UA2FAT	660			
48	OK2BLG / HB9DX	650			
50	UQ2GDM	625			
51	OZ2WA	605			
52	*KH6RS	600	124	UR2RDM	245
53	DL1YA	585	125	LA5KO	240
54	UB5NS	570	126	LA8ZL	235
55	OH6MK	565	127	UC2BA	220
56	UB5VK	560	128	UA6AAM / SP6BAA	215
57	OK1ABP / EA5BS	555	130	UB5EDJ	185
59	HA8UT / OK3ZMT	545	131	UB5LBJ / UK5QBE	175
61	YU1OCV	540	133	UK2BAO / UW3YQ	150
62	SP2AVE / OK2TB	525	135	UP2AW	130
64	G4BXN / YO2AHJ	515	136	DJ2YE / OK1EP	120
66	UK2GAN / OH6RC	510	138	UC2AW	60
68	HA0LO	500	139	SP6PAZ / OK3KWK / YO2AVA	55
69	UB5QBC	485			
70	SP3AUZ / UY5CW / OK1DAV	480	142	YO6EZ	30

* Certificate winners

CW RECEIVING

Posn	Station	Points	Posn	Station	Points
1	*A7460	1,315	7	*BCRS 195	550
2	*BRS18461	1,280	8	UA1-169-185	455
3	BRS33442	1,170	9	OK3-26180	390
4	*HA0541	740	10	OK1-13188	375
5	OK1-17825	690	11	UA6-101-765	315
6	OK3-26456	580	12	OK1-11861	190

CW check logs acknowledged from UA9TS, UZ3RV, G5GH, G3ATU, DK5RY, LA1HI, G2AJB, G3AAM.

* Certificate winners

March 144MHz Open and Listeners' Contest results

The results of the transmitting section of this event are being held over pending investigation of a complaint about the signal quality of one of the leading stations.

The number of entries from listeners was good, but more attention should be paid to correct log, cover, scoring etc, which varied from excellent to almost undecipherable.

Joe Skidmore, BRS26431, receives an award certificate, and Ron Thomas, BRS15822, the runner-up certificate. All log entries go forward to the Listeners Championship.

F. M.

LISTENERS

Posn	Callsign	Points	QSOs	Cnty	Best dx	Km
1	BRS26431	352	110	DY	G3DAH	247
2	BRS15822	260	96	LD	G3JYP/P	—
3	A8016	194	—	EX	GW3WAS/P	—
4	A8513	179	—	LD	—	—
5	BRS33823	151	57	BS	GW3UCB/P	203
6	BRS28005	128	36	SX	GW3UCB/P	310
7	A8065	103	27	SX	G8CXI/P	290
8	A8163	92	60	EX	—	—
9	A8284	66	—	SD	—	—
10	A7693	48	12	WK	G4BFN/P	200
11	A8015	37	—	ST	G8FOT	—
12	A8305	27	11	BE	GW3OXD/P	—

A8398 not accepted: no points claimed in columns.
Check logs acknowledged from G3JFO/P, G3PJK and G4BRO.

80m Low Power Contest results

As a result of circumstances outside of the control of the HF Contests Committee, the rules for this event were not published in the March issue of *Radio Communication*, which perhaps explains why only 16 logs were received from the 70 plus stations who were active during the contest.

The winner, GD4BEG, who operated portable from Sky Hill near Ramsey, had a clear margin over G3NEO who was the runner-up. In third place was G4BCH who was operating /A from the Brunel University site at Uxbridge.

The majority of entrants were using powers of 0·5W or less and as to be expected there were many transistorized rigs in evidence. GD4BEG/P used a 1,500ft long-wire aerial which was suspended across a valley giving a height of up to 250ft above ground near the middle of the span. G3NEO used a dipole 40ft above ground, and G4BCH/A has three aerials, a dipole, a full-wave and a $\frac{1}{4}\lambda$ vertical.

Many entrants commented on the good conditions and the lack of QRM from higher powered stations, which had resulted from the WAB cw contest in previous events. This year the event coincided with the WAB phone contest, thus removing a great problem for the low powered cw operators.

GD4BEG will be awarded the 1930 Committee Cup, and Certificates of Merit will go to G3NEO and G4BCH.

Posn	Callsign	Points	Power (W)	QSOs
1	GD4BEG/P	5600	0·5	56
2	G3NEO	4900	0·5	50
3	G4BCH/A	4700	0·5	47
4	G3JVJ	4500	0·5	45
5	G4BRK	4000	0·5	40
6	G3XJO/A	3200	0·5	32
7	G4ALG	2900	0·5	29
8	G4BUO	2715	0·5&5·0	40
9	G3JKY	2400	0·5	24
10	G3RQZ	1400	0·5	14
11	G8PG	1025	2·0	41
12	G3BRS/P	725	2·0	29
13	G3UJG	720	2·0&5·0	30

Check logs were received from G3NYA, G4BWP and G4CMY

432MHz Open Contest results

The VHF Contest Committee's crystal ball once again proved its worth. Conditions were very good during the Saturday and from dawn until noon on the Sunday, but then they deteriorated rapidly and activity almost ceased.

The Council Cup, very deservedly, goes to G4BEL, with G3JQA/P the runner-up.

The contest was notable for the considerable number of ssb-equipped stations, and for their willingness to make cross-mode contacts. Many entrants, in particular newcomers to the band, were impressed by the high standard of operating. Other comment was largely favourable. In the main it was a successful event, and with a 25 per cent increase in entries was a pleasure to adjudicate.

