March 1984

RADio COMmunication

THE BANQUETING HALL, CARDIFF CASTLE

The magnificent setting for the installation of Bob Barrett, GW8HEZ, as 50th President of the RSGB on 14 January 1984

Journal of the Radio Society of Great Britain

RSGB

Amcomm

Phone 01-422 9585 for fast delivery

G5VS

G3LNC

YAESU FT980
GENERAL COVERAGE TRANSCEIVER

Yaesu said the FT1 was an adventure in electronics and we agreed. The FT980 is something quite different . . . IT'S AN ACCOMPLISHMENT IN ELECTRONICS providing the operator with a brilliantly designed transceiver with a wealth of features. Every feature has been carefully designed in to ensure the operator has MAXIMUM BENEFIT without gimmicks while allowing INCREDIBLE EASE OF OPERATION. We'd need more than this page to do justice to the FT980 so we suggest you call in and try it for yourself or call 01-422 9585 for a beautifully illustrated leaflet with a full description. . . . Yes it is expensive . . . the best usually is unless a way can be found to ease the pain . . . AMCOMM ARE EXPERTS AT THAT . . . TRY US.

THE FM MOBILES

There are many on the market these days and it must be difficult for the buyer to make a decision. . . . DON'T LET IT WORRY YOU for we have exactly the same problem. . . . We've searched the specs, tested the performance and analysed the reliability and our findings are simple . . . THEY ARE ALL GOOD . . . some have this and some have that, some are black, some are grey but they all have one thing in common . . . VALUE FOR MONEY. If you like it and it suits you then it's the one for you. . . . It leaves only one problem . . . THE PRICE. Our Welsh friends are forever repeating our original copy "HELPING WHERE IT HURTS". We haven't changed, we're still easing the pain. . . . Call 01-422 9585 and stop hurting.

ICOM ICR70 GENERAL COVERAGE RECEIVER

Our ads have said it all year "SILKY SMOOTH APPEARANCE WITH THE SILKY SMOOTH PERFORMANCE". What we did not mention was THE SILKY SMOOTH PRICE. . . . We are still not going to but call 01-422 9585 and see the price you can't refuse. Other receivers available FRG7700, KENWOOD 2000. Call for quote.

DATONG SRB2 and DATONG ANF

From the remarkable man in the north a pair of real SHOW STOPPERS . . . the SRB2 Auto Blanker for the nasty woodpecker . . . and it really works . . . the SRB2 locks on to the woodpecker as it appears and GETS RID OF IT just as fast, QRM GONE. . . . QSO ON. The Automatic Notch Filter is really IMPRESSIVE . . . if you spend any time on the LF portion of 80mts you need to be a brave man to last the evening . . . with the ANF you'll lose a lot of sleep but your COUNTRIES SCORE WILL SOAR. . . . You are sure to get one sometime why not now. . . . Call 01-422 9585.

YAESU 757GX
GENERAL COVERAGE RECEIVER

The requests for leaflets of this unit has been incredible. Most of you have the information you need to make a decision, however there is one question left to ask, CAN MR. YAESU PRODUCE ENOUGH TO MEET THE DEMAND? . . . The competition are already in a state of depression . . . read on . . . this is the complete HF rig and includes as standard FULL BREAK IN, CW FILTER, KEYER, MARKER, IF/WIDTH SHIFT, NOISE BLANKER, SWITCHABLE AGC and RF PRE AMP. . . . It also has AM and FM fitted. General coverage 150hz-29.999MHz plus TWIN VFO's. . . . Call 01-422 9585 if you require more information and we will give you a surprise with the price.

Stop Press! Yaesu Lads on Nightshift.

THE HANDHELDS

A large selection of hand-held equipment both amateur and professional to buy or rent including Yaesu FT208R, or FT708R, Icom IC2E and IC4E. Call 01-422 9585 for immediate despatch.

AMTECH 300B ANTENNA COUPLER

BRITISH MADE and MADE TO LAST . . . thousands in use throughout the world and priced to suit your pocket. Rated at 300 watts P.E.P. this coupler is suitable for coaxial fed antennas or random wires . . . just compare the price with anything else available and you'll understand why users say it's SUPER VALUE . . . at £49:95 including carriage. It really is our STAR BUY. . . . Call 01-422 9585 for fast delivery.

ROTORS

HIRSCHMANN 250. . . . There is no better buy on the market than this. . . . A lightweight Rotor suitable for most VHF antennas. . . . It's yours for £45 . . . Carr and ins. £1:50.

SKYKING SU4000. . . . An outstanding Rotor for large VHF arrays or light HF beams. . . . A delightful illuminated compass readout. . . . NICE ONE AT £85:00 CARR & INS. £1:50.

YAESU FT726R 2m/70cms/SAT

Without a doubt THE RIG OF THE YEAR and a clear indication of YAESU's view of the future of amateur radio (ring us and we will explain that). . . . All mode base station, 2m 17cms and 6m, think what three rigs would cost you and work out the value for money on this one. Call 01-422 9585 we'll give you the info. and the price.

YAESU FT290RB 2m
ALL MODE TRANSCEIVER

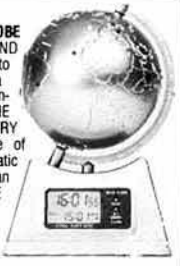
The world's BIGGEST AND FASTEST SELLING TRANSCEIVER EVER, still without a competitor in sight. This versatile rig is a REAL GIFT from AMCOMM to you at a price YOU'LL NEVER SEE AGAIN. . . . You don't believe us? Call 01-422 9585 FOR YOUR SURPRISE.
N.B. Competitors please call after 6.00 p.m.

THE ICOM NEW ONES

ICOM have been busy little boys this year. . . . THREE NEW ONES all announced at the same time . . . IC751 GENERAL COVERAGE TRANSCEIVER . . . IC745 ALSO A GENERAL COVERAGE TRANSCEIVER. . . . The differences are shown in the full illustrated literature which is yours for a phone call. . . . Replacing the IC251E is the NEW IC271, it looks the part and our first buyers are saying it certainly lives up to the high standards everybody has come to expect from ICOM. . . . 01-422 9585 FOR SUPER PRICE AND SUPER SERVICE.

UNION ELEC. WORLD TIME GLOBE

INSTANT TIME AT HOME AND ABROAD . . . simply turn the globe to the required country and it displays a red FLASHING LIGHT on that country. . . . Beneath, IT DISPLAYS THE TIME IN THE UK AND THE COUNTRY OF YOUR CHOICE. . . . Long life of batteries guaranteed by automatic switch off after 30 seconds . . . an IDEAL GIFT AT AN IDEAL PRICE £47:50 post paid. . . . Call now 01-422 9585 FOR FAST DELIVERY.



YAESU FT102
9 BANDER

See the reviews on this rig and call us . . . We'll tell you some more.

OUR MAIL ORDER SERVICE

The words we hear most frequently are **"I REALLY DIDN'T EXPECT IT UNTIL NEXT WEEK".** THEY REFER TO OUR MAIL ORDER SERVICE and come both by telephone and letter. When we say "IT WILL GO TODAY" we really mean that, the **same day** via red label special Securicor or first class post. You have very little to do, refer to the list below, pick up the telephone, quote your credit card number and the product is on the way to you . . . or drop a cheque in the post and goods will be despatched on receipt. WE PROMISE YOU ONE THING, the very least you'll save is the cost of a telephone call . . .
TET, HYGAIN, YAESU, ICOM, TRIO/KENWOOD, MICROWAVE MODULES, BNOS, DATONG, JAYBEAM, TONNA, MORSE KEYS including HI-MOUND and the SWEDISH BRASS, UNADILLA, SKYKING, HIRSCHMANN, TONO, TASCO, JVC PADDLE, VALVES, WELZ, MUTEK, HANSEN, DAIWA and many more. **If you need it we probably have it.** If you've got the time we've got the phone lines. . . . We guarantee you'll save more than a phone call. All the year round call 01-422 9585 for fast quotes and fast delivery BACKED UP BY FIRST RATE AFTER SALES SERVICE.

E. & O.E.

Amcomm

194 NORTHOLT ROAD, SOUTH HARROW, MIDDX. HA2 0EN. ENGLAND. TEL: 01-422 9585. TELEX: 24263

MARCH 1984

VOLUME 60 No 3

RADio COMmunication

Contributions **(including Members' Ads)** and all correspondence concerning the **content** of *Radio Communication* should be addressed to:

The Editor, RSGB,
88 Broomfield Road,
Chelmsford,
Essex CM1 1SS

Tel 0245 84938

Office hours: 0900 to 1700

Correspondence concerning the distribution of the journal and all other Society matters should be addressed to:

RSGB Headquarters,
Alma House,
Cranborne Road,
Potters Bar,
Herts EN6 3JW

Tel 0707 (from London, 77) 59015

Business hours: 1000 to 1600

CONTENTS

Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, 88 Broomfield Road, Chelmsford, Essex CM1 1SS.

All articles received are reviewed for technical merit by the RSGB Technical & Publications Committee, or an acknowledged expert on the subject, before acceptance. Payment at high competitive rates will be made for all articles published.

A contribution will only be considered for publication on the understanding that the person submitting it is the original author and owner of the whole copyright, and that on acceptance for publication such copyright will become the property of the RSGB in consideration of the above-mentioned payment by the RSGB to the contributor.

The editor will be pleased to send intending authors a manuscript preparation guide and to give any other advice and assistance requested.

Radio Communication **is published by The Radio Society of Great Britain as its official journal on the first Friday of each month and is sent free and post paid to all members of the Society**

ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS 34,792 copies per issue average circulation in 1983

Closing date for contributions unless otherwise notified: five weeks before publication date

We here at TRIO-KENWOOD have over the years developed a range of equipment designed by our professional engineers for you the active radio amateur. Our products range from the top notch TS930S HF amateur band transceiver to the smallest accessory. Each piece of equipment is specifically designed with the requirements of you, the radio amateur in mind. It has always been our policy at TRIO-KENWOOD to improve the specification and reliability of equipment by listening to the valuable comments of radio amateurs all over the world. The important relationship between yourself, the radio amateur and TRIO-KENWOOD is through our authorised distributor for the UK, LOWE ELECTRONICS LTD.

We give below a list of approved dealers in the UK. Any dealer not on this list has no connection with the UK distributor network and has no direct factory backing. Great care should be taken when purchasing your amateur radio equipment, to ensure that the dealer is factory approved. In any case, first contact our sole distributor for the UK: Lowe Electronics Ltd., who will be pleased to advise you of your nearest dealer.

Sole Distributor Lowe Electronics Ltd.
Chesterfield Road, Matlock, Derbyshire DE4 5LE.
Tel: 0629-2817, 2430, 4057, 4995

London Lowe Electronics Ltd.
278 Pentonville Road, London N1 9NR
(Shop located lower sales floor, Hepworths)
Tel: 01-837 6702

Glasgow Lowe Electronics Ltd.
4/5 Queen Margarets Rd, off Queen Margarets Drive, Glasgow.
Tel: 041-946 2626

The North East Lowe Electronics Ltd.
56 North Road, Darlington, Durham.
Tel: 0325 486121

Birmingham Ward Electronics
Soho House, 362-364 Soho Road, Birmingham B21 9QL
Tel: 021-554 0708

Buckinghamshire Photo Acoustics Ltd.
58 High Street, Newport Pagnell, Bucks.
Tel: 0908 610625

East Scotland Jaycee Electronics
20 Woodside Way, Glenrothes, Fife KY7 5DE
Tel: 0592 756962

Essex Waters & Stanton Electronics
Warren House, 18-20 Main Road, Hockley, Essex
Tel: 0702 206835

Lancashire Stephens-James Ltd.
47 Warrington Road, Leigh
Tel: 0942 676790

North London Radio Shack Ltd.
188 Broadhurst Gardens, London NW6 3AY
Tel: 01-624 7174

West Midlands Dewsbury Electronics
176 Lower High Street, Stourbridge
Tel: 0384 390063

W. Sussex Bredhurst Electronics
High Street, Handcross, Haywards Heath, W. Sussex
Tel: 0444 400786

Yorkshire Leeds Amateur Radio
27 Cookridge Street, Leeds LS2 3AG
Tel: 0532 452657

Northern Ireland George Moore Electronics
7 Cyprus Avenue, Belfast BT5
Tel: Belfast 658295

the **new** hf amateur band transceiver **and** general coverage receiver... the Trio TS430S

TS430S £752 inc VAT

"Digital DX-terity" is a phrase that describes simply the new HF transceiver from Trio. Combining an amateur band HF rig with the facilities of a general coverage receiver, the TS430S provides today's discerning amateur with a transceiver which enables him not only to communicate with his fellow amateurs but to listen to the broad spectrum of shortwave communication worldwide.

- The rig covers 160-10 metres, the amateur bands, plus 150 KHz-30 MHz as a general coverage receiver.
- USB. LSB. CW. AM modes are provided. FM is also available by adding the optional FM430 receive/transmit unit.
- A compact and lightweight design – 270mm wide, 96mm high and 275mm deep, the TS430S weighs only 6.5 Kg (14.3 lbs) and can be said to be a true portable transceiver, ideal for both shack and mobile use.
- The TS430S has dual digital VFO's operating independantly in 10 Hz steps. Both VFO's store frequency, band and mode of operation. The tuning dial torque is adjustable to suit the operator and a step switch provides a fast frequency shift for the VFO (100 Hz steps). An "A=B" switch shifts "B" VFO to "A" VFO frequency and mode, or vice versa. There is also a frequency lock switch, RIT for VFO or memory and an up/down manual scan facility from the optional up/down microphone.
- An all solid state transceiver, the input is rated at 250W PEP on SSB, 200W DC on CW, 120W on FM (with optional FM board fitted) and 60W on AM.
- The rig operates from a 13.8V DC source or by using the optional PS430, 240 volts AC supply.
- The digital readout indicates frequency to 100 Hz (readout is internally modifiable to 10 Hz).
- Eight memories store frequency, mode and band data. The eighth memory stores the receive and transmit frequencies independantly.
- An internal lithium battery having an estimated five year life is provided for memory back-up.
- Memory Scan.
- Programmable automatic band scan width.
- IF shift for minimum QRM.
- Tunable notch filter.
- Narrow/wide filter selection on SSB, CW and AM (filter optional).
- Speech processor built in.

Optional Accessories
PS430 matching AC power supply.
SP430 external speaker.
MB430 mobile mounting bracket.
FM430 FM board.
YK88C 500 Hz CW filter.
YK88CN 270 Hz CW filter.
YK88SN 1.8 KHz narrow SSB filter.
YK88A 6 KHz AM filter.
MC42S up/down fist microphone.
MC60A deluxe desk microphone with up/down switch.

TRIO

TRIO-KENWOOD CORPORATION
Shionogi Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150, Japan

TRIO-KENWOOD COMMUNICATIONS, GmbH
D-6374 Steinbach-TS. Industriestrasse,8A West Germany

TR9130 TWO METRE ALL MODE TRANSCEIVER

This rig is proof, if one needed it, that TRIO do not bring out new models just for the sake of it. The TR9000 is remembered as a classic rig and today people are still asking for second hand ones. They're even a rarity on our S/H shelf. The TR9130 incorporates the improvements that all amateurs asked for, green display, reverse repeater, tune whilst transmitting, higher power, more memories and of course memory scan. TRIO's answer, the TR9130.

TR9130 . . . **£442.52** inc VAT.

TS780 DUAL BAND BASE STATION TRANSCEIVER

The TS780 is the perfect base station VHF/UHF transceiver for the enthusiastic operator. The rig has all the necessary control functions essential for operating on both today's busy two metre band and the wide open spaces of seventy centimetres. Full repeater facilities plus reverse repeater are included and the transceiver has the usual memory channels (10), two VFOs, up/down frequency shift microphone, IF shift, two priority channels, memory and band scan etc. A superb rig, I have one myself, write for a full enthuse!

TS780 . . . **795.00** inc VAT.

TR7930 TWO METRE FM MOBILE TRANSCEIVER

Those who have used or owned a Trio TR7800 will know what I mean when I say that Trio, with the introduction of the TR7930 have improved on the unimprovable. The Trio TR7930 improves on the TR7800 by giving a green floodlit liquid crystal display, extra memory channels, both timed and carrier scan hold, selectable priority frequency and correct mode selection (simplex or repeater). The most significant change is the liquid crystal display, but closely following this must be the ability to omit specific memory channels when scanning and the programmable scan between user designated frequencies.

TR7930 . . . **£312.11** inc VAT.