G5HD

Posn	Callsign	Score	QSOs	Best dx	Km	Cnty	Pwr
1	G4BEL	705	122	PA0ANS	410	CE	250 p.e.p.
2	G3JQA/P	626	114	F8MM	523	SD	50 p.e.p.
3	G3NHE	541	86	DL9LU	580	YS	10*
4	GW8AWM/P	538	88	PA0VV	505	RN	150
5	G4CCC/P	499	107	PA0VV	385	BE	15*
6	G3WDG/P	477	90	ON5FF	370	WE	20
7	GW8AZU/P	372	64	G4BYV	288	BR	10*
8	G4AGE	356	60	DL9LU	575	DY	4p.e.p.
9	G3NNG	339	63	ON5EB	400	BE	15*
10	GW8BHH/P	300	52	G2DSP/A	275	RN	15*
11	G3YYF/P	238	36	PA0BMC	340	SX	12
12	G8ERW	202	60	G8AGU/P	265	HF	25
13	G8GNE	194	40	PA0HKE	307	CE	5*
14	GD2HDZ	178	24	G4BEL	365	IM	40
15	G4BWW	175	35	G3WDG/P	300	LE	10 p.e.p.
16	G3SHY	173	37	ON5FF	381	NM	25
17	G8EOP	165	25	ON5FF	510	YS	150 p.e.p.
18	G3JVL	156	30	G3NHE	293	HE	100*
19	G4BFT	155	45	G8AGU/P	207	WR	30
20	G8FMK	138	35	G8AGU/P	210	OX	6
21	G4BBR	132	28	G4BWW	220	GR	400 p.e.p.
22	G5UM	117	37	G8AGU/P	230	LR	15
23	G3VPS/P	114	24	G3NHE	287	SX	5
24	G3OBD/P	109	33	G3NEO	275	WE	200 p.e.p.
25	G8CPX	96	24	GW8BHH/P	198	BD	150
26	G8ARM	89	19	G8AGU/P	288	KT	3p.e.p.
27	G8CTT	85	25	GW8AWM/P	245	KT	30
28	G8ECO	58	18	GW8BHH/P	220	SY	10
	G8BVF	58	16	G4BBR	175	LE	6
30	G8ACE	32	8	G3JQA/P	175	HF	1·5
31	G8FUF	28	16	G8GNE	150	SY	2*
32	GM8BKE	11	1	G4BWW	270	DU	40 p.e.p.

* Watts output

Spring 1974 432MHz Cumulative Contest results

The total of 25 entries in the 432MHz Cumulatives for spring 1974, does little to reflect the steadily growing interest in uhf activity. The event attracted support from at least 10 stations for every log submitted as an entry, and it is estimated that the overall count of callsigns recorded during the seven sessions exceeded 300. Conditions were disappointing and few stations made contacts beyond the 250km radial.

The next series of 432MHz Cumulatives will take place during the summer months, and if present trends continue the leading stations can confidently expect to top 100 QSOs from their three best sessions.

C. S.

Posn	Callsign	Score	QSOs	Best dx/Km	Cnty	Zone	Sessions
1	G3NHE	285	71	G3JVL/280	YS	A	3, 5, 7
2	G8CXH	211	39	G8EOP/256	GR	D	3, 5, 6
3	G3BA	210	70	G3BW/240	WK	B	3, 5, 7
4	GW8ACG/P	193	69	G8GNE/230	FT	E	2, 3, 4
5	G4BFT	164	58	G4BYV/222	WR	B	2, 3, 5
6	G4ALN/P	162	58	G8CXH/205	EX	C	5, 6, 7
7	G5UM	126	58	G4BYV/123	LR	B	2, 4, 5
8	G8AVX	123	49	G8EPG/123	WK	B	2, 3, 4
9	G3JVL	107	41	G3KMS/328	HE	D	5, 6, 7
10	G8AWM	105	60	—	—	—	2, 5, 7
11	GD2HDZ	94	14	G3BA/245	IM	A	3, 5, 7
12	G8EDF	93	43	G8CXH/190	DY	B	4, 5, 6
13	G8FMK	88	36	G3NHE/170	OX	D	3, 5, 7
14	G8ATD/P	82	38	G3NHE/170	BD	C	3, 6, 7
15	G8GVA	79	41	G8FMK/103	LR	B	2, 5, 7
	G3XEB	79	51	G3BA/145	HF	C	5, 6, 7
17	G8VN	55	35	G8AVX/60	DY	B	3, 4, 5
18	G8CTT	52	44	G3NHE/200+	KT	C	4, 5, 7
19	G8BQH	51	39	G3FEC/P/75	BS	D	1, 2, 3
20	G5HD	48	23	G8CXH/85	WE	D	5, 6, 7
21	G8BVF	39	15	G3UBX/103	LE	A	1, 2, 4
22	G8CUB	38	22	G3JHM/106	EX	C	2, 4, 7
23	G8EPJ	35	33	G8CFZ/92	SX	C	4, 5, 6
24	G3SHY/A	33	23	G4BFT 115	LE	A	1, 2, 3
25	G3XFW	12	6	G6XM/100	ST	D	1, 6, 7

Late entry from G8EOP not accepted

Chiltern ARC 2m Contest

1000–1300bst, 30 June

Any amateur station in the UK holding a Class A or Class B licence and any swl is eligible; fixed, mobile or portable. Single-operator entries only, and SWLs are restricted to one receiver only. Any mode permitted by the licence may be used.

Exchange report, serial and county: serial commences 001. One point per QSO under 100 miles and five points for each QSO over 100 miles. Final score is number of points from QSOs multiplied by number of different counties.

Certificates will be awarded to the leading entry in both sections (transmitting and swl); one for the leading CARC-member entry and one for the leading non-CARC member entry.

Logs, to include date, time, station worked, report and serial sent, report, serial and county received and points claimed for QSO, to: Mr P. Russell, 13 New Road, Bolter End, High Wycombe, Bucks HP14 3NA.