R2000 GENERAL COVERAGE RECEIVER

The amateur bands are only a very small part of the radio spectrum, many other transmissions are available for the short wave listener. Broadcast stations provide an alternative source of current information both political and regarding the life style of the country. Fitted with the internal VHF converter the R2000 covers continuously frequencies from 118 to 174 MHz giving access to amateur two metre transmissions (am, fm, ssb and cw) plus a lot more. Having 10 memories, memory scan and programmable scan the R2000 provides in one rig the perfect receiver.

R2000 . . . **£421.36** inc VAT.

TS930S HF TRANSCEIVER WITH GENERAL COVERAGE RECEIVE FACILITIES

Much has been said about the TS930S transceiver and it now has a place high in the affection of those amateurs fortunate enough to own one, indeed it has become the "flagship" of the TRIO range. Providing full amateur bands plus a general coverage receiver (150kHz to 30MHz), the TS930S has every conceivable operating feature for today's crowded frequencies.

TS930S . . . **£1150.00** inc VAT.

TR2500/TR3500 HANDHELD TRANSCEIVERS

Two first class hand held transceivers, one for two metres and the other for seventy centimetres. Ten memory channels, band and memory scan, repeater shift, reverse repeater and a low power position make the rigs extremely useful for the radio amateur who wishes to keep in touch with his local scene. A comprehensive range of accessories, base station charger, speaker microphone, mobile mount etc. can be added to enhance operation, accessories used with one rig being compatible with the other.

TR2500 . . . **£237.82** inc VAT.

TR3500 . . . **£256.45** inc VAT.

TS530SP HF AMATEUR BAND TRANSCEIVER

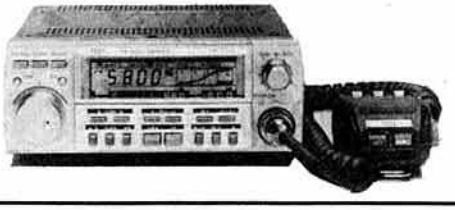
A logical progression from the reliable TS520 series the TS530S was the most popular HF rig in the range. I use the term "was" because TRIO decided to cease production and supplies were no more, however the demand from radio amateurs worldwide for the transceiver have continued and TRIO have reintroduced the rig. A standard HF valve transceiver without the frills but providing today's amateur with all necessary facilities for reliable world wide communication, the TRIO TS530SP now with notch filter.

TS530SP . . . **£638.00** inc VAT.

TW4000A DUAL BAND FM TRANSCEIVER

I have been waiting for this rig for the last three years, now it is here and I am using one, words fail me. Send for details.

TW4000A . . . **£469.00** inc VAT.

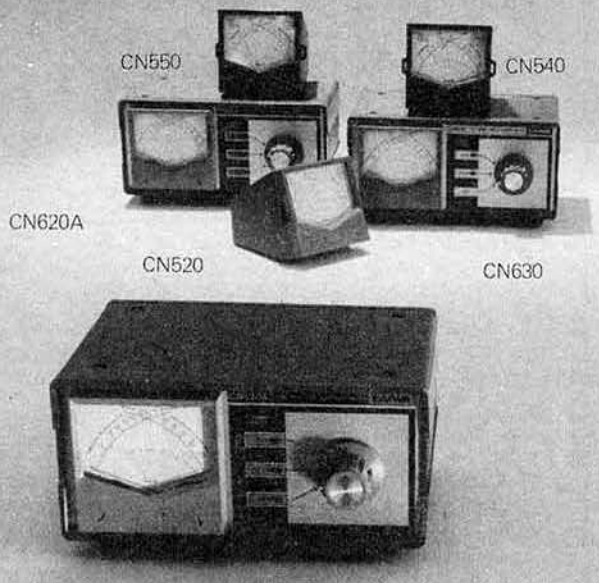


just a part of the range

LOWE ELECTRONICS Ltd

CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

for "cross needle" metering, DAIWA



What's so special about "cross needle" metering? Well, it's typically Daiwa to go direct to the heart of the matter and develop a system which will give you the true value of forward power, reflected power, and SWR all at a single glance. The elegant simplicity of the idea hides a great deal of thought, which of course is the hallmark of Daiwa products.

You will see from the photograph that the meter displays have two scales, one reading forward power, the other reflected power. Since SWR is calculated using these two values, Daiwa have arranged the meter pointers so that SWR is shown at the crossing point of the two meter needles.

Why don't other makers use the idea? Basically it's a question of power meter accuracy. The usual type of single or twin meter "SWR/power meter" uses a simple strip line to measure the VSWR on the transmission line. You will note that I have said "VSWR", and this is important. These so-called power meters are in fact only measuring the voltage standing wave and in order to display power, you need to monitor both voltage and current in the line. Daiwa meters of course, do just that, and consequently are very accurate indeed. The cheaper so-called power meters depend for their accuracy in being terminated in a load, and exhibit wild inaccuracy when terminated in a reactive load. In other words, when the indicated VSWR on the meter is other than 1:1, their accuracy is quite badly affected.

To summarise; the Daiwa cross needle power meters give you easy, unambiguous readings at a glance, and what's more those readings are accurate even in lines displaying high SWR, and since Daiwa meters measure true power, they are accurate at any point in the feedline from transmitter to aerial.

As with all Daiwa products, their meters show the Daiwa approach design, combining accuracy, ease of use and interpretation, and that indefinable feel of quality which is the sure sign of a good product. Once owned, never discarded.

CN520	1·8-60MHz	**£41.71** inc VAT
CN540	50-150MHz	**£45.00** inc VAT
A500	mounting bracket for above meters	**£2.30** inc VAT
CN620A	1·8-150MHz up 1kW	**£65.40** inc VAT
CN630	140-450MHz up to 200W	**£99.00** inc VAT
CN650	1·2-2·5GHz up to 20W	**£128.00** inc VAT

Carriage on "5" series meters £1.50, on "6" series £2.50.

If I am absolutely honest,

I am not certain whether I own a NRD515 because of its unbelievable performance as a general coverage receiver or just for the sheer pleasure of having and constantly admiring probably the finest piece of equipment available today.

Perhaps it comes down to the same thing, certainly the other NRD owners I have spoken to have all expressed the same feelings, that the NRD515 is a receiver in a class of its own.

As a person not owning the receiver, you may ask what sets this particular one above all the others. This is difficult to define—the feel of the equipment when wandering over the crowded band, its signal handling capability and selectivity can only really be appreciated by use. Technically, the equipment is above reproach. JRC's manufacture and production control methods as applied to other items in the range are equally applied to their amateur products. The other items referred to, only a small part of the vast range, are marine radio equipment, Marisat mobile terminal, Omega navigators, Doppler sonar, echo sounder/fish finders, communication satellite earth stations and a complete range of avionic beacons, radar and associated products. Indeed, a wide range of application of electronic and radio technology for land, sea and air.

You may be forgiven for associating such advanced technology with complexity of operation, a piece of equipment that needs an operator with an electronics degree. However, this assumption is incorrect. The NRD515 is easy to use with the minimum of controls to ensure the operator really enjoys his listening time. Digital readouts, MHz, mode and filter bandwidth switches together with a VFO knob that will tune the band continuously without using any other control, from 100KHz to 30MHz or vice versa. To assist with difficult band conditions the NRD515 has pass band tuning and the medium wave broadcast section to 600KHz to 1·6MHz has a preselector control to cope with crowded conditions. To give real "armchair copy" JRC have introduced the NCM515 remote control keypad. As its name suggests, the NCM515 enables frequencies to be quickly keyed into the receiver. Four memories are provided, two rates of frequency stepping in increments of either 100Hz or 10MHz and finally the ability to add to or subtract from the operating frequency by any frequency step. Add the optional 600Hz CW filter and the 96 channel memory unit and, as the other NRD515 owners would say, "a joy to own".

NRD515	monitoring receiver	**£965.00** inc VAT
NDH515	96 channel memory unit	**£264.00** inc VAT
NCM515	remote frequency controller	**£125.00** inc VAT
NVA515	speaker	**£34.50** inc VAT
CFL260	500Hz cw filter	**£39.10** inc VAT
CFL230	300Hz cw filter	**£64.00** inc VAT

EMPORIUM NEWS

Good Morning,

Just like to mention a **new handheld portable** transceiver from **Belcom: the LS202E** – not just another 2 metre FM box but a dual mode, **yes SSB and FM** truly hand held rig. So now, when the FM channels in your area are full, then QSY to SSB. Your friends with their base station multi-modes will now be contactable and from the local hill top rare DX will be available during lift conditions. Keep in touch at all times, **use an LS202E.** Power output is 3.5 watts, full repeater facilities are available as is a mobile mount which includes space for rig, linear and includes a high quality tailored audio speaker. Now the catch: **the rig will cost £1,000.00** – no, I jest, I do not know at this moment what the transceiver will cost and until the rig is in stock, hopefully during April, I will not be drawn on the subject.

The **Telereader** equipment is now well known amongst radio amateurs. The CWR685E receive/transmit unit is still installed in my shack. I must admit I have had to stop my wife from serving my meals in the shack whilst I am operating – apart from the fact that there is no room for her endless cups of coffee and Christmas cake, there is the danger that crumbs will fall into the keyboard. **The Telereader equipment seems to be extremely reliable.** To date I don't think any owner has had a problem, not even with crumbs. The Telereader range comprises of three models: **the CWR685E** combined transmit/receive unit with monitor at £797.80 inc. VAT, **the CWR670E** receive only unit without monitor £386.00 inc. VAT and **the CWR610E** receive monitor with combined CW practice facilities at £179.50 inc. VAT.

The three models all have **both ASCII** and **Baudot** facilities, plus a phase lock loop system for locking onto and decoding CW. I have had my first ASCII contact with Tim, G6XBE at 110 bauds. A great mode but I cannot keep pace with the rig at 50 never mind 110 baud.

32K COLOUR GENIE £168.00 inc. VAT (carr. £6)

Not so long ago I was in the showroom here at Matlock. David was on holiday so I had the enviable job of working in the same room as Beryl, our vivacious and attractive receptionist. I am sure those of you who have rung us will know her voice, indeed, I am sure that a lot of you ring us just to hear it. Anyway I digress. A gentleman enquired as to the facilities and performance of the **TRIO R2000.** It is some time since I used an R2000, being the owner of an NRD515. (We still have a few **NRD515's** available at **£965.00,** act now **before the price goes up**). Back to the R2000. The receiver has 10 memories which, along with frequency retain mode, the rig also has memory scan, programmable scan between user set limits, and to my mind a most important feature not included in some current general coverage receivers is the ability to tune continuously from one end of the band to the other. I cannot imagine using a receiver which only tunes 1 Meg and has to use a separate switch to change band – to my mind the TRIO R2000 is a useable **"operator friendly receiver".** Priced at **£421.36 inc.** VAT, the R2000 is real value for money. The VHF converter for the receiver **costing £113.00 inc. VAT** extends the range and adds 118 to 174MHz. Remember this converter also changes the digital readout so if you select 119.650 then that is also what the readout says. **Also available at £263.12 inc. VAT is the TRIO R600.** A more economical rig having receiver performance to please but no memories, scanning, etc. – in short a general coverage receiver without frills.

For those **who live around Cambridge** then, good news. We are opening a new Lowe shop in Cambridge. The address is 162 High Street, Chesterton, Cambridge. Street parking is available outside the shop and I do not have to tell you that Cambridge is a delightful town to browse around. **Of course a visit to Lowe Electronics is the ultimate pleasure.**

Tony, from our London shop, is to be in charge and he is looking forward to making new friends. The **shop** will open on **3rd April, 1984** subject to Solicitors, Builders, etc. Please telephone Beryl here at Matlock for further information. It is my intention to have a pre-shop opening get together on Sunday 18th March starting at 2.00pm **Cambridge Post House** – join us for a glass of wine, a look at the entire TRIO range of equipment and an opportunity to meet Tony, the Manager.

We now have **a new tool** set **Ref AT1030** priced at **£11.50,** inc. VAT. Housed in a neat green plastic tray the tools are a pair of long nosed pliers, and different sizes of both regular and Philips' screwdrivers – nine pieces plus, for the two larger Philips screwdrivers, a small wrench. The ordering code is AT1030 and, as I said earlier, **the price is only £11.50.**

To cast a magnified look at a component or circuit board under direct illumination is a simple job for a LSCP self-illuminated microscope. **Also just the thing for checking bees' knees,** the **LSCP** costs **£6.50, carriage 75p.**

I must take this opportunity **to apologise** for the long wait for those who wish to purchase an AR2001. Although we thought the receiver would be extremely popular when we first saw it we did not, for one minute, expect the demand and enquiries to be so high. The supply problem goes right back to the factory. AOR also did not expect such demand and coupled with a shortage of components available to the electronics industry worldwide, the result is a shortage of AR2001 receivers. **However, the situation is improving** and by the time you read this we hope that things will be better. The February edition of **Amateur Radio Magazine** carries a full review of the receiver. The front cover features the AR2001 in full colour, complete with **laser beams,** etc. Again for those who are still waiting for an AR2001 receiver, our apologies.

As you know, I am into RTTY using the **Telereaders** as previously mentioned. Another equally good way of getting into RTTY is to use a computer, plus specialist RTTY hard and software. The company that I have in mind is **RadSoft** from County Durham and, of course, the home computer can only be a **Colour Genie as sold by ourselves** and, therefore, subject to our normal standards of sales and service. I know several amateurs who, when pestered to buy a computer for the home, have realized that here is an ideal way to get on RTTY. Indeed, I have worked many stations using Colour Genies together with **a RadSoft package.** The **RadSoft RTTY/CW receive only** costs **£40.00** inc. VAT – the **RTTY transmit/receive** package costs up to **£90.00** and are available from us here at Matlock. A **32K Colour Genie** costs **£168.00** inc. VAT and I have found it extremely reliable. I have taken our shop unit home at weekends so that David, my son, could experiment with the colour graphics and the sound synthesizer.

The **Colour Genie** is reliable, easy to use, has a proper keyboard and is ideally suited to RTTY. **Ken Gray,** my friend who is part of **"RadSoft"** is an amateur who operates RTTY and, consequently, knows what he is talking about. **The Colour Genie** and **RadSoft RTTY** package makes a good system. Join the slow typists on RTTY!! As my wife said, rather unkindly, "A better mode. At least you will have time to think what you are saying before you say it".

Anyway, that's about it for now as I have to choose a wine for our grand opening in Cambridge. I hope to be at the shop during the first day and look forward to meeting new faces.

Gud DXes 73es FBYLS, XYLS, esFBOM, etc.

David, G8GIY.

We don'
of our s

The new IC-02E
Push-button Perfection

ICOM introduces the new top-of-the-line IC-02E to compliment its existing line of popular handheld transceivers and accessories. The new direct entry microprocessor controlled IC-02E is a 2 meter handheld jam packed with excellent features.

Some of these features include: scanning, 10 memories, duplex offset storage in memory & odd offsets also stored in memory. Internal Lithium battery backup and repeater tone are of course included.

Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority. The IC-02E has an easy to read custom LCD readout indicating frequency, memory channel, signal strength, transmitter output and scanning functions.

A battery lock, frequency lock and lamp on/off switch are also featured, as is an aluminium case-back, providing superior heat sinking.

A variety of batteries will be available for the IC-02E, including new long-life 8.4 volt and 13.2 volt packs. Top panel connector for 13.8 volts which will power transceiver operation.

The IC-2E continues to be available, and its complete range of accessories work with the new IC-02E.

The IC-02E comes with the BP3 Nicad battery pack, BC25E wall charger, flexible antenna, wrist strap and belt clip as standard equipment. A truly excellent product destined to a great future.

"We don't sell any of our sets until we know them inside-out." A bold claim, but as our engineers have been trained by ICOM in Japan we can guarantee the best after-sales maintenance service available.
As well as the 02E, 751, 745, 271, 471, R70, 290D, 490E, 25H, 45E, 2KL, AT100, 27E, AT500, 120, 2E, 4E in the ICOM range we also stock such famous names as Tono, Telereader, Cue Dee, Versatower, Yaesu, Jaybeam, Datong, Wetz, G-Whip, Western TAL, Bearcat and RSGB Publications. Thanet Electronics can offer you the most comprehensive and thorough service.

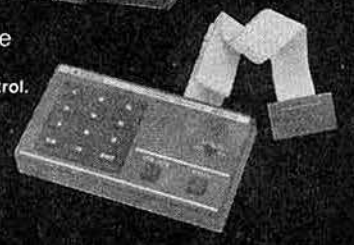
Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICO

t sell any sets until...

IC-751, HF Transceiver

The IC-751 supercedes the already popular IC-740. Improvements such as the addition of 36 memory channels, doing away with mechanical bandswitching and adding full HF receive capability (0.1-30 MHz), which is even better than the IC-R70, gives you some idea just how sophisticated the IC-751 is. The IC-751 is fully compatible with ICOM auto-units such as the AT-500 and IC-2KL. A computer control option can be added. There is also a digital speech synthesizer option which is ideal for blind operators. Power supply options are the IC-PS35 internal, or the PS-15/PS20 range for external use.

As you would expect, the IC-751 has a built-in speech processor, switchable choice of a J-FET pre-amp, straight through, or a 20dB pin diode attenuator and two VFOs allowing split frequency operation. More information on request.



with remote control.

IC-27E, Latest and smallest FM Mobile

And we thought that the IC25E was small! ICOM have now produced a new and even smaller 25W FM 2 meter mobile – the IC27E.

We have little information on the IC27E at the moment, but by the time you read this they should be available.

Briefly, the IC27E offers two VFO's, 9 memories, priority channel and scanning. The easy to read LCD displays frequency, memory channel, power, S-meter and functions. All this is packed into a case W140×H38×D177mm. and weighing only 1.2 Kgs.

The price has not yet been announced but give us a call for this and other information.

Interest-free credit available
Securikor or post despatch free,
same day if possible.

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM

...we know inside

IC-R70, HF Receiver

The R70 covers all modes (when the FM option is included), and uses 2CPU-driven VFOs for split frequency working, and has 3 IF frequencies. 70MHz, 9MHz and 455KHz, and a dynamic range of 100dB. It has a built-in mains supply. Other features include input switchability through a pre-amplifier, direct or via an attenuator, selectable tuning steps of 1KHz, 100Hz or 10Hz, adjustable IF bandwidth in 3 steps (455KHz). Noise limiter, switchable AGC, tunable notch filter, squelch on all modes, RIT, tone control. Tuning LED for FM (discriminator centre indicator). Recorder output, dimmer control.

The R-70 also has separate antenna sockets for LW-MW with automatic switching, and a large, front-mounted loudspeaker with 5.8W output. The frequency stability for the 1st hour is ± 50Hz, sensitivity – SSB/CW/RTTY better than 0.32 uv for 12dB (S + N) ÷ N, Am – 0.5 uv. FM better than 0.32 for 12dB Sinad. DC is optional.

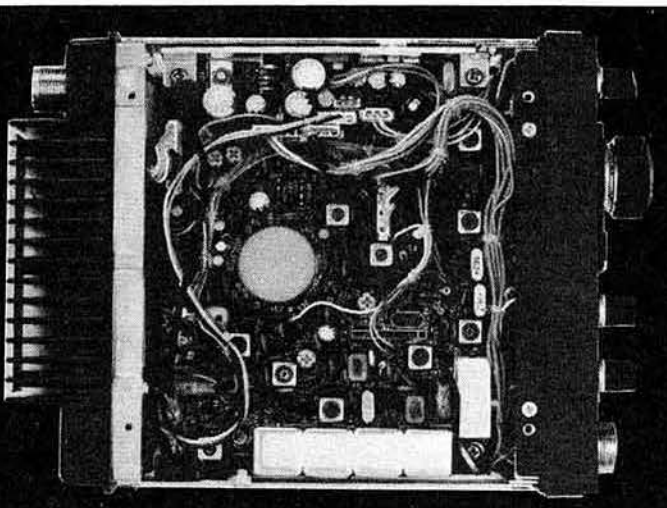
Ever since its introduction the IC-R70 has proved to be a popular and reliable HF receiver making your listening hours a pleasure. Please contact us for further details on this excellent set.

IC-271E/271HE/471E, VHF Multimode Base Stations

The IC-271E (2 meter VHF) and IC-471E, 430-450 MHz are the 'terrific twins' in Base multimodes at the moment. The design is based upon a new CPU chip that is easy to operate and offers the maximum number of functions available. Power can be adjusted up to 25W on all modes, squelch works on all modes and a listen-input facility has been added for repeater work. RIT shift is shown on the multicolour fluorescent display. 10Hz tuning facilities are included on both machines. Options for the 271E and 471E include – switchable front-end pre-amp, SM5 desk microphone, speech synthesizer announcing displayed frequency, 22 channel memory extension with scan facilities and an internal chopper PSU. A new 100watt model, the IC271HE will soon be available. If you would like to learn more specific details for the 271E, 271HE and 471E, don't hesitate to ask for a brochure.

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet IC

them e-out.



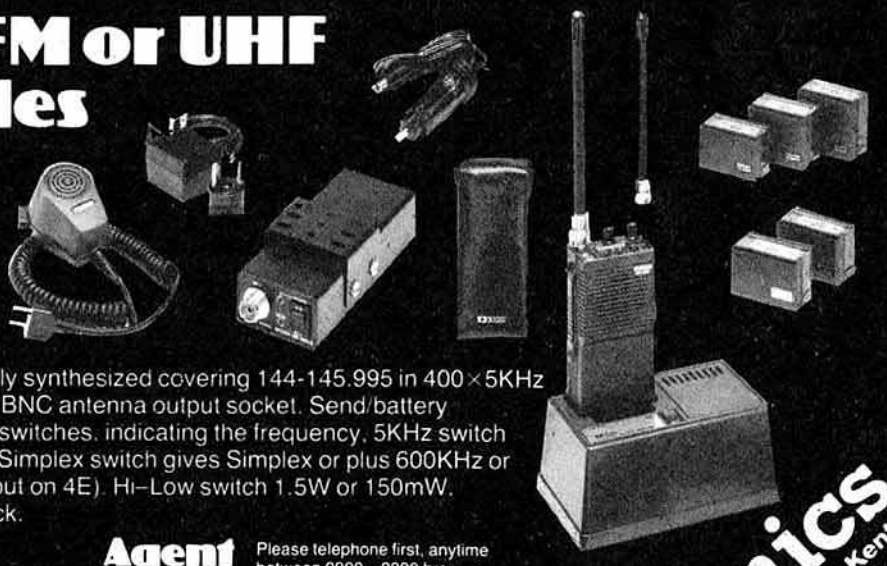
IC-745, Latest HF Transceiver

Hearing is believing, the IC745, a new all band HF transceiver with SSB, AM (receive only), CW, RTTY, FM option, and a 100KHz-30MHz general coverage receiver.

The IC745 has a terrific combination of features found on no other transceiver, at such a low price. The IC745 is the only transceiver today that has so many standard features, options and accessories.

The IC745 is yet another superlative set in the ICOM range, see it in our retail shop at 95 Mortimer Street Herne Bay Kent, or contact our Reculver Road address for more information. Your own local ICOM dealer will be able to help you too.

IC-2E/4E, VHF/FM or UHF Handportables



Nearly everybody has an IC-2E, the most popular amateur hand-held transceiver in the world. There is also the IC-4E, a 70cm version which is fully compatible with the same accessories, as is the new push-button IC-02E also mentioned in this advertisement.

Here are some features of the IC-2E: Fully synthesized covering 144-145.995 in 400×5KHz steps, (430-439.99 4E). Power output is 1.5W. BNC antenna output socket. Send/battery indicator. Frequency selection by thumbwheel switches, indicating the frequency. 5KHz switch adds 5KHz to the indicated frequency. Duplex/Simplex switch gives Simplex or plus 600KHz or minus 600KHz transmit, (1.6MHz and listen input on 4E). Hi–Low switch 1.5W or 150mW. External microphone jack. External speaker jack.

Our local RETAIL premises have now moved to 95 Mortimer St. Herne Bay Kent.

Agent
Gordon , G3LEQ

Please telephone first, anytime between 0900 – 2200 hrs.
Tel: Knutsford (0565) 4040

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet Electronics

143 Reculver Road, Herne Bay, Kent
Tel:(02273) 63859/63850

BARCLAYCARD VISA

LATEST!

COMING SOON – FT-203R
NEW COMPACT 2m FM HAND-HELD

FT-726R
VHF/UHF multi-mode

Fitted 2 metres with 70cm, 6 metres or HF options. Satellite unit available provides complete satellite operation with full Duplex.

FT-230R 2 metre 25 watt FM mobile

- Two independent VFO's
- 10 memories
- Priority function
- Memory and band scan
- 12.5/25KHz steps (25/100KHz FT-730R)
- Large LCD readout.

FT-480R 2 metre multi-mode

Now the finest value on the market back in town by popular demand!

FT-290R 2 metre multi-mode portable

10 memories,
2 VFO's, LCD display,
C size battery, easy car mounting tray,
FT-290R 0.5 low/2.5 high watts out

XIV Olympic Winter Games Sarajevo 1984

YAESU

FT-208R 2 metre FM hand-held

The finest hand-held bar none

ACCESSORIES:
- NC-7 - Standard charger
- NC-8 - Standard/quick charger/DC Power supply
- NC-9C - Compact charger (220-234V)
- PA-3 - Car adapter
- YM-24A - Speaker/microphone
- FL-2010 - 10 watt power amplifier for FT-208R
- FL-7010 - 10 watt power amplifier for FT-708R

BRANCHES

For your convenience we now have fully stocked branches at the following locations where you will be assured of prompt and personal service.

NORTHERN
Amateur Electronics UK/ Holdings, 45 Johnston St., Blackburn. Tel: 0254 59595
Contact Harry G3LLL for all your requirements and specialised advice.
Open: 9.15 am - 5.15 pm closed Thurs.

SOUTH-WEST
Amateur Electronics UK/ Uppington, 12–14 Pennywell Rd., Bristol. Tel: 0272 557732
Call Peter or Bert G2BAR for prompt and friendly service.
Open: 9 am - 6 pm.
Sat: 9 am - 1 pm

YORKSHIRE
Amateur Electronics UK/ Hooker, 42 Nether Hall Rd., Doncaster. Tel: 0302 25690
Alan G4OEM has a large stock of our product range – why not give him a ring and save yourself some petrol?
Open: 9 am - 6 pm Mon. - Sat.

AGENTS
Wales & West – Ross Clare, GW3NWS (0633) 880 146
East Anglia – Amateur Electronics UK, East Anglia, Dr. T. Thirst (TIM) G4CTT Norwich (0603) 667 189
North Staffs – Bob Ainge W5MJQ (0538) 754553
Shropshire – Syd Poole G3IMP, Newport, SALOP (0952) 814275

For full details of these new and exciting models, send today for our latest SHORT FORM CATALOGUE. All you need do to obtain the latest information about these exciting developments from the World's No.1 manufacturer of amateur radio equipment is to send 36p in stamps and as an added bonus you will get our credit voucher value £3·60 – a 10 to 1 winner!

As factory appointed importers we offer you- widest choice, largest stocks, quickest deal and fast sure service right through-

504-516 Alum Rock Road · Birmingham 8 Telephone: 021-327 1497 or 021-327 6313
Telex: 334312 PERLEC G Open: 9.30 to 5.30 Tues. to Sat. CLOSED all day Monday.

AUTHORISED YAESU ®

ICOM

AMATEUR RADI

★INSTANT HP FACILITIES ★ACCESS ★BARCLAYCARD ★FREE FINANCE ★MAIL OR

YAESU

0010	FT1	Gen Cov HF t'ceiver	PHONE
0020	Key T901	Curtis keyer for above	28.75
0030	DC11	DC power cable	10.35
0040	RAMT1	Non-volatile mem board	13.80
0050	FMUT1	FM unit	42.85
0060	XF8.9KCN	300Hz CW filter	18.40
0070	XF8.9KC	600Hz CW filter	18.40
0080	XF8.9KA	6kHz AM filter	18.40
0090	XF10.7KC	CW filter	16.65
0100	FT980	Gen cov HF t'ceiver	PHONE
0110	SP980	Matching speaker	58.65
0130	FT102	9 band HF transceiver	PHONE
0140	FC102	9 band matching atu	179.00
0150	FV102DM	Remote vfo for above	230.00
0160	SP102	External speaker	52.50
0240	FM AM	Unit for above	46.75
1341	MH1B8	Scanning hand mic.	14.95
0390	FT77	8 band 100 watt t'ceiver	PHONE
0450	Marker unit		10.35
0460	FM Unit		27.20
0410	FP700	PSU for FT77	125.00
0420	FC700	ATU for FT77	98.90
1449	FL2100Z	160-10m linear amp	459.00
0810	FT290R	2m Multimode portable	269.00
0840	FT790R	70cm Multimode Portable	269.00
0860	NC11C	FT290/790 AC charger	9.95
0880	CSC1A	FT290/790 carrying case	4.20
0870	MMB11	FT290/790 Mob mount	26.85
0900	FL2010	290R Linear amplifier	63.25
0700	FT208R	2m FM handheld 2½W	198.00
0710	FT708R	70cm FM handheld 1W	175.00
0750	NC9C	Slow charger	8.80
0720	FWB2	Spare Ni-cad battery pack	21.45
0740	FBA3	Charging sleeve	5.65
0760	NC7C	Base master charger	32.95
0770	NC8C	Base master quick charger	54.05
0780	PA3	Charger 12v DC	15.35
0800	MMB10	Mobile mounting bracket	8.05
1000	FT230R	2m 25W FM mob t'ceiver	PHONE
1010	FT730R	70cms 10W FM mob t'ceiver	239.00
1020	FT726R	3 band all mode base station	PHONE
1030	430T726	70cms module	250.00
1050	50T726	6 metre module	185.00
1051	HFT726R	HF module	200.00
1060	SAT726	Full duplex x/band unit	95.00
1090	FRG7700	0.2-30mHz gen cov rec	PHONE
1100	FRG7700M	7700 with memory unit	PHONE
1110	MEMGR7700	Memory module	69.00
1120	DCRG7700	DC modification kit	1.38
1130	FRT7700	Antenna tuner unit	46.00
1201	FRA7700	Active Antenna	41.80
1140	FF5	Low pass filter	10.75
1150	FRV7700A	118-130, 130-140, 140-150mHz	86.25
1160	FRV7700B	118-130, 140-150, 50-59mHz	90.85
1170	FRV7700C	140-150, 150-160, 160-170mHz	80.50
1180	FRV7700D	118-130, 140-150, 70-80mHz	87.40
1190	FRV7700E	118-130, 140-150, 150-160mHz	89.70
1200	FRV7700F	118-130, 150-160, 170-180mHz	89.70
0490	FT757GX	Multi Mode Gen Cov.	PHONE

ICOM

2005	IC751	* NEW * 100W H.F.	PHONE
2021	IC745	* NEW * 100W H.F.	PHONE
2008	RC10	Keyboard Freq. cont.	PHONE
2006	PSU(Int.)	230v AC power supply	149.00
2030	FM(EX242)	FM module for above	32.50
2040	KEYER(EX243)	Keyer module for above	39.00
2100	IC730	100w HF trans 12v DC	659.00
2120	FL30	SSB pass band filter	29.00
2190	IC720A	100w HF trans plus gen. cov.	949.00
2200	PS15	230v p.s.u. for HF t'ceivers	119.00
2210	PS20	230v chopper type unit	155.00
2060	FL45	500Hz filter for 740/730	39.00
2130	FL44	2.4kHz SSB filter	79.00
2220	FL32	CW narrow filter for 720	39.00
2230	FL34	AM filter for 720	29.00
2150	EX202	LDA unit for 730	13.50
2050	EX203	CW audio filter for 730	14.50
2170	EX205	TRV unit for 730	14.00
2240	B10	Memory back up for 720	5.95
2290	IC2KL+PSU	500W solid state linear	1303.33
2310	AT100	100 watt HF Auto ATU	269.00
2320	AT500	500 watt HF Auto ATU	369.00
2340	CF1	Cooling fan	24.00
2970	SP3	Matching ext speaker	45.00
2360	HP1	Communication phones	34.50
2960	SM5	Base microphone	34.50
2250	IC-R70	Comms rec 230v AC	549.00
2260	FM unit	Plug in module	30.00
2270	FL63	CW narrow filter	39.00
2130	FL44	Xtal filter	79.00
2410	IC290H	Multimode 2m 12v DC	469.00
2430	BU1	Back up supply	24.50
2440	IC471	Multimode 70cm	699.00

ICOM CONT.