Contests calendar

8-9 June	—NFD (Rules in February issue)
15-16 June	—Microwave Field Day (Rules in February issue)
15-16 June	—All Asian DX (phone)
16 June	—Slade DF Qualifying (Rules in June issue)
22-23 June	—Summer 1·8MHz (Rules in May issue)
23 June	—Region 1 (RSGB) VHF
25 June	—Start of 432MHz Summer Cumulative (Rules in June issue)
30 June	—Derby DF Qualifying (Rules in June issue)
30 June	—WAB phone
30 June	—Chiltern ARC 2m (Rules in June issue)
6-7 July	—"Jubilee" VHF/UHF & SWL (Rules in June issue)
13-14 July	—SSB Field Day (Rules in March issue)
21 July	—432MHz Open (Rules in June issue)
21 July	—Stratford-on-Avon DF Qualifying
28 July	—70 MHz Open (Rules in June issue)
4 August	—Oxford DF Qualifying
18 August	—144MHz QRP
24-25 August	—All Asian DX (CW)
1 September	—Dartford Heath DF Qualifying
7-8 September	—VHF NFD & SWL (Rules in March issue)
15 September	—80m Field Day
15,22,29 September	—1,296MHz Cumulative
22 September	—DF Final—Coventry and Rugby
5-6 October	—UHF NFD & SWL (Rules in April issue)
5-6 October	—VK/ZL/Oceania (phone)
12-13 October	—VK/ZL/Oceania (CW)
12-13 October	—21/28MHz Telephony (Rules in May issue)
October	—Start of 70MHz Cumulative
October	—Start of 432MHz Cumulative
19-20 October	—7MHz CW (Rules in June issue)
20 October	—432MHz SSB
2-3 November	—7MHz Phone (Rules in June issue)
2-3 November	—144MHz CW
9-10 November	—Second 1·8MHz
8 December	—144MHz Fixed

Looking ahead

10-17 August—GB3RN operational on board HMS *Belfast*.
24-26 August—GB3RN operational during Portsmouth Navy Days.
14-15 September—North-West Amateur Radio Convention, University of Lancaster, Bailrigg, Lancaster.
28 September—Scottish VHF Convention, Region 12 ORM and Zone G Conference, Dundee.
31 October-2 November—Midland National Amateur Radio Exhibition, Leicester.
25 November—RSGB lecture at the IEE.

RAYNET

by S. W. LAW, G3PAZ*

An analysis of the registered membership taken over the last two years shows a very satisfactory increase of something of the order of 15 per cent to date. Naturally it is impracticable to arrive at an exact figure at any one time as the position fluctuates almost daily but the overall picture remains healthy.

Taking a closer look at the figures shows a lamentable decrease in the number for Scotland where the membership has dropped to nearly half that existing in mid-1971. Wales, on the other hand, has doubled as from that time. In the southern counties the drop in some areas has been about balanced by the increase in others, including those in the London postal district. The Anglia area, as always, has a very good record and the extreme west is doing very well. Another area to double its membership is that comprising the Cheshire consortium, where some re-organization is, we believe, making good use of the doubled membership since 1971. We have every sympathy for the steadfast members in certain areas who have so far been unable to raise a "quorum" sufficient to form another group and we sincerely trust that their unremitting enthusiasm will eventually prove fruitful.

Principle and practice

There has recently been some comment on the setting up of groups of people (not necessarily radio amateurs) for the express purpose of providing "emergency radio" using frequencies other than those allotted to the radio amateur. Let us make it clear that there is nothing to stop any person or persons who can afford the fees from obtaining a "business radio" licence and using equipment which is approved by the authorities for any purpose which satisfies the appropriate regulations in force at this time. The cost of the equipment and licence is high and the penalties for mis-use are severe. There may be some who deplore this development, and in the framework of Raynet they may have a point which for obvious reasons we will not enlarge upon here. The only point we see at issue is a rather vexed one of "mistaken identity", in that the public or some of the prospective user services may confuse our well-established system with that of these independent bodies. Far be it from us to decry the work done by the independent groups, but let us at all costs make it unmistakably clear to all that Raynet is old-established and experienced in the work of emergency communications within the framework of amateur radio and in accordance with the terms of that licence which we all worked so hard to obtain. Therefore let us take the greatest care to correct any mis-use of our Raynet title immediately and without equivocation. And, in conclusion, make certain that your registration card is up-to-date and valid.

Get together?

It has been proposed, further to our "social" note in the April issue, that a social function be arranged towards the end of the year in London for all Raynet members and families. Suggestions as to the viability of such an event would be welcomed by the Raynet Committee. To forestall comment on the venue from our northerly members, you will find that Raynet will be well represented at the show in Leicester and there should be ample opportunity for discussion and any suggestions for a possible similar social in the Midlands or North to cover those areas to ease travel problems. Your comments are welcome; please send them in now.

Hon Registrations Secretary; Mrs L. A. Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester, Essex.

* 130 Alexandra Road, Croydon, Surrey CR0 6EW

MEMBERS' ADS

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

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

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

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

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

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

FOR SALE

Drake SPR-4 transistorized communications receiver, less than 20 hours use, as new and in maker's packing (list price with accessories, £390), must be a bargain at £290. *Wanted:* TF144H signal generator. A. Fletcher, 62 Moorbridge Lane, Stapleford, Nottingham. Tel Sandiacre 397446.

Why not save £70? Buy an "as new" KW 204 with vox unit for £115. G3ONU, 6 Sutcliffe Close, Bushey, Herts. Tel 01-950 2354.

Complete Drake line station comprising R4B receiver, matching speaker, psu, T4XB transmitter, L4B linear 2000, MN2000 antenna match network, mic, cost over £1,000. Hy-gain TH3 Mk3 3 ele beam, rotator, 150ft feed lines 10–15–20m, £95. Yaesu FT2F 2m, £70. All equipment new condition. Best bona-fide offers considered for complete Drake line. SE London GLC area. Tel 01-460 8481, evenings.