2450	IC490	Multimode 70cm 12v DC	495.00
2480	IC2E	2m synth h'held 1.5w Special	169.00
2490	IC4E	70cm synth h'held 1.5w	218.00
2475	IC02E	144MHz h'held with k/b+LCD	229.00
2476	IC04E	432MHz h'held with k/b+LCD	T.B.A.
2810	MMB9	Mobile mounting bracket	12.50
2840	MMB12	Mobile mounting bracket	12.50
2870	HM7	8 pin hand mic.	14.95
2890	HM9	L/S mic for IC2E/4E	16.50
2900	HM10	Up/down scan mic.	29.00
2950	SM2	4 pin desk mic.	34.50
2960	SM5	8 pin desk mic.	34.50
2962	SM6	Desk mic (745/751/271/471)	34.50
2970	SP3	External loudspeaker	45.00
2520	LC3	Cases for IC2E/4E	5.00
2570	BC25	Standard mains charger	6.69
2590	BC30	Base hod type charger	56.35
2610	BP2	Low voltage pack	38.00
2620	BP3	Standard pack	25.00
2630	BP4	Empty battery box (AA cells)	7.95
2640	BP5	High power battery pack	48.00
2650	CP1	Charger lead for 12V supply	4.95
2660	DC1	12v Regulator pack	9.75

TRIO/KENWOOD

1450	TS930S	160-10m t'ceiver with gen cov	1095.00
1460	AT930	Automatic ATU 80-10m	141.75
1470	SP930	External speaker unit	58.00
1490	YK88A-1	6kHz AM filter	33.25
1500	YK88C-1	500Hz CW filter	33.25
1510	YG455C-1	500Hz CW filter	77.50
1520	YG455CN-1	270Hz CW filter	91.75
1530	TS430S	160-10m with gen cov rec	736.00
1540	PS430	Mains PSU for TS430S	112.75
1550	SP430	Speaker for TS430S	29.50
1570	FM430	FM option unit TS430S	34.50
1580	YK88C	500Hz CW filter	31.75
1590	YK88CN	270Hz CW filter	37.25
1600	YK88SN	1.8kHz SSB filter	32.50
1850	TL922	160-10m 2kw linear	724.50
1870	MC60 N4	Desk microphone	51.50
1880	MC60 S6	Desk mic with up/down	53.50
1890	MC60A	Desk mic with pre-amp	55.25
1900	MC35S	Fist mic 50K imp	14.75
1910	MC30S	Fist microphone 500ohm imp	14.75
1920	MC40S	Up/down mic for TR9000/7800	14.75
1930	MC42S	Up/down mic (TS930S)	15.25
1940	LF30A	LF low pass filter	21.25
1950	TS780	2m/70cm all mode t'ceiver	785.00
1980	TR9130	2m multi mode mobile	433.50
1934	TW4000	FM transceiver 2m/70cm	425.00
1680	TR2500	2m FM synth handheld	219.00
1700	ST2	Base stand and charger	51.75
1710	SC4	Soft case and belt hook	13.75
1720	MS1	Mob stand and power unit	31.75
1730	SMC25	Speaker/microphone	16.00
1750	LH2	Deluxe leather case	24.00
1770	DC25	Power supply from 12V	16.00
1780	TR3500	70cm handheld trans.	225.00
1790	TR9500	70cm multimode mob	395.00
1800	R600	Gen cov rec 150kHz-30MHz	239.00
1820	R2000	Gen cov rec	389.00
1821	HC10	World time clock	62.00

DATONG

3880	PC1	Gen cov convertor	137.40
3870	VLF	Very low frequency convertor	29.90
3670	ANF	Freq agile audio filter	67.85
3660	FL2	Multi-mode audio filter	89.70
3650	FL3	Auto filter for receivers	129.00
3700	ASP/B	r.f. speech clipper for Trio	82.80
3700	ASP/A	r.f. speech clipper for Yaesu	82.80
3710	D75	Manual RF speech clipper	56.35
3740	D70	Morse Tutor	56.35
3750	MK	Keyboard morse sender	137.40
3910	RFA	RF switched pre-amp	33.90
3800	AD270	Active dipole indoor	47.15
3820	AD370	Active dipole outdoor	64.40
3810	AD270-MPU	As above with mains p.s.u.	51.75
3830	AD370-MPU	As above with mains p.s.u.	69.00
3980	MPU	Mains power unit	6.90
3730	RFC/M	RF speech clipper module	29.90
3920	PTS1	Tone squelch unit	46.00
3640	SRB2	Auto Woodpecker blanker	86.25

MICROWAVE MODULES RANGE

3130	MML28/100-S	10m 100W lin/preamp	129.95
3140	MML70/50	4m 50 watt lin/preamp	85.00
3150	MML70/100-S	4m 100W lin/preamp	139.95
3160	MML144/30LS	2m 30W linear amp	69.95
3170	MML144/50S	2m 50W lin/preamp	85.00
3180	MML144/100-S	2m 100W lin/preamp	139.95
3190	MML144/100LS	2m 100W (1 or 3W i/p)	159.95
3200	MML432/30L	70cm 30W lin/preamp	99.00
3210	MML432/50	70cm 50W lin/preamp	109.95
3220	MML432/100	70cm 100 watt linear	228.65
3250	MMC435/51	70cm ATV con, VHF out	37.90
3260	MMC435/600	70cm ATV con, UHF out	27.90
3270	MTV435	70cm ATV 20W t'mitter	149.00
3290	MM1000KB	Converter with keyboard	99.95
3300	MM2001	RTTY to TV converter	189.00
3320	MM4001KB	RTTY term with keyboard	299.00
3330	MMS1	The MORSETALKER	115.00
3340	MMS2	Advanced morse trainer	169.00
3350	MMT28/144	10m linear transverter	109.95
3360	MMT70/28	4m linear transverter	119.95
3370	MMT70/144	4m linear transverter	119.95
3380	MMT144/28	2m linear transverter	109.95
3390	MMT432/28-S	70cm linear transverter	159.95
3400	MMT432/144-R	70 cm linear transverter	184.00
3410	MMT1296/144	23cm linear transverter	184.00
3425	MMC27/MW	27MHz to med wave conv	19.95
3430	MMC28/144	10m to 2m up conv	29.90
3440	MMC50/28	6m to 10m down conv	29.90
3450	MMC70/28	4m to 10m down conv	29.90
3460	MMC70/28LO	4m to 10m down conv	32.90
3470	MMC144/28	2m to 10m down conv	29.90
3480	MMC144/28LO	2m to 10m down conv	32.90
3490	MMC432/28-S	70cm to 10m down conv	37.90
3500	MMC432/144-S	70cm to 2m down conv	37.90
3510	MMC1296/28	23cm to 10m down conv	34.90
3520	MMK1296/144	23cm to 2m down conv	69.95
3530	MMK1691/137.5	1691mHz Meteosat conv	129.95
3540	MMA28	10m low noise preamp	16.95
3550	MMA144V	2m RF switched preamp	34.90
3560	MMA1296	23cm low noise preamp	34.90
3570	MM6050/500	500MHz digital freq meter	75.00
3580	MM6600P	600mHz-10 prescaler	29.90
3590	MMDP1	Freq counter amp/probe	14.90
3620	MMS384	384mHz freq source	29.90
3630	MMR15/10	15dB, 10W attenuator	11.90

AZDEN

4060	PCS4000	2mFM transceiver 25W	229.00
4130	MEX55	Mobile boom safety mic	28.50

FDK

5779	M750XX	2m FM/SSB/CW 10W t'ceiver	315.00
5782	EXP.430	M.750 70cm transverter	249.00
5772	KP100	AC/DC Electronic Keyer	69.00
5780	ATC720	Synth air monitor 110-138MHz	159.00
5781	RX40	Synth FM mon 140-180MHz	149.00

MUTEK LTD

5850	SLNA 50s	50MHz low noise switched preamplifier using BF981	37.10
5860	SLNA 70s	70MHz low noise switched preamplifier using BF981	37.10
5870	SLNA 70u	70MHz low noise unswitched preamplifier using BF981	22.40
5880	SLNA 70ub	Unboxed version of SLNA 70u	13.70
5890	SLNA 144s	144MHz low noise switched preamplifier using BF981 (0.9dB noise figure)	37.10
5900	SLNA 144u	144MHz low noise unswitched preamplifier using BF981	22.40
5910	SLNA 144ub	Unboxed version of SLNA 144u	13.70
5920	SLNA 145sb	Transceiver optimised preamplifier with antenna c/o switching using BF981. Intended for the FT290R, but has many other applications!	27.40
5930	GFBA 144e	Ultra-high performance environmentally housed switched gasfet preamplifier using advanced negative feedback circuitry for superb dynamic performance. Supplied with ATCS 144s controller	129.90
5940	TLNA 432s	Very high performance bipolar transistor switched preamplifier for 430-440MHz using BFQ69 for 1.4dBnf and 0dBm input intercept performance	74.90
5950	TLNA 432u	Unswitched boxed variant of TLNA 432s	29.00
5960	TLNA 432ub	Unboxed TLNA 432u	20.40
5970	GLNA 432u	Series 432 MHz gasfet unswitched preamplifiers	PHONE
5980	BLNA 432ub	Sub-miniature 1.3dBnf BFQ69 preamplifier	13.70

MUTEK LTD CONT.

5990	BLNA 1296ub	Noise matched Ina
6000	RPCB 144ub	Complete repla for the FT221 a
6010	RPCB 251ub	Complete repla for the IC211 ar
6020	HDRA 95u-1	1.5dBnf/8.5dB g range 88-108M
6030	HDRA 95u-2	11.5dB gain var
6040	BBBA 500u	20-500MHz broa dynamic range
6050	BBBA 860u	250-860MHz bro amplifier
6060	XBPF 700ub	Microstripline b
6070	PPSU 012	12V (nominal) r HDRA95 & BBB
6080	CISA 001	'UHF'(f) to BNC
6090	ATCS 144s	Transmit receiv sequence and c

WRAASE ELECTRONI

SLOW SCAN H.F. EQUIPME

4720	SC140	SSTV receive
4730	SC160	SSTV trancei
4740	SC442A	SSTV TX/RX
4775	SC-1	SSTV + FAX
4750	FG422A	Light pen
4760	KB422A	Keyboard
4780	Prince	12" green dis

SCANNING RECEIVE

5573	Sony ICF7600D	Digital receive
5574	Power supply	mains, for abov
5580	Bearcat BC100	synthesised h/
5610	Bearcat BC2020FB	AM/FM VH
5650	Jil SX200N	AM/FM VHF/UHF
5651	Jil SX400	26-510MHz AM/FM
5659	Gemscan	Synthesised VHF/U
5641	AOR2001	Synth. 26-520 AM/F
5770	Fairmate AS32320	AM/FM VH airband
5760	Corona CD6000	AM airband r
5781	FDK RX40	pocket synthesised 180MHz
5780	FDK ATC720	pocket synthesis receiver

VHF/UHF AMPLIFIER

TONO PRODUCTS

5340	2M-50W	40W linear fo
5250	2M-100W	90W linear fo
5360	MR-150W	140W linear
5370	MR-250W	210W linear f
5380	MR28	100W linear f
5390	4M60	50W linear fo

TOKYO HY-POWER LABS INC

5670	HC-150	3.5MHz to 30
5680	HC2000	1.8MHz to 30
5690	HL-82V	2M linear am includes Mos
5700	HL-160V	2M linear am includes J.Fe I/P
5709	HL-45U	70cm linear a 50W O/P
5711	HL90U	70cm linear a O/P *NEW*

ALINCO ELECTRONICS

5720	ELH230E	2M linear mi P small
5730	ELH710	70cm linear a 3W I/P
5740	ELH730	As above but
5741	ELH230D	As ELH230 b (switched)
5742	ELH250D	2M linear 50 pre-amp (swi

See full range of BNOS and Micro

DAVETREND LTD

4670	VHF/W	Wavemeter
4680	4APSU	4 amp 13.8V
4690	6APSU	6 amp 13.8V
4700	12APSU	12 amp 13.8V
4710	24APSU	24 amp 13.8V
4711	MT1	Morse tutor v

Buy it with Access

MAIN BRANCH AT

LONDON

01-992 5765/6

373 UXBRIDGE ROAD, ACTON, LONDON W3 9RH

NORTHERN BRANCH AT

EARLESTOWN

092 52 29881

38 BRIDGE STR EARLESTOWN, NEWTON LE W MERSEYSIDE

MAIL ORDER PRICES CORRECT AT TIME OF GOING TO PRESS

IO EXCHANGE

FDK

RDER AVAILABLE ON ALL LISTED ITEMS ★RAPID DESPATCH ★PART EXCHANGE ★

NE64535 1.3GHz 26.50
ement front-end
id FT225 71.00
ement front-end
d IC251 76.90
ain high dynamic
iz preamplifier 32.90
iant 32.90
idband high
preamplifier 29.00
iadband low noise 22.60
andpass tvi filter 2.95
ains psu for
A860 6.90
m) coaxial adaptor 1.60
e changeover
ontroller 22.60

S

NT

board 179.00
/e board 299.00
+ colour 695.00
TX/RX 795.00
40.25
149.00
play vdu 119.00

S HF/VHF/UHF

r *NEW* 169.00
e 6.00
held VHF/UHF 345.00
F/UHF 258.75
299.00
P.O.A.
IF scanner *NEW* 259.00
M P.O.A.
F/UHF + military 149.00
eceiver, digital 99.00
receiver 140-
132.00
ed airband 149.00

S

r 2 metres 69.00
r 2 metres 129.00
metres 169.00
or 2 metres 325.00
or 10 metres 65.00
r 70cms 159.00

MHz ATU. 150W 62.50
MHz ATU. 2Kw 276.55
p min 80W O/P
fet preamp 144.50
p min 160W O/P
preamp 3 or 10W 242.40
mp 10W I/P 40- 115.00
mp 10W I/P 100W 259.00

30W O/P 1/3W I/ 49.00
mp 10W O/P-1/ 59.00
30W O/P
it with pre-amp 59.95
V O/P 1/3W I/P
tched) 99.00
wave Module amplifiers!

20-450MHz 27.50
psu prot. 30.75
psu prot. 49.00
psu prot. 74.00
psu prot. 105.00
vith mains psu 49.00

MORSE KEYS

HI-MOUND KEYS

5430	HK702	Up/down on marble	26.94
5440	HK704	Up/down super deluxe	17.65
5450	HK705	Up/down deluxe	13.80
5460	HK706	Up/down economy	14.60
5461	HK707	Up/down popular	13.75
5470	HK708	Basic unit up/down	13.26
5480	MK704	Squeeze keyer manipulator	12.65
5490	MK705	As 0548 with metal base	21.28
5501		Ex-ministry No. 8 key, original packing	4.95

Bencher Products

5220	BY1	Keyer paddle (black base)	37.95
5230	BY2	Keyer paddle (chome base)	48.30
5240	BY3	Keyer paddle (gold plated)	92.00
5250	ZA1A	Balun 3.5-30MHz for dipoles	15.00
5260	ZA2A	Balun 14-30MHz for beam antennas	17.25

RTTY/CW READERS

Tasco Products

5400	CWR685E	Tele reader – RTTY/CW/ASCII	769.00
5410	CWR670	Tele reader – as above, RX only	349.00
5420	CWR610E	Tele reader – as above, basic unit	159.00

Tono Products

5270	9000E	CW/RTTY/ASCII/Editor/lite pen, term L	669.00
5280	550E	CW/RTTY/ASCII/Terminal RX	299.00
5290	350	CW/RTTY/ASCII/Terminal RX only	259.00
5300	CRT120G	VDU 12 inch green screen – mains power	125.00
5310	CRT1200G	VDU 12 inch for 80 columns	136.00
5320	HC800	Line printer centronics	449.00
5330	SK7	Plug adaptors for printers	8.50

ICS Electronics

4900	AMT-1	Amtor RX/TX	265.00

BNOS ELECTRONICS

5800	12/6A	Power supply 13.8V 6 amp, fully protected	48.30
5810	12/12A	Power supply 13.8V 12 amp, fully protected	86.40
5820	12/24A	Power supply 13.8V 25 amp, fully protected	125.45
5830	12/40A	Power supply 13.8V 40 amp, fully protected	225.40
5831	L144/1/100	1 watt input linear	138.00
5832	L144/3/100	3 watt input linear	138.00
5833	L144/10/160	10 watt input linear	115.00
5834	LPM144/1/100	1 watt input linear/preamp	172.50
5835	LPM144/3/100	3 watt input linear/preamp	172.50
5836	LPM144/10/100	10 watt input linear/preamp	149.50
5837	L144/25/160	25 watt input linear	155.00
5838	LPM144/25/160	25 watt input linear/preamp	189.50
5839	L144/10/180	10 watt input linear	178.00
5840	LPM144/10/180	25 watt input linear/preamp	212.50

TONNA ANTENNAS F9FT

	50MHz	L(M)	W(kg)	
6100	5 element	3.5	3.2	34.30
	144MHz			
6103	4 element	0.87	0.5	14.95
6110	9 ele fixed	3.3	1.9	17.71
6120	9 ele portable	3.3	1.7	20.00
6130	9 ele crossed	3.5	2.0	32.43
6140	13 ele portable	4.5	2.5	31.05
6150	17 ele fixed	6.60	4.5	37.66
	435MHz			
6190	19 element	3.2	1.1	20.70
6189	19 ele crossed	3.3	1.8	34.27
6200	21 element	4.6	2.6	29.62
6210	21 element ATV	4.6	2.6	29.67
	144/435HMz			
6160	*Oscar Special* 9 & 19 element	3.3	2.0	34.27
	1,250MHz or 1,296MHz			
6213	23 element	1.8	0.9	25.90
6214	4 × 23 ele antennas – power splitter – stacking frame			148.00

Full range of J Beam, T.E.T. and Yaesu antennas available!

WELZ

4980	SP200	1.8-160MHz PWR/SWR	69.95
4990	SP300	1.8-500MHz PWR/SWR	97.00
5000	SP400	130-500MHz PWR/SWR	69.95
5010	SP600	1.8-500MHz PWR/SWR	97.00
5040	SP10X	1.8-150MHz PWR/SWR	24.45
5020	SP15M	1.8-160MHz PWR/SWR	35.00
5030	SP45M	130-470MHz PWR/SWR	51.00
5050	SP250	1.8-60MHz PWR/SWR	49.50
5060	SP350	1.8-500MHz PWR/SWR	59.95
5080	AC38	3.5-30MHz ATU 400w PEP	65.00
5160	TP05X	50-500MHz 0-5W meter	13.95
5131	CA35A	Static protector	10.75
5132	CA23N	Static protector	12.60
5090	CT15A	15/50W dummy load PL259	7.95
5100	CT15N	15/20W dummy load N plug	13.95
5110	CT150	150/400W dummy load	35.50
5120	CT300	300/1kW dummy load	49.50
5130	CT03N	3W dummy load 1.3gHz	30.00
5140	CH20A	2 way coax switch SO239	17.95
5150	CH20N	2 way coax switch N socket	31.95
5133	DF72C	144/430MHz duplexer	18.95

A.R.E. SPECIALS – OUR OWN IMPORTS

ALINCO VHF/UHF AMPLIFIERS

5720 2m linear 30W O/P 1-3W I/P 49.00

5730 70cm linear 10W O/P 1-3W 59.00

5740 AS 5730 30W O/P 119.00

5741 AS 5720 but with switched pre-amp 69.95

5742 ELH260D 2m linear 50W O/P 1-3W I/P switched pre-amp 114.95

VHF/UHF SCANNING RECEIVER

5770 Fairmate Airband VHF and UHF 149.00

ROTATORS

9121 EMR400 Alinco med. duty rotator 79.00

9271 EMRBB Lower mast clamp 10.00

BOOKS

9680 Confidential Frequency List 10.95

WRAASE SLOW SCAN

4730 SC160 TX/RX slow scan boards 299.00

4740 SC422A Complete TX/RX memories 645.00
Display models of above 475.00

4775 SC1 Full s/scan + Fax TX/RX 795.00

VHF/UHF TRANSVERTERS

FTV107 Yaesu Transverters modified for use with:

YAESU

FT102/FT980/FT ONE/FT757 = **£125**

TRIO

TS930/TS430 = **£135**

ICOM

IC740/IC745/IC751/IC720A = **£125**

All above complete with 2M module, cables.

Fitted with 2M/70cm card – **£359**

Free carriage on all A.R.E. Specials

Just write or pick up the phone, quote the Stock Number together with your Access or Barclaycard and the goods are despatched within 24 hours!

If the particular item you require is not listed, dial 01-992 5767 or 092 52 29881 – Brenda and Bernie pride themselves in supplying anything in Amateur Radio!

All items over £100 carriage free. For 24 hour Securicor add £6.00. Below £100 add £2, Books £1.

All Beam Antennas Securicor only.

Goods despatched within 24 hours if held in stock.

FULL DEMONSTRATION FACILITIES AVAILABLE AT LONDON AND MERSEYSIDE.

POP-IN, HAVE A CHAT ABOUT THAT NEW RIG AND A CUP OF BRENDA'S COFFEE!

EET

ILLOWS

24 HOUR ANSWERPHONE SERVICE AT BOTH PREMISES AVAILABLE

OPENING HOURS
ACTON: 9.30 to 5.30. Closed Wednesday
EARLESTOWN: 10.00 to 5.00. Closed Monday

BARCLAYCARD VISA

WATERS & STANTON ELECTRONICS

2M SSB-CW-FM ON A BUDGET!

The M.750XX is the latest from FDK with a powerful output of 20 watts on all modes SSB-CW-FM. Features include bright digital display, LED bar S-meter, RF gain control, RIT control, dual vfo memory, 144-148mHz coverage, band scanning, up/down control from microphone, tone burst, repeater shift, etc., etc. Supplied complete with microphone, mobile mounting bracket, DC lead and all hardware. Ideal as mobile or base station, here's your chance to work the DX on a budget.

FDK M750XX £329

20 WATTS OUTPUT

POSSIBLY THE SMALLEST COMMUNICATIONS RECEIVER IN THE WORLD
150kHz-30MHz PLUS BROADCAST FM AM-SSB-CW 8 MEMORIES LCD DISPLAY

SONY ICF7600D

£179 inc AC PSV & Headphones

The ICF7600D is ideal for the man on the move. This completely portable receiver gives true world wide reception in a package that will fit into a briefcase. This programmable receiver has 10 memories, band scanning, electronic tuning, built in clock, telescopic whip, external antenna connector, etc., all at an incredibly low price. Stocks are very limited, so hurry!

FM MONITOR 141-180MHz

The FM monitor covers the major portion of the VHF communications band. It includes 2m ham band, Marine radio telephone, etc. Ideal as a professional monitor or for general listening. Rechargeable batteries, AC charger and aerial are all included.

RX40 £132

NEW FROM ICOM

IC02

2M HANDHELD WITH KEY PAD

£229

ESTABLISHED 11 YEARS WE ARE "THE ONLY DEALER IN THE SOUTH EAST OFFICIALLY APPOINTED AS AGENTS FOR ALL THREE MAJOR BRANDS TRIO-YAESU-ICOM BY UK IMPORTERS

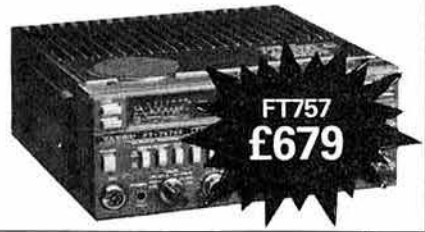
100 WATTS O/P
FM-SSB-CW
0.5-30MHz RX
8 MEMORIES

OUR FASTEST SELLING HF RIG

TRIO TS430S £752

YAESU's LATEST HF RIG

YAESU	
FT980	£1150.00
SP980	£54.00
FT102	Special
FC102	£179.00
FT77	£459.00
FP700	£110.00
FC700	£85.00
FT290	£249.00
FT790	£299.00
FT208	£199.00
FT726	£675.00
FRG7700	£335.00



FT757 £679

2M/70cm RIG!

TRIO VHF/UHF	
TR9130	£442.00
TR7930	£312.00
TS780	£795.00
TR2500	£237.00
TR3500	£256.00
TR2300	£152.00
B09A	£47.00
VB2530	£71.00
SMC25	£16.50
TR201A	£269.00

TRIO TW4000A £469

We can also supply matching dual-band antenna from WELZ

PROBABLY THE BEST VALUE HF RIG!

It really amazes us that so many newcomers have not considered the Trio TS530SP. Where else can you get a complete self-contained 100 watt HF rig for less than £600? Full coverage 160-10m. One of our all time favourites.

TRIO TS530SP £638

WELZ SWR/PWR METERS "SIMPLY THE BEST"

SP200 1.8-160mHz 20-200-1kw	£75.00
SP300 1.8-500mHz 20-200-1kw	£106.00
SP400 130-500mHz 5-20-150w	£75.00
SP10X 1.8-150mHz 20-200w	£26.50
SP15M 1.8-160mHz 5-20-200w	£39.00
SP45M 130-470mHz 3-20-100w	£55.00
SP35O 1.8-500mHz 5-20-200w	£65.00

SP15M

SP300

"A HIGHLY RATED RECEIVER"

TRIO HF	
TS9305	£1150.00
AT930	£145.00
SP930	£59.00
TS430S	£752.00
PS430	£115.00
SP430	£29.50
FM430	£34.50
TS530SP	£638.00
TS830S	£731.00
AT230	£138.00
SP230	£42.00
AT130	£95.00

TRIO R2000 £421

HORNCHURCH BRANCH (5 mins from M25)
12 NORTH STREET, HORNCHURCH, ESSEX
TEL: (040 24) 44765 E.C. WED 1 PM

HOCKLEY BRANCH—MAIL ORDER & HEAD OFFICE
18-20 MAIN ROAD, HOCKLEY, ESSEX
TEL: (0702) 206835/204965 TELEX 995895

PASS FASTER

MODEL D70 MORSE TUTOR

Once you've decided to tackle the dreaded Morse Test you won't want to mess about. You'll want a learning method that is effective, painless, and that gets you on the HF bands FAST without any expensive retakes.

Thats exactly what the Datong Morse Tutor can do for you, as thousands of satisfied users will confirm.

The Morse Tutor generates a random stream of Morse characters to give receiving practice, but two very important features set the D70 apart from other systems.

First: each character comes at you at its normal speed but with an extra delay between each one. As you improve you reduce the delay until full speed is reached. This way you always learn the correct rythmic sound for each character and avoid the worst of the notorious "plateau" effect.

Second: you can take it anywhere and use it whenever you like without the bother of a mains lead. Battery drain is so low that you should be able to pass the exam on the battery which we install before shipping!

Supplied complete with internal speaker plus personal earpiece, and with a key jack for sending practice, Model D70 is your passport to a more rewarding hobby.

Price: **£49.00 + VAT** (£56.35 total)

FL2/FL3 MULTI-MODE AUDIO FILTERS

These high performance audio filters will improve the performance of any existing communications receiver. . . in most cases, dramatically.

By selecting "SSB" mode you can: remove high pitched monkey-chatter from off-tune SSB stations; remove low pitched noises from other stations on the low side of your signal; remove tune-up whistles with a manually controlled notch filter; at the same time remove tune-up whistles with a second notch filter which tunes itself automatically (this function applies to FL3 only).

What marks out the Datong filters from the rest is the high performance of each of the above functions plus the fact that *all four functions are available simultaneously.*

By selecting "CW" mode all available filters (except the automatic notch) are automatically harnessed together to give an almost unbelievable ability to pull out a single CW signal from a crowded band.

Whether you are an amateur or a professional and no matter which rig you use, the overcrowding on today's HF bands can spoil your reception. Simply adding a Datong audio filter in series with the speaker may be the biggest single improvement you will ever make.

Note that by retrofitting the FL2/A auto-notch conversion kit you can convert an FL2 to an FL3 at any time. The only difference is the auto-notch filter.

Prices: FL2, **£78.00 + VAT** (£89.70 total); FL3, **£112.49 + VAT** (£129.37 total); FL2/A conversion kit, **£34.49 + VAT** (£39.67 total)

DATONG ELECTRONICS LIMITED

ORDER FORM

Your Name ..... Call Sign .....

Address ..... Tel .....

Town .....

City ..... Post Code .....

Please send me the following

Model	Qty.	Unit Price	Unit Total

Total £ _____

Prices include Post, Packing and VAT (U.K.)

I enclose CHEQUE/POSTAL ORDER No. .....

..... for £ .....

Please debit my VISA/ACCESS account.

Card No .....

All orders sent by return, 1st class parcel post. Any delay will be notified to you immediately.

SEND TO- Dept **R.S.G.B.** Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Tel: (0532) 552461

South Midlands

***FREE FINANCE —•2 YEAR GUARAN**

Branches at SOUTHAMPTON, LEEDS, CHESTER

FED UP WITH THE QRM AND POOR OPERATING STANDARDS ON 2M

Then Q.S.Y. to 70cm and begin to enjoy your hobby again instead of giving up after hearing some of the depressing operating activities on 2M.

In order to help promote further activity on 70cm we have been able to reduce prices of many of Yaesu's UHF transceivers. This has been possible due to S.M.C.'s bulk purchasing from Yaesu together with reduced production costs at the factory due to increasing demand on the Japanese home market since the introduction of UHF repeaters in Japan.

Check out the prices of Yaesu's UHF Transceivers against other manufacturers' models and you will probably agree Yaesu leads the way to 70cm.

Just consider with lower equipment costs than equivalent 2M transceivers, a large number of UHF repeaters in the UK per amateur population than anywhere else worldwide and remember 70cm antennas because of their smaller size and similarity to TV antennas make them far more environmentally acceptable than 2M long Yagis.
'Need we say more except see you on 70 cms'

FT708R
Now only
£179 inc

FT790R

shown with FL7010 optional amplifier

Now only
£249 inc

FT730R

Now only
£229 inc

COAXIAL FEEDERS

Don't throw away those valuable watts by using a poor quality feeder. Remember approximately 20M of UR67 will have an approximate attenuation of 3dB at 432MHz. This means if you invest around £250 for a 100W PA you will only end up with about 50W at the antenna.

UR67	att 3.9dB per 25M approx	£0.69 p/m
Pope H100	att 2.25dB per 25M approx	£0.79 p/m
*Eupen 5121	att 1.4dB per 25M approx	£2.93 p/m NEW
*Andrews LDF2.50	att 1.9dB per 25M approx	£3.00 p/m
*Andrews LDF4.50	att 1.3dB per 25M approx	£3.58 p/m

*Helical Foam-Dielectric cables
Carriage on cables £2.40 up to 20M over 20M £3.20

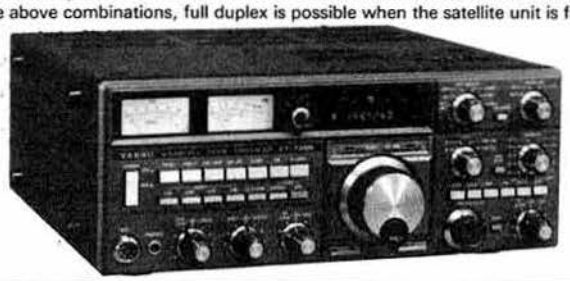
70cm ANTENNAS

D8/70	8 over 8 Yagi	£25.87
PBM18/70	18 ele Parabeam	£32.20
PBM24/70	24 ele Parabeam	£44.55
LW24/70	24 ele Yagi	£27.02
MBM28/70	28 ele Multibeam	£21.27
MDB48/70	48 ele Multibeam	£35.65
MBM88/70	88 ele Multibeam	£48.87
8XY/70	8 ele crossed Yagi	£42.55
12XY/70	12 ele crossed Yagi	£52.90
SMCGP432X	3 × ⅝ wave colinear	£32.20
SMCGP714	14 step coaxial colinear 10DBI	£78.60NEW
SMC70 N2V	2/70cm Colinear	£32.20

Carriage on antennas £2.65

LOOKING FOR A SATELLITE TRANSCEIVER SYSTEM?

Those clever little men at Yaesu have put together your total satellite transceiver requirements in one package. If you are interested in the RS satellites with 2M to 10M transponders, the answer is FT726R + HF module and satellite unit, or if you want to use Oscar 10 with 70 cms to 2M transponder, the answer is FT726R + 70 cms module and satellite unit. You can even use the FT726R with the mode L transponder on Oscar 10. *However in this case the FT726R does require a little help from Microwave Modules and their MMX1268/144.* For mode L the answer is FT726R + 70cms module, satellite unit and MMX1268/144 on all the above combinations, full duplex is possible when the satellite unit is fitted to the FT726R. *So look no further, Yaesu have the answer, the FT726R!!*



FT726R(2)	Transceiver c/w 2M	£739.00
FT726R	Transceiver Main frame	£585.00
21/24/28	HF module	£200.00
50/726	6M module	£185.00
144/726	2M module	£155.00
430/726	70cms module	£250.00
SAT726	Full duplex module	£95.00
XF455MC	600Hz CW filter	£39.85
MMX1268/144	Satellite transmit transverter	£135.00

URGENT

Then use **HOTLINE** numbers

URGENT ORDERS	0703 867330
SERVICE ENQUIRIES	0703 861829
NORMAL CALLS	0703 867333

SMC SERVICE
Free Securicor delivery on major equipment.
Access Barclaycard over the phone.
Biggest branch agent and dealer network.
Securicor 'B' Service contract at £5.00.
Biggest stockist of amateur equipment.
Same day despatch whenever possible.

FREE FINANCE
*On many regular priced items SMC offers.
Free Finance (on invoice balances over £120)
20% down and the balance over 6 months or
50% down and the balance over a year.
You pay no more than the cash price!
Further details on eligible items on request.

GUARANTEE
Importer warranty on Yaesu Musen products.
Ably staffed and equipped Service Department.
Daily contact with the Yaesu Musen factory.
Tens of thousands of spares and test equipment.
Twenty five years of professional experience.
• 2 years warranty on regular priced Yaesu products.