4m walkie-talkie, tx aligned on 4m with xtal, rx needs conversion. Complete with ni-cads, £30. Electroniques 1·6MHz transistor ssb i.f. strip with xtal filter, £10. Telephone weekends only, or write. GM8BKE, QTHR. Tel 041-942 1406.

Components (clearing shack). Unused 14 × 2·5K 3W ww, 8 × 5K log, 7 × 100K log all with sp mains switches, 47 × 50K 1in, all long spindle pots. 77 × 1M 1in pre-set pots. 10 × 24 pin chassis plugs. 4 × 0·005μF 5000V dc/wkg, 19 × 0·0015μF 8000V dc/wkg, oil filled capacitors. 80 × 6·8K 5% 3W, 76 × 10K 10W ww resistors. 50 × spst, 55 × spst 250V ac 5A switches. The lot £30. D. S. Marshall, "Shelwyn", Nut Orchard, Twyning, Tewkesbury, Glos GL20 6DR. Tel Tewkesbury 294082 (evenings).

Racal 1·4MHz ssb filter complete with carrier crystal 6dB passband 500–3000Hz, £8. Hy-gain LC80Q loading coil, £5. Redifon GR286, full range of spares, xtals etc available. G3JMJ, QTHR. Tel 073-271 3467.

KW Atlanta, psu, with remote vfo. All as new condition, £170 ono. Would exchange for KW2000B and psu in same condition. G3BII, QTHR.

Storno Viscount, multi channel working with crystals for GB3PI, 144·48 fitted toneburst and preamp, excellent condition, £30. Also, wanted or would exchange amateur bands receiver, eg JR500S. A. D. Parker, 32 Pondcroft, Hatfield, Herts.

HRO, recently realigned, re-valved and all decoupling capacitors replaced. All sw coil packs and 40, 20, 15 and 10m bandspread. With handbook, speaker, psu, £25. Class D wavemeter, £4. G4AWC, QTHR.

Eddystone 888 Pye F27AM base station tx, working on 2m. Cash offers or exchange EC10 and cash adjustment. G8BKQ, QTHR. Tel Redditch 66228.

KW2000 dc psu, £18. Offers for FT100, FT400, FT500. *Wanted:* 1m hf ant. 18AVQ W/B, circuit frontier digital 200S, digital 24hr battery clock, ships clock, digital one vfo. G3DCS, QTHR.

TIL209 leds, 10 for £1. BF256A fets, 15 for £1. AD161 AD162, 35p pair. RCA16561 117W silicon npn, 25p each. BB113 Vcaps 9–100pF, 25p each. BC107, 25 for £1. BF241 vhf low power, 10 for £1. All new. G3WZT, QTHR. Tel Partridge Green 710565.

Valves, 50 used but good useful types cheap. Sae list. *Wanted:* Stick xtal mic, cheap, good. G2ANB, QTHR. Tel Hockley 3278

HRO-5T with matching speaker/psu, 5 coils, manual. Eddystone 898 and Jackson 4489A sm dials. Sell or part exchange for vhf gear, rotator, small scope, teleprinter, fax equipment, why. R. S. Sayers, 140 Wolverley Ct, Woodside, Telford, Salop.

FT401, FL2000B, FV401, SP401, Osker power meter, lpf, dummy load, mint condition. Delivery by Securicor. Best offer over £350. GM3RUI, QTHR. Tel Aberdeen 53553, ext 68.

CR100, good condition, c/o relay plus 6SG7 rf stages, good performance on 160 to 40m, £18 or nearest offer. *Wanted:* 9MHz crystal filter with sideband crystals ("Inoue" or any other). R. Kell, 177 Main Street, Seahouses, Northumberland. Tel 463.

Cassette tape recorder. Battery with microphone, gone stereo, £12. Digital voltmeter, good condx but fault which I have no time to fix, gift £22. E. Jones, Westfield College, Hampstead, London. Tel 435-2528.

35ft lattice tower, buyer collects. Heathkit HW17, Codar AT5 T28 ac/psu. Pair Eagle DM73 mics with floor stands. G3WZD, QTHR.

Cambridge AM10D, six channel working well on 2m with xtals, £30. Heathkit Mohican, factory built, £15. Hamgear PM11 preamp, £6. All in good cond. GW4BIQ, QTHR. Tel 044-128 3245.

Eddystone 840C receiver, good condition, £32. Codar AT5 tx with mains psu, £14. Sell both for £42. Chris McCarthy, 6 Lymington Avenue, Leigh-on-Sea, Essex. Tel Southend (0702) 711742.

HW12 80m tx/rx complete with homebuilt mains power supply and microphone, in good condition, £60 ono. Asahi twin swr meter, excellent condition, £8. G4AXT, QTHR.

Storno CQF 13c-14, 146–174MHz. Recent manufacture, very clean, needs aligning, xtals for 145MHz, conversion data supplied, also new manual, £30 ono. TW2 a.m./tx, fair condition, £5. G3TDP, QTHR. Tel Stelling Minnis 201.

80ft heavy duty alloy tubing (cost 44p/ft) 30p/ft; x castings and booms for quad, £5; various lengths of tubing for beams. G3NUG, 27 Shenley Hill, Radlett, Herts. Tel Radlett 4435.

Two tone oscillator on circuit board, needs 9–15V, £2 inc postage. Mains timer 240V synchronous motor with knob to preset 0–14h delay (off) then 0–4½h "on", £2 inc postage. M. Mann, 45 Old School Lane, Milton, Cambridge.

Codar AT5 tx + ac psu and mic, £20. Eddystone 640 rx recently overhauled, £17.50. Evershed and Vignoles 500V Megger, in case, ex cond, £15 ono. Could deliver within reasonable distance of Macclesfield or Worcester. J. D. Burling, 41 Park Mount Drive, Macclesfield. Tel Macclesfield 25154.