Communications Ltd.

TEE—MAIN DISTRIBUTOR FACTORY BACKED
FIELD, BUCKLEY, STOKE, GRIMSBY, JERSEY, EDINBURGH

Special Supplier of Ham Radio Equipment for the Sarajevo 1984 Winter Olympic Games

YAESU

YAESU'S TRANSCEIVERS OFFER FACILITIES, NOT GIMMICKS

FT-980

FT980	Transceiver with general coverage RX	£1265.00 inc
SP980	External L/S with audio filter	£58.65 inc
SP980P	External L/S with phone patch	£74.85 inc
FIF80	Computer interface for NEC PC8001	£99.65 inc
FIF65	Computer interface for Apple II	£51.35 inc
FIF232C	Computer interface (RS232)	£58.40 inc

FT77

FT77	8 Band RX/TX 100W output	£459.00 inc
FT77S	8 Band RX/TX 10W output	£425.00 inc
FP700	MATCHING AC PSU	£135.00 inc
FC700	MATCHING ANTENNA TUNER	£98.90 inc
FV700DM	DIGITAL VFO Unit	£200.00 inc
MKT77	Marker unit	£10.35 inc
FMUT77	F unit	£27.20 inc

Multimodes for 6m, 2m & 70cm

package deal FT790R + FL7010 amp bought together £299 inc.

FT690R	multimode Transceiver 6m	£249.00 inc
FT290R	multimode Transceiver 2m	£269.00 inc
FT790R	multimode Transceiver 70cm	£299.00 inc
SMC 2.2C	2.2Ah nicads C size per set	£21.60 inc
SMC 8C	220mA charger (13A style)	£8.80 inc
MMBII	mobile mount	£26.00 inc
CSC1A	carrying case	£4.20 inc
FL2010	2m 10w amplifier	£63.25 inc
FL6010	6m 10w amplifier	£49.00
FL7010	70cm 10w amplifier	£91.00

FM TRANSCEIVERS

FT230R

FT208R

FT203R	2m Handheld	NEW £169.00 inc
FT230R	2m Transceiver 25w	£259.00 inc
FT730R	70cm Transceiver 10w	£259.00 inc
FT208R	2m Handheld 2.5w	£199.00 inc
FT708R	70cm Handheld 1w	£209.00 inc
SMC 8.9AA	Handy charger (13A style)	£8.05 inc
NC7	Base charger	£32.95 inc
NC8	Base quick charger + psu	£54.05 inc
PA3	DC adaptor and charger	£15.35 inc

YAESU'S LINE UP FOR '84
THE FT757 SYSTEM

FT757GX	ALL MODES AND FILTERS FITTED	£685.00 inc
FP757GX	SWITCHED MODE PSU (50% duty)	£149.50 inc
FP757HD	HEAVY DUTY PSU (100% duty)	£162.50 inc
FC757AT	AUTOMATIC ANTENNA TUNER	£231.50 inc

* Frequency range 160-10M Tx, general coverage Rx. 10Hz VFO steps and 500kHz band steps. * Modes, USB, LSB, CW, AM, FM all as standard. * Power output 100W SSB, CW, FM 25W carrier AM, 3rd order products −40dB at 100W on 14MHz. * Dynamic range better than 100dB CW(N) at 14MHz. * Frequency stability better than ± 10ppm after warm up. * Dual VFO's and 8 memories with VFO/memory transfer feature allowing more flexible split frequency operation. * Programmable memory scanning with scanstop threshold adjustable with the RF Gain control. * All accessories installed including AM, FM, marker, speech processor, shift filters, 600Hz CW filter and keyer. * New heatsink design and ducted cooling system allows 100W o/p at 100% transmitter duty cycle. * Selectable semi break-in or full break-in and built-in iambic keyer with dot-dash memory. * Three micro processors control most of the switching and adjusting functions normally done by hand and an optional CAT interface unit allows further operating flexibility with an external computer.
* 100% duty with FP757HD only.

REMEMBER

Only authorised Yaesu dealers have contact with the factory in Japan, and only if you buy your radio from an authorised dealer can you be assured of spares and service back up. So **BEWARE** of grey importers who offer sets a few pounds cheaper, they may not be around if your set goes wrong!

BARCLAYCARD VISA

SOUTHAMPTON	GRIMSBY	STOCK	LEEDS	CHESTERFIELD	BUCKLEY	JERSEY	EDINBURGH
SMC Ltd	SMC (Humberside)	SMC (Stoke)	SMC (Leeds)	SMC (Jack Tweedy) Ltd	SMC (T.M.P.)	SMC (Jersey)	SMC (Scotcomm)
36/38 Rumbridge Street, Totton, Southampton	247A Freeman Steet, Grimsby, Lincolnshire	76 High Street, Talke Pits, Stoke	257 Otley Road, Leeds 16, Yorkshire	102 High Street, New Whittington, Chesterfield	Unit 27 Pinfold Workshops Pinfold Lane, Buckley	1 Belmont Gardens St Helier, Jersey	23 Morton Street EH15 2HN
Southampton (0703) 867333	Grimsby (0742) 59388	Kidsgrove (07816) 72644	Leeds (0532) 782326	Chesterfield (0246) 453340	Buckley (0244) 549563	Jersey (0534) 77067	031-657 2430
8-5.30 Mon-Sat	9.30-5.30 Mon-Sat	9-5.30 Tue-Sat	9-5.30 Mon-Sat	9-5.30 Tue-Sat	9.30-5.00 (Lunch 1-1.45) Tue-Sat	10.00-7.00 Mon-Sat	10-5.00 Tue-Fri (9-4 Sat)

SCANNING RECEIVER

MS-8400

New from S.M.C. the MS-8400 VHF/UHF microprocessor controlled scanning receiver with 40 programmable memory channels, keyboard entry of frequency or command; automatic band search, AM and FM selectable, 4 selectable scanning steps, priority channel, connections for external antenna, DC supply and loudspeaker. Supplied c/w telescopic antenna mounting bracket, etc.

SPECIFICATIONS

Frequency Range:	Low VHF 68,000 MHz ~ 88,000 MHz Mid VHF 108,000 MHz ~ 136,000 MHz High VHF 136,005 MHz ~ 174,000 MHz UHF 360,000 MHz ~ 512,000 MHz
Scanning steps:	5, 10, 12.5 and 25 KHz VHF (10, 12.5 and 25 KHz UHF)
Channels:	40 programmable memories
Modes:	AM or FM selectable
Scan rate:	Approximately 18 channels per second
Scan delay:	2 seconds **Priority sampling:** 4 seconds
Audio output:	1.2 Watts
Selectivity:	Better than −60 dB @ ± 25KHz
Power supply:	DC 12V ~ 16V 0.6A max
Memory backup:	9 volt, battery (PP3)
Antenna:	Telescopic antenna or External
Loudspeaker:	2.5" × 4" oval speaker
Size:	190(W) × 250(D) × 85(H) mm
Weight:	1.7kg

£249.00 inc.

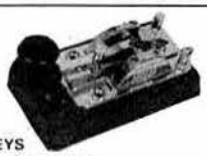
Price includes free carriage

JAY BEAM

				p/p
4 METRES				
4Y/4M	Yagi 4 element	7dBd	£29.90	£2.65
PMH2/4M	Phasing harness 2 way		£16.10	£1.65
2 METRES				
H0/2M	Halo head only	0dBd	£5.98	£1.50
HM/2M	Halo with 24" mast	0dBd	£6.55	£1.65
C5/2M	Colinear omni vert	4·8dBd	£54.62	£2.65
LW5/2M	Yagi 5 element	7·8dBd	£14.37	£2.65
LW8/2M	Yagi 8 element	9·5dBd	£17.82	£2.65
LW10/2M	Yagi 10 element	10·5dBd	£24.15	£2.65
LW16/2M	Yagi 16 element	13·4dBd	£35.07	£3.65
14Y/2M	Yagi 14 element	12·8dBd	£36.23	£3.65
PBM10/2M	10 ele Parabeam	11·7dBd	£44.85	£3.65
PBM14/2M	14 ele Parabeam	13·7dBd	£55.77	£3.65
Q4/2M	Quad 4 element	9·4dBd	£29.32	£2.65
Q6/2M	Quad 6 element	10·9dBd	£39.10	£2.65
Q8/2M	Quad 8 element	11·9dBd	£44.85	£2.65
D5/2M	Yagi 5 over 5 slot	10dBd	£25.30	£2.65
D8/2M	Yagi 8 over 8 slot	11·1dBd	£34.50	£2.65
5XY/2M	Yagi 5 ele crossed	7·8dBd	£28.17	£2.65
8XY/2M	Yagi 8 ele crossed	9·5dBd	£35.65	£2.65
10XY/2M	Yagi 10 ele crossed	10·8dBd	£46.00	£2.65
PMH2/C	Harness cir polarisation		£9.77	£1.65
PMH2/2M	Harness 2 way 144MHz		£12.65	£1.65
PMH4/2M	Harness 4 way 144MHz		£28.75	£1.65
SEVENTY CM				
C8/70	Colinear Omni Vertical	6·1dBd	£62.10	£2.65
D8/70	Yagi 8 over 8 slot	12·3dBd	£25.87	£2.65
PBM18/70	18 ele Parabeam	13·5dBd	£32.20	£2.65
PBM24/70	24 ele Parabeam	15·1dBd	£42.55	£2.65
LW24/70	Yagi 24 element	14·8dBd	£27.02	£2.65
MBM28/70	28 ele Multibeam	11·5dBd	£21.27	£2.65
MBM48/70	48 ele Multibeam	14·0dBd	£35.65	£2.65
MBM88/70	88 ele Multibeam	16·3dBd	£48.87	£2.65
8XY/70	Yagi 8 ele crossed	10dBd	£42.55	£2.65
12XY/70	Yagi 12 ele crossed	12dBd	£52.90	£2.65
PMH2/70	Harness 2 way		£10.35	£1.85
PMH4/70	Harness 4 way		£22.42	£1.85
1296 MHz				
CR2/23CM	Corner reflector	13·5dBd	£40.25	£2.65
PMH2/23CM	Harness 2 way		£31.05	£1.85

NB: PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown

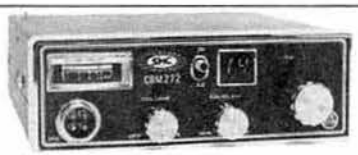
MORSE EQUIPMENT



MORSE KEYS			
HK703	Straight Key	**£28.00**	£1.20
HK704	Straight Key	**£19.25**	£1.20
HK706	Straight Key	**£15.90**	£1.00
HK707	Straight Key	**£15.00**	£1.00
HK710	Straight Key	**£39.70**	£1.75
HK808	Straight Key	**£49.70**	£1.75
HK711	Key Mounting	**£32.15**	£1.50
BK100	Mechanical Bug	**£24.25**	£1.75
MK701	Single Lever Paddle	**£27.50**	£1.60
MK702	Single Lever Paddle	**£28.85**	£1.60
MK703	Squeeze Key	**£28.30**	£1.75
MK705	Squeeze Key	**£24.65**	£1.75
MK706	Squeeze Key	**£21.25**	£1.75
IKP60	Iambic	**£9.95**	FOC
HK802	de Luxe Brass Key	**£85.85**	£2.00
MORSE EQUIPMENT			
KP100	Squeeze CMOS 230/13·8V	**£77.05**	£2.00
KP200	Memory 4096 Multi Ch Mem Back Up 230/13·8V	**£165.62**	£2.50
D70	Morse Tutor (Datong)	**£56.35**	FOC
MMS1	Morse Tutor (M/M)	**£115.00**	FOC
MMS2	Morse Tutor Advanced	**£155.00**	FOC
MICROWAVE MODULES – RTTY EQUIPMENT			
MM2001	RTTY to Demod./Convertor	**£189.00**	FOC
MM4001	RTTY Transceiver		FOC
MM4001KB	RTTY Transceiver c/w keybd	**£299.00**	FOC
MM1001KB	**Morse Keyboard**	**£135.00**	**FOC**
MM1000KB	ASCII – CW conv c/w keybd	**£135.00**	**FOC**

PRICES INCLUDE VAT at 15%
Carriage as shown

10M FM CORNER



Join the many others who have found that operating 10M FM can be a pleasant alternative to the overcrowded 2M band. The SMC Oscar 2 10M gives you 40 channels, channel 1 being 29.310 MHz and channel 40 29.7 MHz, a power o/p of approximately 4 watts and a receive sensitivity of better than 3μV for 12db sinad. Also for your enjoyment when the band opens up, we have incorporated a − 100kHz repeater shift (by using the original front panel Hi/Low power switch), so from the car or at home you can enjoy 10M FM without having to pay £500 for an HF transceiver.

OSCAR 2 10M FM **£49.00 inc**

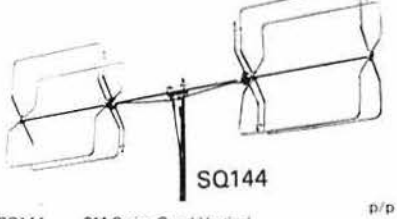
ACCESSORIES		**INC**	**P/P**
SMCGP27	¼ Wave vertical with radials	**£24.15**	**£2.65**
SMC VA27	¼ Wave vertical no radials	**£20.70**	**£2.65**
SMC11V11S	Glass fibre shortened ground plane	**£32.20**	**£2.65**
SMC10SE	10M Mobile whip	**£14.95**	**£2.00**
R5L-28b	Yaesu 10M mobile whip	**£10.65**	**£2.00**
SMCGCCA	Gutter mount and cable	**£10.35**	**£2.00**
SMCSOCA	4M cable assembly for 10SE	**£5.35**	**£1.50**
FLEXI 10	G. Whip mobile 10-80M	**£49.00**	**£2.35**
MULTI-MOBILE	G. Whip mobile 10, 15, 20M	**£32.20**	**£1.85**
FLEXIWHIP	G. Whip 10M mobile	**£19.21**	**£1.85**
GW BASE	Base for all G. Whip antennas	**£6.10**	**£1.00**
SMCT3170L	Twin meter SWR bridge	**£16.50**	FOC
SMC100LP30	Low pass filter	**£6.30**	FOC
SMCRU12 04·06	4 Amp DC power unit	**£14.95**	£2.35
SP55	Extension L/S	**£16.00**	FOC

NB. PRICES INCLUDE VAT AT 15%
and carriage by post or Securicor

SMC-HS

HF, VHF, UHF, BASE STATION ANTENNAS

SMC-HS range of base station antennas covers from 80M through to 70cm. All have SO239M connectors and are supplied complete with all required mounting hardware.



SQ144

			p/p
SQ144	2M Swiss Quad Vertical Mounting 2M ¼ c/w ground plane	**£63.25**	£2.65
GP2M	3·4dB ↓	**£20.70**	£2.65
GP144W	2M 2 × ½ colinear 6·5dB ↓	**£29.90**	£2.65
GP23	2M 3 × ½ colinear 7·8dB ↓	**£43.70**	£2.65
GP432	70cm 3 × ½ colinear 6·8dB ↓	**£32.20**	£2.65
70N2V	2M/70cm colinear 2·8dB ↓/5·7dB ↓	**£32.20**	£2.65
HS770	2M/70cm Duplexer 50W 30dB isolation	**£15.35**	£1.85
VHFL	65-520MHz Discone Rx only	**£16.95**	£2.65
GDX1	80-480MHz Discone 3dB ↓	**£43.65**	£2.65
GDX2	50-480MHz Discone 3dB ↓	**£55.20**	£2.65
GDXA	100-480MHz Discone 3dB ↓	**£36.80**	£2.65
LT606	50-500MHz Log Periodic 7-8dB	**£115.00**	£2.65
HF5V	Trapped Vertical 10-80M 5 bands	**£59.00**	£2.65
HF5R	Loaded Radial Kit	**£38.35**	£2.65
3Y1015D20	3 ele 10, 15M Dipole 20M	**£158.70**	£5.95

NB: PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown

ROTATORS

The finest range: be it Kenpro, C.D.E., Channel Master, SMC, has over 19 models to choose from. Ask the experts for the right model to suit your requirements – it should save you money. Write, phone or call.