LC10FM, quick heat, boot mount Cambridge. All transistor except two YL1080. Very good condition. Complete 10 channel, tone burst, push button control. Fitted 144·48, 145. Ten to 15W out, £45 or offers. G8GXE, QTHR. Tel Fulmer 2078.

Model HQ1 mini beam, only 6 months old, £30. Peak sound audio amplifier, 12W, £3.50. Storno 2m fm transceiver, provision for 8 channels, complete with 5/8 whip, £25. Write or phone (evenings). P. Reed, 73 Dudley Road, Brighton, Sussex. Tel (0273) 504634.

Oscilloscope Hartley 13A complete probe, leads and cover, £15. Buyer collects. G4KG, QTHR. Tel 0491 651270.

FT101 Mk2 just 1 year old, £225. FL2500 linear, almost new plus spare tubes, £115. Quad rotator cables mast, £25. Microwave Modules 2m/28MHz converter, £13. Osker meter, £13.50. Callers by appointment. G8AYM, QTHR. Tel Bourne End 22304.

Icom 1C21 2m fm transceiver, plus vfo, with a.m. mod and 4 channels, £140. Cash sale, buyer to inspect and collect. G8FZH, QTHR.

Heath HR-10B amateur bands only receiver with 100kHz crystal calibrator, excellent condition, excellent performance, £42. G4CHM, QTHR. Tel 22269.

Radio Communication; 1949–73 misc copies, 5p each, 50p for complete years. Sae for list. WW; 1964–66 complete. Practical Electronics; 1964–66 bound, 1967–68 complete. All 50p. G3ZNW, QTHR. Tel 01-432 2343.

Sommerkamp FL500, £110. FR500 with Microwave Modules 2m converter, £120. Diamond KB-104 trap vertical, unused, £16. All ono, prefer buyer collects. G4AOK, QTHR.

Sommerkamp FL200B tx 240W p.e.p. 10–80m, £85. G8FKM/G4CTU, QTHR. Tel Kidderminster 3966.

Yaesu FT75 and mobile psu—extra xtals fitted, £70. Buyer collects. G3VGU, QTHR. Tel Grays Thurrock 5677.

Heath SB620 spectrum analyser, good condition, £50. G3YBU, QTHR. Tel Hull 408677.

Weir Electronics 2m converter 28–30MHz i.f., £8. J Beam 16ft portable mast, £2. 6-ele 2m beam (70Ω), £1.50, IOW toroidal 1/1 balun, £1. Pair 813 bases, £1. RCA 813 filament transformer, £1.50. Prefer buyer collects **or** p/p extra. G3YBA, QTHR. Tel 303408.

Cossor 1035 double-beam scope, time-base requires attention. Must sell, £8 ono, buyer nspect and collect. A. Dunsmore, 2 Glenmavis Drive, Bathgate, West Lothian. Tel Bathgate 53841.

AR88D, £25; Heathkit RAI, £20; Labgear LG50 10–80 a.m.-cw, £15; BG221 and psu, £10; vhf/uhf wavemeter and swr meter, £15; 144MHz 10W tx, £5; Telford TC9, £70. G4BKY, QTHR.

Top-band dx, little used, well built, £8. Buyer collects. Would exchange swr meter, Joystick and atu. G3JIC, QTHR. Tel 0744 23916.

KW2000B with 6146Bs and ac power unit. Checked KW, £180. G4ALV, QTHR. Tel 01-460 3852.

Pye Lynx camera, £27.50. Woden auto transformer 1½kW 110V, £5. RCA 500W modulation transformer, £3. AVO electronic test-meter, £5. Creed 6S5 auto-tx, £12. Rtty automatic perforated tape reeler, £3 buyer collects. G3EFP, QTHR.

FT75, FP75 psu, 2m transverter with integral Microwave Modules converter, psu, in matching case, £150 ono. J Beam 6 over 6, 10 element, 14 element Parabeam, all 2m, 2 × MBM46 8A mains Variac. Offers. G8FAP, QTHR.

SSTV P7 phosphor electrostatic tubes GEC 1646A 6in dia, new boxed, £2 + 25p carriage. G3MWV, QTHR. Tel Cromer 2872 (evs only).

NCX3 matching psu heavy duty step down transformer, handbook, Shure 201 mic, very good condx, £65, includes delivery by Securicor. GI3SHI, QTHR.

RG17 coaxial cable. Extremely low loss (0·4 of RG 8). New unused 93ft length. £28 buyer collects. G3FNJ, QTHR. Tel 01-866 4680 (evenings/weekends).

HW32, 20m single bander, with mains psu, mic, speaker and manual. Will demonstrate, reason for sale—gone to all band rig—£60 buyer collects. G4CDW, QTHR. Tel 0272 671409.

Cornishman ssb 6 band tx, 18W p.e.p. and metered psu. Photo supplied. Working but vfo needs attention, all data supplied, £15 ono. B7G 100kHz crystal, £1. AVO sig gen, £5. G3WBT, QTHR.

RSGB Bulletin; July 1946 to June 1957, July 1954 to Dec 1971. SWM; Mar 1953 to Feb 1970. VHF Communication vols 1–3 in binder. Reasonable offers? G8AHE, QTHR. Tel 021-453 5990.

3 pairs lightweight headphones, 1 pair muff type lightweight headphones. Offers invited. All good condition, excellent reception. G3XWV, QTHR. Tel 021-472 1913.

2m tx/rx homebrew using Cambridge units, needs attention. MR821 tx mains psu, 2m converter i.f. 2–4MHz. 4/4 J Beam aerial. Sae details. GM3OEA, QTHR. Tel Hopeman 452.