KR600RC

95026

FU200	through	3 Core	Light Duty	**£49.95**
KP250	Bell	6 Core	Lighter Duty	**£54.91**
9502B	Offset	3 Core	Lighter Duty	**£57.50**
AR40	Bell	5 Core	Medium Duty	**£98.90**
KR400	Bell	6 Core	Matches KR500	**£99.95**
KR500	Thro	6 Core	Elevation	**£126.50**
AR50	Bell	5 Core	5 Position Medium	**£113.85**
KR400RC	Bell	6 Core	Medium Duty	**£118.45**
CD45	Bell	8 Core	Heavy Duty	**£149.50**
KR600RC	Bell	8 Core	Heavy Duty	**£167.90**
HAM IV	Bell	8 Core	Heavier Duty	**£264.50**
KR2000RC	Bell	8 Core	Heavier Duty	**£333.50**
T2X	Bell	8 Core	Very Heavy Duty	**£332.35**
H300	Bell	8 Core	Digital Readout	**£546.25**

Control Cable

RC5W	5 Way 40p/mtr	Carriage £1.90
RC6W	6 Way 55p/mtr	Carriage £1.90
RC8W	8 Way 59p/mtr	Carriage £1.90
9523	Support Bearing **£19.65** 9502b F4200	Carriage £2.50
KC038	Lower Mast Clamp **£12.65** KR400 600 etc	Carriage £2.50

Prices including VAT and carriage, but carriage on accessories is extra unless sent with rotators

STOCK-CARRYING AGENTS WITH DEMONSTRATION FACILITIES

Stourbridge Andrew G4BJY (0384) 390916

Bangor John GI3KDR (0247) 55162
Tandragee Mervyn GI3WWY (0762) 840656

Neath John GW4FOI (0639) 52374 Day, (0639) 2942 Eve

POWER METERS

IN LINE POWER/SWR BRIDGES P.E.P., R.M.S. 1·8-440MHz

The Hansen range covers 30 quality models with top-of-the-line the FS710. This is a flat frequency response, peak envelope power and average in-line wattmeter with many novel features. Notable being the 'power independent' SWR scale—no forward power calibration knob, just direct reading SWR.

FS-500H

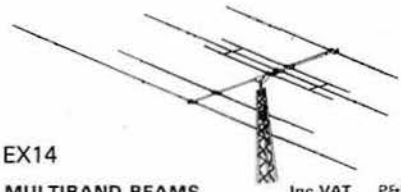
				£
HANSEN				
FS710H	1.8-60 MHz	15/150/1500W	Pep	97.75
FS710V	50-150 MHz	15/150W	Pep	97.75
FS50HP	1.8-60 MHz	20/200/2000W	Pep	96.60
FS50VP	50-150 MHz	20/200W	Pep	96.60
FS500H	1.8-60 MHz	20/200/2000V	Pep	77.80
FS500V	50-150 MHz	20/200W	Pep	77.80
FS300H	1.8-60 MHz	20/200/1000		50.60
FS300V	50-150 MHz	20/200		50.60
FS200	1.8-150 MHz	20/200	Pep	55.95
FS601M	1.8-30 MHz	20/200W	Pep	57.50
FS601MH	1.8-30 MHz	200/2000W	Pep	57.50
FS602M	50-150 MHz	20/200W	Pep	57.50
FS603M	430-440 MHz	5/20W	Pep	56.75
FS210	1.8-150 MHz	20/200W	Auto SWR	59.80
FS301M	2-30 MHz	20/200W		39.50
FS301MH	2-30 MHz	200/2000W		39.50
FS302M	50-150 MHz	20/200W		39.50
FS711H	2-30 MHz	20/200W	Head	41.00
FS711V	50-150 MHz	20/200W	Head	41.00
FS711U	430-440 MHz	5/20W	Head	41.00
HB1	FS711H Coupler			23.00
VB1	FS711V Coupler			23.00
UB1	FS711U Coupler			23.00
FS5E	3.5-150 MHz	20/200/1000W	HF	41.00
FS5S	1.8-150 MHz	20/200/1000W	HF	41.00
FS7	145 & (432 MHz)	5/20/200	144	44.85
SWR3E	3.5-150 MHz	20/200/1000W	HF	26.85
SWR3S	3.5-150 MHz	F/S Meter ant.		28.35
SWR50B	3.5-150 MHz	Twin Meter		26.85
FS20D	3-150 MHz	5/20W		39.85
FS-800	1.8-150 MHz	6/30/150W		115.00
JD				
JD110	1.5-150 MHz	10/100W		13.80
WELZ				
SP600	1·8-500mHz	20/200/2kW		97.00
S.M.C.				
S3-30L	Mini			8.80
T3-170L	3.5-170 MHz	Relative		16.50

T3-170L

NB: PRICES INCLUDE VAT AT 15%
Carriage free by post

HF ANTENNAS

SMC have the greatest range of HF antennas eg. Multi Beams/Quads, over 20 models. Shown below is the sensational new Explorer 14—contact us for full details.

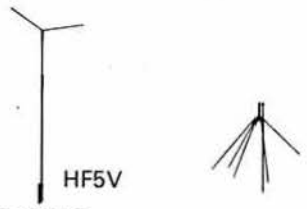


EX14

		Inc VAT	P&P
MULTIBAND BEAMS			
EX14	Explorer 10-20m	£325.00	£5.95
TH3JN	3 Ele 10-20m	£199.00	£3.50
TH2MK3	2 Ele 10-20m	£169.00	£3.50
TH3MK3	3 Ele 10-20m	£199.00	£5.30
TH5DXX	5 Ele 10-20m	£419.00	£6.70
TH7DXX	7 Ele 10-20m	£520.00	£8.75
TB3	3 Ele 10-20 Jaybeam	£189.75	£5.90
HQ1	Mini Quad 10-20	£169.00	£4.00
G4MH	Mini Beam 1-20	£88.50	£4.50
TA33JNR	3 Ele 10-20 Moseley	£177.10	£6.00
Mustang 2	2 Ele 10-20 Moseley	£177.10	£6.90
Mustang 3	3 Ele 10-20 Moseley	£220.80	£6.90
GQ2E	2 Ele 10-20 Quad	£270.25	£5.40
GQ3E	3 Ele 10-20 Quad	£435.00	£9.20
GQ4E	4 Ele 10-20 Quad	£599.00	£10.00
Hyquad	2 Ele 10-15M dipole 20M	£325.00	£6.00
LP1007	Log Periodic 13-20 MHz	£1707.75	DIST
3Y1015D20	3 Ele 10-20m	£158.70	£5.95
DB10/15A	3 Ele 10-15m	£199.00	£4.80

TB3

MONO BAND BEAMS			
103BA	3 Ele Yagi 10m	£69.00	£3.50
105BA	5 Ele Yagi 10m	£155.00	£3.95
153BA	3 Ele Yagi 15m	£95.00	£3.50
155BA	5 Ele Yagi 15m	£239.00	£5.90
203BA	3 Ele Yagi 20m	£179.00	£4.90
204BA	4 Ele Yagi 20m	£289.00	£7.30
205BA	5 Ele Yagi 20m	£399.00	£9.40
402BA	2 Ele Yagi 40m	£249.00	£6.50
18TD	Dipole Tape 10-80m		



HF5V HF5R

VERTICALS			
12AVQ	Vertical 10-20m	£52.90	£2.75
14AVQ	Vertical 10-40m	£66.70	£2.75
18AVT/WB	Vertical 10-80m	£113.85	£2.75
18V	Vertical 10-80m taped	£36.22	£2.75
C4	Vertical 10-20m	£59.00	£2.65
SMCHF5V	Vertical 10-80m	£59.00	£2.65
SMCHF5R	Radial Kit for above	£38.35	£2.65
TRAP DIPOLE			
SMCTD/HP	High Power 10-80m	£45.00	£2.65
SMC TD/P	Portable inc coax	£65.55	£2.65
MOBILE			
Tribander	10-20m Slide sw.	£27.37	£1.65
Multimobile	10-20m	£32.20	£1.85
Flexiwhip	10m only	£19.21	£1.85
Extra coils	For above to 160m	£6.90	£1.00
Flexiten	2, 10, 12, 17, 15, 20, 30, 40, 80M	£49.00	£2.35
Bases	For above	£6.10	£1.00

NB: PRICES INCLUDE VAT AT 15%
Carriage extra. Mainland rate shown.

SMC-HS

HF, VHF, UHF ANTENNAS MOBILE VERTICALS

SMC-HS Mobile Elements, tabulated below, feature an inbuilt PL259M connector, which mates with the SO239M on any of the four standard mounts. This arrangement is ideal for easy removal —band changes, comparative test, car wash, and anti-vandal, system checks from the feed point, portable operation and for ease of garaging etc. All models have fold over bases (either lift and lay or locking collar) except the 78B which has an inbuilt ball in case the mount must be fitted askew.

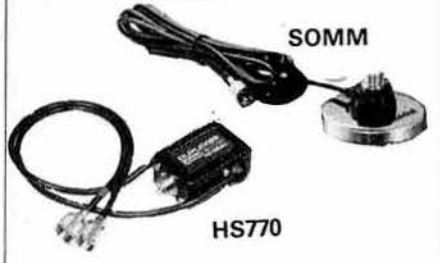
SMC 78F

GCD

SMC258

GCD

			P&P
SMC-HS MOBILE ANTENNAS			
SMC6P2T/PL	Telescopic 2M PL259 fitting 0dB	£5.75	£0.85
SMCT144h	Telescopic 2M ¼ wave BNC	£9.20	£0.85
SMC6P2T/BNC	Telescopic 2M BNC fitting 0dB¼	£5.75	£0.85
SMC2H/PL	Helical 2M PL259 fitting	£5.75	£0.85
SMC2H/BNC	Helical 2M BNC fitting	£5.75	£0.85
SMCHS430	70cm ½ wave BNC fitting 2.5dB¼	£7.30	£0.65
SMC2QW	2M wave 0dB¼ 1.6'	£2.53	£1.85
SMC2NE	2M wave fold 3.0dB¼ 4.3'	£7.30	£2.00
SMC2VF	2M wave fold 3.0dB¼ 3.5'	£12.65	£2.00
SMC78F	2M ¼ wave fold 4.5dB¼ 5.7'	£14.95	£2.50
SMC78B	2M ¼ wave ball 4.5dB¼ 5.6'	£14.95	£2.59
SMC78SF	2M ¼ wave short 4.7'	£14.95	£2.50
SMC88F	2M /8 wave 5.2dB¼ 6.5'	£20.70	£2.50
SMC118M	Colinear 2M 11/8 wave fold 7dB¼ 9.7'	£33.35	£2.65
SMC25B	70cm 2 × ¼ fold 5.5dB¼ 3.1'	£13.80	£2.00
SMC35B	70cm 3 × ¼ 6.3dB¼ 4.7'	£18.40	£2.00
SMC70N2M	Dual band 2M 2.7dB¼ 70cm 5.1dB¼	£18.40	£2.00
SMCHS770	144/432 Duplexer 50W	£16.50	£1.85
SMC20SE	20M 1.72M 'fold over' 100W PEP	£19.15	£2.50
SMC15SE	15M 1.72M 'fold over' 130W PEP	£15.70	£2.50
SMC10SE	10M 1.72M 'fold over' 200W PEP	£14.95	£2.50
SMC17SE	17M 1.915M 'fold over' 200W PEP	£17.25	£2.50
SMC12SE	12M 1.915M 'fold over' 200W PEP	£15.35	£2.50
RSL-28b	Yaesu 10M mobile whip	£10.65	£2.00
SMCGCCA	Gutter clip 4 mtrs cable	£10.35	£2.00
SMCSOCA	Cable assembly 4M	£5.35	£1.50
SMCSOCAL	Cable assembly 6M	£5.75	£1.50
SMCTMCAS	Trunk mount c/w 6M cable	£9.20	£2.00
SMCSOMM	Magnetic base c/w 4M cable	£10.75	£2.00
SMCSOWM	Adjustable wing mount base	£4.60	£0.90
SMCGCD	Gutter clip deluxe	£5.00	£1.50
SMCBSD	Bumper strap deluxe	£9.60	£1.50
HS88BK	Bumper mounted extension for 144 MHz ant.	£20.30	£2.00



SOMM

HS770

NB: PRICES INCLUDE VAT AT 15%

Head office
Mail orders
Service & Spares

S. M. HOUSE, RUMBRIDGE STREET, TOTTON, SOUTHAMPTON SO4 4DP, ENGLAND
Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton
See preceding pages for complete addresses and phone numbers of branches

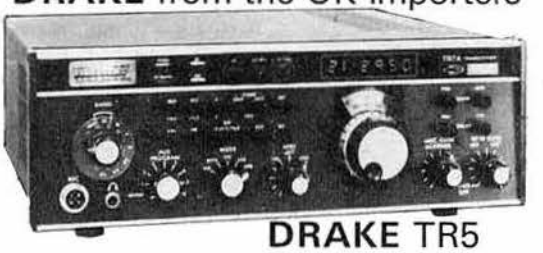
RADIO SHACK

For the best in Amateur Radio and bargains throughout the ranges

COLLINS KWM-380

NEW! YAESU FT-757GX

DRAKE from the UK importers



DRAKE TR5

ICOM IC-751 £1049

ICOM IC-R70 £549

TRIO—London's centre for the full range and a good deal

TRIO TS930S
HF transceiver with General Coverage receive

TRIO TR7930
Two metres FM mobile transceiver

TRIO R2000
General Coverage Receiver

SCANNERS

AR-2001

Realistic

PRO-2003	50 Ch. + 10Ch 89 – 108 MHz	£259.95
New . . . PRO-30	16 Ch. Handheld Programmeable. 68-88, 108-136 AM Aircraft, 138-144, 144-148, 148-174, 380-450, 450-470, 470-512MHz	£229.95

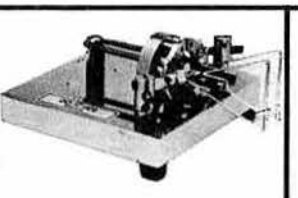
Bearcat

BC-100FB	Handheld 16 Channel	£345.00
BC-150FB	16 Channel Scan only	£159.95
BC-200FB	16 Ch. Scan & Search	£184.95
BC-20/20FB	40 Ch AM & FM	£275.00

BEARCAT BC-20/20FB

BENCHER PADDLES

BY-1 Black Base	£49.45	ZA-1A Balun	£20.95
BY-2 Chrome Base	£62.25	ZA-2A Balun	£24.95
BY-3 Gold plated	£159.00	ZY-2 CW Audio Filter	£57.50



TONO 550 Decoder £299

Access

RADIO SHACK LTD

188 BROADHURST GARDENS, LONDON NW6 3AY

(Just around the corner from West Hampstead Station on the Jubilee Line)

Giro Account No. 588 7151 Telephone 01-624 7174 Telex: 23718

BARCLAYCARD VISA

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY REPRESENTING ALL UK RADIO AMATEURS

Founded 1913 Incorporated 1926 Limited by guarantee A member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the general manager, from whom full details of Society services may also be obtained.