Sommerkamp FR100B rx, full 10m and top band, ex cond, £75. G3TRB, QTHR. Tel Droitwich 4806.

Heathkit SB102 complete with SB600 and HP 23A power supply, in new condition with GH/12A Heath microphone, all for £220. *Wanted:* HW 12A with power supplies if possible. Must be immaculate condition. G3WY, QTHR. Tel Evesham 45497.

Heathkit SB301 rx, fitted cw filter, £85 ono. G3SYM, QTHR. Tel Aldershot 27873.

Codar AT5 tx with ac psu, £16. Codar T28 rx, £14. Marconi CR100/2, £12. HSC morse records, beginners' course, £1.50; advanced course, £1.50. G4ACH, 38 Starre Road, Bury St Edmunds, Suffolk. Tel Bury St Edmunds 64241.

DX40U 75W and VF1U working fab. Pre-war Hallicrafters Super Sky Rider, collectors item, £30 the lot or sell separately. Don Phillips, 162 St Helens Avenue, Swansea. Tel 0792 57230.

Storno Viscount transmitter rf strip, £4. Hudson FM208 low band, £9. Practical Wireless, Practical Electronics, Radio Constructor, 1966 to 1972. Please ring for details. D. W. Evans, 75 Nether St, Finchley, London N12. Tel 01 445 0759.

Woden mains trans type PTM17 750 × 750 250mA 5V lt, £5 p+p. G3JNY, QTHR. Tel 3058.

Trap vertical antenna. Hustler 4 BTV 10–80m, perfect condn, £18. R209 rx 12V, needs attention, £8. G3YFI, QTHR. Tel 093786 2502.

BRT402E, fb performance and condition, with makers full manual, £60. Buyer must collect. A. E. Townshend, 4 Harbour View, Fowey, Cornwall. Tel Fowey 3289.

CR150, psu spare valves, copy handbook, £25. KW202, cal, handbook, spare valves, £110. Buyer to collect or arrange transport. Livsey, 18 Tollard's Rd, Countess Wear, Exeter. Tel 79876.

Sentinel 2m converter i.f. 6–4MHz, £8. *Wanted:* Sentinel 2m converter i.f. 28–30MHz. A. Abbot, 6 Rectory Road, Birmingham 31. Tel 021-476 1161.

FT2FB fitted five extra crystals, £75 or nearest. Also Heath Stereo fm tuner, £15. G3UOX, Elm Cottage, Chawton, Nr Alton, Hants. Tel Alton 58198.

3 bed semi, mod kitchen, 2 recpt, bath, 2 wc, hobbies room, garden, shack, 30ft pole. Garage poss. Easy commute London. Would convert two flats. G2CIL, QTHR. Tel Horsham 61210.

Labgear quad elements complete but only one "spider", £5 cp. Variac 0–27V 12A out, £20. Londex uhf ant c/o relay 50V, £3. T. Biddlecombe, 27 Mandeville Close, Wyke Regis, Dorset. Tel Weymouth 71529,

Two Pye Bantams, one Cambridge 70MHz in very good condition, will exchange sell for air band versions or similar. Suitable for gliding. Also selling SB125 ssb fixed freq transceiver 3–15MHz, £35. G3WUT, QTHR. Tel Basingstoke 4590.

SB102 HP23A SB600 SB640, perfect. Best offer secures. *Wanted:* KWM2, also 32S1. G3MPN, 54 Norwich Road, Wymondham, Norfolk. Tel Wym 3382.

KW2000 + ac psu + Shure mic, £86. *Wanted:* Amateur bands transistor rx, buyer collects. G3WBO. QTHR. Tel Horsham 64606.

2m transistor tx 5W a.m. with xtals, £20. 6JP Varactor tripler die-cast box, £9. Both ono. 47 Queens Ave, Meols, Wirral, Cheshire. Tel 051-632 1216.

R1155 working, £3 ono. *Wanted:* For HRO-5 (with df)—borrow manual or purchase to copy, coil pack covering above 15MHz, any bandspread coils? State price. Also need 100kHz exact xtal, state price. R. J. Napper, 22 Rydal Dr, Hale Barns, Cheshire WA15 8TE. Tel 061-980 4252.

BC221 with charts and instruction manuals, external power supply, £30. Cossor LO58 7MHz single beam scope, £10. A.m. receiver R1481 65–80MHz, £7. Buyer collects. All very good condition and in working order. G8DFT. Tel 01-942 1230.

Microwave Modules tx plus three crystals, £30. *Wanted:* Defunct JR310 (must not have vfo fault), tx unit from high band Cambridge ect. G8FMS, QTHR.

SWM: 1962, 1963 less June July, 1964, 1966, 1967, 1968 less Feb, 1972, 1973, 60p per year. Odd copies; August 1956, Feb 1958, Oct 1960, Jan 1971, 5p per copy, postage extra. G4FN, QTHR.

KW600 linear, £75. Consider part exchange transceiver or JR599. Prefer buyer collects or would deliver Birmingham area. Hamgear 160m converter, £5. G3EGS, QTHR. Tel 021-472 2525.

Crystals: 42 for 4m conv, 65 and 65·5MHz for DC6ML. £2 each. G3XTQ, QTHR.

KW2000B + ac ps, £180. KW1000 linear inc ac ps, £80. Heathkit DX100, £30. All gear in vgc, carriage extra. GW8DUP, QTHR. Tel Swansea 72632.

Radio Communication: 1972, 1973, 60p per year, postage extra. Odd copies; Jan 1952, July 1953, Oct 1956, July 1966, Sept 1967, Oct 1967, Sept 1969, Jan 1971, 5p per copy, postage extra. G4FN, QTHR.

Microphone AKG D703 unused, £5. Equipment fan 4in dia, £2. 3in Magslip trans Mk2, £1. G8ADX, QTHR.

2m converter on printed circuit board 4¼in × 2in 22·5–24·5MHz, i.f. 9V negative earth, £5. G8ACE, QTHR. Tel Royston 0763 41164.

Compact 4m transmitter and converter, £9. Receiver 4–6MHz, suit above, £4. 50W modulator, £5. 700V psu, £2. Other psus and Command tx, 50p each. Buyers collect. *Wanted:* Small ssb filter. G. D. Lean, 54 Blacketts Wood Dr, Chorleywood, Herts. Tel Chorleywood 3337.

Trio communication receiver JR500S; SP-5DS speaker; Sentinel mosfet vhf converter; extremely stable performance. Instruction/service manuals for rx, original packing. All in immaculate condition, £52 + carriage. Solatron scope. CD523S-2 overhauled, revalved, £18 plus carriage. G3ZDO, QTHR.

4m base stn 60W pa fully metered fm, rx tunable a.m. (with spare fm i.f.) squelch, nl, £40 offers. AM10D rx tunable, £23. *Wanted:* 2m or 4m transverter or comp ssb system. Nock, 4 Park Crescent, West Bromwich.

Pye Cambridge AM10D, v good condition, recent respray. New Escutheon (multi-channel) panel transmitter and receiver tuned to 145·00, mobile cradle available if required, £25. A. Richardson, 4 Belgrave Rd, Branksome Park, Poole, Dorset.

Heathkit HW 17A transceiver, good condition complete with handbook, but minus xtals. Would suit beginner, £50 ono. A. Palfrey, 29 Rydal Ave, Redcar, Teesside.

National NCX5 Mk2 transceiver with main psu and 12V dc converter, £160 or might separate. Assistance with delivery. G2AFD QTHR. Tel 06845 3242.

Transistor dash Ranger tx no 2m less crystal, £10. 2-B44s txs on 4m, rxs tunable, one mains one 12V, £7 each; uhf tvi filters, £1.05 carr extra. Sae enquiries. G8FUI, QTHR.

2m transmitter vfo controlled. A.m. fm/cw power control. QQV06-40 output, £75 ono. G8EZM, QTHR. Tel 01-467 6030.
Swan 350, ac psu and spkr in matchg cab, condx immac, £165. G5WG, QTHR. Tel 01-504 5499.
House, 1936 semi-det, 3 beds, large garage/workshop, quiet situation near station, shops. 13 miles London. Good vhf site. £13,250. G3OHD, QTHR. Tel Orpington 24138.
BSR type TSB2 microphone, metal cabinet with door 34in by 26in. Table top cabinets 19in. Transformer 1000V 200mA, transformer 375-0-375 100mA. Relays. Choke 150mA. Mullard 5-10 amplifier with book. Large wire resistors, UM2 transformer. G3DFS, QTHR. Tel 021-354 7769.
House, three recep, five bed, two bath. Beautifully situated, convenient London. Excellent QTH, hf and vhf, £35,000. G8FGE, QTHR.

WANTED

10GHz rx, need not be complete, must be cheap. Interested in other uhf/shf gear, tx and rx. Also s/h QQV03-20A and mod. Transformer EL84s into QQV03-20A. *For sale:* CV22 power triode (unused). B. Hewitt, 12 Thameside, Teddington, Middlesex. Tel 01-977 1982.
Information on alterations or modification to CR100 receiver. Also handbook parts 1 and 2 for New Zealand wireless set No ZC1 Mk1. Ferguson, Moaney Moare House, Ronague Rd, Ballasalla, IOM. Tel Castletown 3415.
BC221. Write stating condition and price. T. Johns, 62 Westmorland Avenue, Hornchurch, Essex RM11 ZEF. Tel Hornchurch 46748.
Handbook for Erskine scope type 2W. Buy or borrow. J. E. Fletcher, 114 Scholes Park Road, Scarborough, Yorks.
FL400 FT101 18AVT WB TH3JR beam, 2m and 70cm converters speaker for FR400. Handbook for R389-URR R390/WRR receivers. Please write. H. Richardson, 18 Forestdale, London N14 7DT.
Stoke Radio Society require KW2000 tx/rx or simliar. Also linear amplifier 80/10. Dead or alive. RCA ET4332 big rig and McMichael suitcase, four rx collectors items available. Offers with sae please to Brindley, president, STARS, 2a Racecourse Road, Oakhill, Stoke-on-Trent.
Ex RAF morse key type D reference No 10F/7373 with brown bakelite cover, in good condition, all offers considered. G4AWU, QTHR.
Rx type BC348 or BC342 in good condition. State price. T. Cooper, 48 Grange St, Burton-on-Trent, Staffs.
Electroniques general coverage Quoilpax—transistor or valve type—good condition. A. C. Bryant, 21 Briarfield Road, Newcastle upon Tyne NE3 3UE.
HRO coils: 7–14MHz general coverage, and any bandspread coils except 40m. G4CIB, 53 Elmleaze, Gloucester GL2 OJS.
R206 rx handbook or circuit required. Details of any mods etc. Can photocopy or return or purchase. S. J. Hodgetts, 14 Windsor Avenue, Littleover, Derby.
FT101 with 160m band. Also car mounting bracket and fan. Will pay cash or take over hp. Lee, 400 Edgware Road, W2. Tel 01-723 5521.
Cash paid for handbook, circuit, of Redifon GR286B base unit. G8EWO, 24 Thornwood Road, London SE13 5RG.
Hallicrafters SX28. State price and condition, all letters answered. GM3NIO, QTHR.
FT101 or FTDX150 for mobile operation, details and price to: Mitchell, 56 Sandy Road, Renfrew, Scotland.
XFGA or XF9B with usb carrier xtal. G8DKA, QTHR. Tel 021-353 5901.
Two new unused 813s needed. G3ETU, QTHR. Tel 061-740 5285.
Radio Communication Handbook, third edition. KW77, KW201, 888A in good condition. Inspect and collect within 50 mile radius. G3RPD, QTHR.
Codar T28 receiver. G3PXJ, QTHR. Tel 021-444 4312.
Bandspread coils and 456kHz xtal for HRO. Complete or scrap rx considered. G3AGF, QTHR. Tel Cheltenham 54773.
Buy or borrow manual for Murphy communications receiver type 100335, all postage paid. G4BGP, QTHR.
Handbook-service manual for EMI RE301F/TR52 series tape recorders, to buy or loan. Also metal 8¼in tape spools for ¼in tape, nab or standard centres. G8HMF, QTHR.
TA33, TH3, TA32 or similar beam wanted. Please write giving details. GM3WOJ, QTHR.
Marconi CR100 receiver in first class order—offers to G2UX, QTHR.
Codar 12m/s mobile psu. G3VUN, QTHR.
Geloso converter complete, case, 4·6 i.f., good working order, tuning 3·8-10, also 250 × 250 and 0005 wide spacing for Z match. Carry SB200 or two 250 × 250. GI6VU, QTHR.

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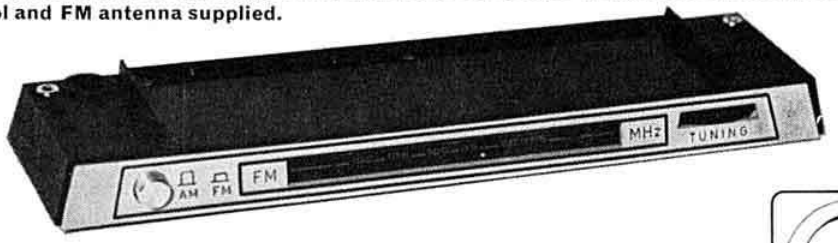

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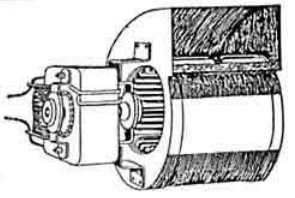

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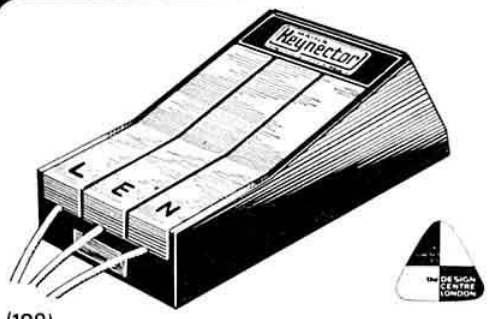

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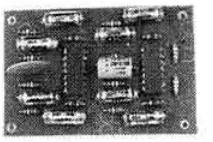
CWZ-BX £11.00 plus VAT



CWF-2 £7.25 plus VAT, Kit ready built **£8.25**

- **Get razor sharp selectivity from any receiver or transceiver.**
- **Extremely high skirt rejection.**
- **Drastically reduces all background noise.**
- **No audible ringing.**
- **No impedance matching.**
- **Ultra modern active filter design uses ICs for super high performance.**

We have what we think is the finest CW filter available anywhere. The 80Hz selectivity with its steep sided skirts will allow you to pick out one signal and eliminate all other QRM and QRN. Simply plug it into the phone jack or connect it to the speaker terminals of any receiver or transceiver and use headphones, small speaker, or speaker amplifier. Better still, connect it between any audio stages to take advantage of the built-in receiver audio amplifier.

Build the 2" × 3" CWF-2 PC card into your receiver or get the self contained and ready to use CWF-2BX and plug in!

SPECIFICATIONS

BANDWIDTH: 80Hz, 110Hz, 180Hz (Switch selectable)
SKIRT REJECTION: At least 60dB down 1 octave from centre frequency for 80Hz bandwidth
CENTRE FREQUENCY: 750Hz
INSERTION LOSS: Typical gain 1.2 at 180Hz BW, 1.5 at 110Hz BW, 2.4 at 80Hz BW
INDIVIDUAL STAGE Q: 4 (minimizes ringing)
IMPEDANCE LEVELS: No impedance matching required
POWER REQUIRED: CWF-2 . . . 6 volts (2ma.) to 30 volts (8ma.); CWF-2BX . . . standard 9 volt transistor radio battery
DIMENSIONS: CWF-2 . . . 2" × 3" PC board; CWF-2BX . . . 4" × 3½" × 2⅝" (black winkle steel top, white aluminium bottom, rubber feet)

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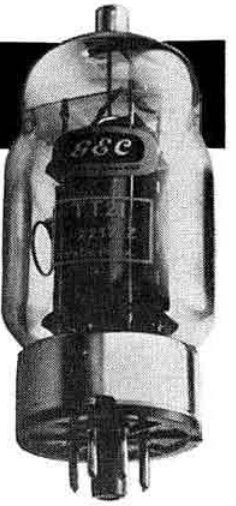

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BARGAINS. Hygain 18-HT "Hytower," never erected, £85. Hygain SJ2S4-362 2M J-pole, unused, £30. J-Beam PBL6 (Uhf tv) unused, £1. Freq. meter LM14, immaculate condition, manual, spare valves, £25. Solartron Highstab PSU AS516 (250/300V STAB–6·3/0/6·3V 4A –6·3V 1A), chassis only, manual, spare valves, suitable LM14, £10 Instrument case 12½″ × 7½″ × 8¾″, unused, suitable AS516, £1. Two WMT1 Wharfedale audio autotrans (2–16Ω), unused, £1. Copper earthing strip 6″ × 20 feet roll, £8. Buyer collects. R. Pragnell, 9, Broadwalk, Heston, Middlesex, Tel 01-570-9909.

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9494	9497	9505	9526	9527	9543	9551	9552
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