Headquarters and registered office: **Alma House, Cranborne Road, Potters Bar, Herts EN6 3JW**
Telephone (Dialling code 77 from London, 0707 from outside London) 59015. Telex 25280 (RSGBHQ G)
Secretary and general manager: D. A. Evans, PhD, FIM, CEng, G3OUF

COUNCIL OF THE SOCIETY

PRESIDENT: R. G. Barrett, GW8HEZ

EXECUTIVE VICE-PRESIDENT
J. Heathershaw, G4CHH (Mrs)

IMMEDIATE PAST-PRESIDENT
D. E. Baptiste, CBE

HONORARY TREASURER
P. F. D. Cornish, FCA, G3COR

ORDINARY MEMBERS OF COUNCIL

D. S. Evans, PhD, FIM, CEng, G3RPE
H. M. Holmden, G4KCC
G. R. Jessop, CEng, MIERE, G6JP
T. I. Lundegard, G3GJW
B. O'Brien, G2AMV
D. M. Pratt, BEng, CEng, MIEE, MIERE, G3KEP
G. R. Smith, BSc, MBIM, G4AJJ
K. E. V. Willis, BSc, ARCS, CEng, MIEE, G8VR

ZONAL MEMBERS OF COUNCIL

Zone A	*(Regions 1, 2 and 18)*	J. Heathershaw, G4CHH (Mrs)	**Zone E**	*(Regions 10 and 11)*	D. M. Thomas, GW3RWX *(co-opted)*
Zone B	*(Regions 3, 4 and 5)*	H. S. Pinchin, BSc, MBIM, G3VPE			
Zone C	*(Regions 7, 8, 16 and 19)*	W. J. McClintock, MSc, G3VPK	**Zone F**	*(Region 15)*	I. J. Kyle, GI8AYZ
Zone D	*(Regions 6, 9, 17 and 20)*	L. Hawkyard, G5HD	**Zone G**	*(Regions 12, 13 and 14)*	F. Hall, GM8BZX

REGIONAL REPRESENTATIVES

Region 1	*(Cheshire, Cumbria, Gtr Manchester, Isle of Man, Lancashire, Merseyside)*	W. R. Parkinson, G3FNM. Tel 061 973 1472.
Region 2	*(Humberside N of Humber, North, South, West Yorkshire)*	(Post vacant).
Region 3	*(Herelord and Worcester, Salop, Staffordshire, Warwickshire, West Midlands)*	L. W. Craven, G4EQI. Tel 021 445 1347.
Region 4	*(Derbyshire, Humberside S of Humber, Leicestershire, Lincolnshire, Nottinghamshire)*	M. Shardlow, G3SZJ. Tel 0332 556875.
Region 5	*(Bedfordshire, Cambridgeshire, Northamptonshire)*	J. S. Allen, G3DOT. Tel 0582 21151.
Region 6	*(Berkshire, Buckinghamshire, Oxfordshire)*	F. S. G. Rose, G2DRT. Tel 0494 814240.
Region 7	*(Gtr London S of Thames, Surrey including part of London N of Thames administered by Surrey)*	(Post vacant).
Region 8	*(Kent, East Sussex, West Sussex)*	M. Elliott, G4VEC. Tel 0795 70132.
Region 9	*(Cornwall, Devon)*	W. J. Colclough, G3XC. Tel 0726 860485.
Region 10	*(Dyfed, Gwent, Mid Glamorgan, Powys, South Glamorgan, West Glamorgan)*	E. J. Case, GW4HWR. Tel 0222 810368.
Region 11	*(Clwyd, Gwynedd)*	B. H. Green, GW2FLZ. Tel 0492 49288.
Region 12	*(Grampian, Highland, Island Authorities, Tayside)*	M. R. Hobson, GM8KPH. Tel 0796 2140.
Region 13	*(Borders, Fife, Lothian)*	A. B. Givens, GM3YOR. Tel 0592-200335.
Region 14	*(Central, Dumfries and Galloway, Strathclyde)*	(Post vacant).
Region 15	*(Northern Ireland)*	J. T. Barnes, GI3USS. Tel 0247 3948.
Region 16	*(Essex, Norfolk, Suffolk)*	T. D. Howe, G3PLF. Tel 0268 24453.
Region 17	*(Isle of Wight, Channel Islands, Dorset, Hampshire, Wiltshire)*	H. G. Cunningham, G8FG. Tel 0202 876018.
Region 18	*(Cleveland, Durham, Northumberland, Tyne & Wear)*	W. Ricalton, G4ADD. Tel 067 088 259.
Region 19	*(Greater London N of Thames, Hertfordshire)*	R. J. Broadbent, G3AAJ. Tel 01-989 6741.
Region 20	*(Avon, Gloucester, Somerset)*	B. L. Goddard, G4FRG. Tel 0272 848140.

HONORARY OFFICERS

Aerial Planning Panel co-ordinator: (c/o MSO, RSGB HQ)
Audio Visual Library co-ordinator: R. G. Auckland, G2PA
Awards managers. HF: P. Miles, G3KDB; **VHF:** Jack Hum, G5UM
HF manager: E. J. Allaway, G3FKM
Intruder Watch organizer: S. Cook, G5XB
Microwave manager: D. S. Evans, G3RPE
Observation Service organizer: D. M. Pratt, G3KEP
Slow morse practice transmissions organizer: M. A. C. MacBrayne, G3KGU
Trophies manager: P. A. Miles, G3KDB
VHF manager: K. A. M. Fisher, G3WSN

Correspondence to RRs and honorary officers should be addressed directly to them (QTHR), not to RSGB HQ

ANNUAL SUBSCRIPTION RATES

UK corporate member: £14.50 **Associate member under 18: £5.80** **Family member: £5.80** **Overseas member: £14.50**
Students over 18 and under 25: £8.70 (Applications should give applicant's age at last renewal date and include evidence of student status)
Affiliated societies: £14.50 (including *Radio Communication*); **£8.70** (excluding *Radio Communication*)
(Subscriptions include VAT where applicable)

RSGB QSL BUREAU

QSL cards for distribution should be sent to: **Mr E. G. Allen, G3DRN, QSL Bureau manager, 30 Bodnant Gardens, London SW20 0UD**

A list of QSL Bureau sub-managers was published in January issue of *Radio Communication*, and amendments will be published under "Amateur Radio News".

RSGB NEWS SERVICES

Headline News
Telephone 0707 (77 from London) 59312 for a recording of the latest amateur radio news.

GB2RS Broadcasts
Sunday news broadcasts from stations throughout the UK using the callsign GB2RS on frequencies in the 3·5, 7 and 144MHz bands.

Details of frequencies, locations and times were last published in the June 1983 issue.

Amendments are published under "Amateur Radio News". A full schedule can be obtained free on request by sending a large sae to the Membership Services Dept, RSGB HQ.

EDITORIAL

THE RADIO INTERFERENCE SERVICE

One of the best features of amateur radio is that it can take place within the comfort of one's home. However, because in this country we seem determined to cram our homes together as tightly as possible, we inevitably face problems with breakthrough in which amateurs' signals find their way into tv and radio sets, hi-fi, and a host of other domestic equipment—including, for all one knows, microprocessored washing machines.

The situation can be fraught: the amateur feels he has right on his side; he is sure his equipment is satisfactory, and he knows enough about domestic equipment to recognize its technical limitations. The neighbour also feels he has right on his side; he has paid what he regards as a high price for a top-quality commercial product and he expects it to work perfectly for ever more. The manufacturers feel they have right on their side; they cannot possibly justify wasting the customers' money by modifying their millions of products or improving immunity at the design stage to prevent perhaps just a few thousand problems after sale.

If breakthrough is not sorted out amicably, it can all too easily turn into a local disaster. The neighbour says that his set is perfectly good provided the amateur does not use his transmitter. The amateur says his transmitter causes no problems provided the tv set is switched off and so on. A few more exchanges at this level and the situation can become polarized beyond repair. The next move from the neighbour is usually the "unsightly" antennas, and so the scenario continues. But, in the final reckoning, the amateur is usually considered guilty until the breakthrough ceases.

Fortunately this type of problem can be nipped in the bud by calling in the Radio Interference Service. This is a body of some 300 overworked officers in the field, backed up by clerical and managerial staff. One of their responsibilities is to investigate breakthrough with domestic equipment from amateur and all other sources. In this the RIS officers have to be seen as an independent authority being fair to both parties. They are then able, in many cases, to sort out the technical problems, and can often defuse a potentially highly-emotive situation, sometimes within minutes.

It may come as a surprise to some to learn that the future of the Radio Interference Service is unclear. At present it is operated by British Telecom who act on behalf of the Department of Trade & Industry. However, with the possible privatization proposed in the Telecommunications Bill, it appears that British Telecom now have a conflict of interests problem and no longer wishes to continue this service. The delays to the Bill, as a result of the 1983 General Election, have left matters hanging, though initially the service was to have ceased operation under BT by the end of March 1984.

All in all, amateurs have been well-served by the Radio Interference Service, and it deserves our sincere thanks for its past efforts. The thought of no RIS or a reduced service would be appalling. If, as is rumoured, the DTI are to take it over, then we should surely advocate more investment both in manpower and facilities. Such investment now could save our nation the very high cost of sorting out even worse chaos in years to come. In this context, the introduction of cb, and illicit cb, overwhelmed the already-overstretched RIS officers. Alas, short-term cost cutting in the radio regulatory side of the Civil Service, contrary to Merriman, is likely to result in *only* the continuance of the RIS. The present service cannot cope adequately with the alarming increase in radio abuse and the rapid expansion in telecommunications. The RIS needs to expand now just to keep up with the growth. We only need look at countries whose airwaves are already blighted by inadequate laws and lack of controls to appreciate the priority which must be given to the future of the RIS. Sound technical decision making is essential in an environment which becomes more complex and inter-related each day. The RIS is an essential part of the future licensing and regulatory process.

Up to now, only a small amount of our licence fee has gone each year to support the Radio Interference Service. One feels that many amateurs would be happy to pay more, perhaps substantially more, in its support, if it meant an **easier solution to breakthrough difficulties** and **a clean-up of our bands.**

David Evans, G3OUF
General manager/secretary

COMPUTERS AND THE RSGB

Some years ago, the RSGB's Technical & Publications Committee agreed a policy for handling articles dealing with computer programs. This was intended to encourage the publication of articles having a genuine amateur radio content: at the same time we wished to avoid material which had no specific amateur radio interest and which would be quite at home in a computer magazine, and also articles which were merely a program repeated for a different computer.

With the growth of interest and importance of computers in amateur radio, the committee feels that it is now an appropriate time to take a more active role in this area. In particular, it is proposing the following actions:

Major articles for *Radio Communication*

Major articles describing computer programs will continue to be most welcome for publication in *Radio Communication* provided that they have a genuine amateur radio interest. However, it is now proposed that when program listings exceed, say, half a page, then these will be made available at a nominal cost from RSGB HQ and not published as part of the article. An important advantage of this approach is that it will allow the article to concentrate on providing:

(i) a description of the overall function of the program;
(ii) all the relevant information, including equations, which the program employs;
(iii) flow charts to illustrate the form and structure of the program.

The information given should therefore be sufficient to allow the reader to produce or adapt the program to suit his particular computer. It is envisaged that listings will initially be available only for the computer used by the author of the article, although other versions may become available at a later date.

Articles which provide an overview of relevant topics, eg packet radio, will also be favourably considered.

Short articles

These should accept similar constraints as major articles. However, listings of suitable programs which are less than approximately a half page in length will be published as part of the article, as is current practice.

Computer column

Consideration is being given to the possibility of establishing a regular computer column in *Radio Communication*. While its precise coverage has not yet been settled, it would be expected that the compiler of the column would be able to provide an up-to-date picture of the field and to indicate new developments, including those from professional sources which were relevant to amateur radio. The column could also perform another most important function; namely, that of providing a forum for the exchange of reader's ideas and information. Member's views on a column of this type would be welcome, and should be addressed to: The Editor, *'Radio Communication*, 88 Broomfield Road, Chelmsford, Essex CM1 1SS.

Because of the importance of the subject, the compiler would be expected to become a member of the Technical & Publications Committee, and to take a leading role in advising the committee on its future policy in this area.

RSGB's adoption of a "preferred" computer

Some of the problems in the computing area are simply a result of the large number of different computers which people use and the equally large number of pieces of equipment with which they are required to interface. If the number of computers to be catered for is limited to perhaps one or two, then it may become practical for RSGB to supply not only listings but also programs in the form of cassette tapes or contained within eproms. Indeed, the possibility exists, in principle at least, of the Society itself selling computers and accessories.

At the present time, the committee is looking into whether or not it makes sense for the Society to "adopt" one or more computers, basing its choice on technical specification and factors such as popularity, expected life and price. Here again, readers views would be welcome, and should be addressed to: Dr Dain Evans, G3RPE, c/o RSGB HQ, Alma House, Potters Bar, Herts EN6 3JW.

Dain Evans, G3RPE,
Chairman, Technical & Publications Committee

RSGB PRESIDENTIAL INSTALLATION 1984

In the delightful surroundings of the Banqueting Hall of Cardiff Castle, Bob Barrett, GW8HEZ, was installed as the RSGB's 1984 President on 14 January. Despite some fairly ferocious weather, including a thunderstorm and a heavy snowstorm simultaneously in the immediate area of Cardiff, some 120 members and their guests were present at the ceremony at which the retiring President, Mr D. E. Baptiste, CBE, passed on the chain of office. Mr Barrett becomes the RSGB's 50th President, and the first Class B licensee to hold the Society's premier office.

In his speech of acceptance Mr Barrett noted some of the many changes which had taken place within the hobby since he had become licensed. He mentioned some recent events within amateur radio, the most notable of which had been W5LFL's operation from the space shuttle *Columbia* during the STS-9 mission. Thousands of amateurs had attempted to contact W5LFL and, even though relatively few had made two-way contact, the President noted that the hobby of amateur radio had received some very positive publicity. He said that the media coverage received had done more than any other single item for many years to bring the potential of amateur radio to the public's notice.

The newly-installed President mentioned two major forthcoming events: the RSGB National Convention to be held in Birmingham in April, at which he hoped to see even more visitors than last year; and the IARU Region 1 Conference to be held in Sicily during the same month. The Society had already contributed a good deal of work in the form of conference papers for this conference—far outnumbering those from other countries, and he said that the UK amateur would be extremely well represented.

Mr Barrett paid tribute, not only to the RSGB staff, but also to the many hundreds of volunteers throughout the country, and he said that he was delighted to note the amount of volunteer effort which the hobby inspired. He closed his speech by thanking amateurs in South Wales who had supported him in his efforts in the course of several years.

An excellent buffet supper was then enjoyed by the guests.

The new President, Bob Barrett, GW8HEZ, being installed by his predecessor

The President congratulating newly-elected members of the 1984 Council after presenting them with their badges of office. L to r: Dain Evans, G3RPE; Basil O'Brien; G2AMV; and Geoff Smith, G4AJJ.

THREE OF THE UK AMATEURS WHO WERE LOGGED BY W5LFL DURING HIS FLIGHT ON *COLUMBIA*

(See "More amateurs in space?" on facing page)

Gloria Hills, G4UYL, who had a confirmed contact with W5LFL on board *Columbia* at 1430 on 7 December 1983

Jan Niven, G6EGY, who was heard by W5LFL during a pass on 4 December

Sue Nelson, GM8NXC, another successful yl contact with W5LFL

Amateur Radio News

More amateurs in space?

Some interesting information emerged at the post-STS-9 press conference which took place on 19 December. As a direct result of the success of Dr Owen Garriott's operations during the flight of the space shuttle *Columbia*, it appears that amateur radio may well be welcome on future flights —W5LFL hinted that NASA "would be interested in doing this kind of thing again".

Dr Garriott said that during the time available in his off-duty periods he had recorded about 290 amateurs in various parts of the world, principally in the USA but a good many in Europe and elsewhere. Of the few two-way contacts, most took place using phone, but there were also some in which cw was used. All were logged on tape. He felt that fm had been the best mode to use, since there was no doppler shift and the capture effect had assisted in the large pile-ups.

On the assumption that there would be another chance of amateur radio activity from the space shuttle, Dr Garriott was asked whether any improvements could be envisaged. He felt that some improvement to the receiver's front-end to prevent overloading would be helpful, coupled with headphones instead of a simple earpiece. Other than that, he was satisfied that the basic method of operation was satisfactory and that all the objectives had been successfully completed.

The Society has so far heard from four of the five UK amateurs whose callsigns were logged on W5LFL's tape. G4UYL, Mrs Gloria Hills, used a Trio 9000 multimode with a Tono amplifier and a 14-element Parabeam with no elevation facility. GM8NXC, Mrs Sue Nelson, used an FT221R with a home-built 4CX250B amplifier and a nine-element Tonna. G6EGY, Jan Niven, used an FT480R, an HL160V 100W linear, and a two-element crossed Yagi alternately with a 4×8-element Yagi array. Finally G6DEF, Mr J. W. Hoyland, used an unmodified FT290R with a home-built 10W amplifier and a nine-element Tonna.

Some aspects of the RSGB's response to the STS-9 mission were reported in last month's issue, and the public relations aspect of the flight was discussed. It appears that the public response to the extensive media coverage in the USA was very marked, and that the spin-off has been some much-needed public exposure for NASA: the feeling that ordinary members of the public can have some contact with the space programme has been novel and helpful.

Pirates in the House

On 20 January 1984 the Secretary of State for Trade & Industry was asked how much his department had spent on tracing and taking action against pirate radio broadcasters within the UK during each of the past five years; how much was being spent during the current year, and whether there were any plans to increase expenditure during the coming year. Mr Alexander Fletcher replied that it was not possible to identify separately the amount spent on tracing and taking action against pirate radio stations from the total spent on monitoring the frequency spectrum and dealing with illicit use of radio. However, 97 raids were carried out on pirate radio stations in 1983, and 40 persons were convicted; compared with 60 raids and 10 persons in 1982. It was intended to continue giving action against pirate radio stations a high degree of priority.

Cable television news

Members will be aware that the Society has for some time been concerned about the standards to be adopted in cable television systems, and that a good deal of effort and time have been spent in putting the radio amateur's point of view to the appropriate bodies. It appears that there is a potentially serious problem in Milton Keynes: there are strong carriers in the 144MHz band which are being radiated from a cable system operated by British Telecom. The Society has been in contact with the DTI, and it is understood that British Telecom has the problem in hand, and that DTI staff visited Milton Keynes in early February to investigate the problem.

The Society is obviously very concerned about the dangers of interference in amateur bands, especially since it is understood that some cable tv companies wish to reduce the technical specification of their cables in areas which would make increased radiation from them inevitable. Any member experiencing problems connected with cable tv systems is urged to write to the secretary/general manager at RSGB headquarters, marking the envelope "Cable TV".

On the same subject, it appears that an epidemic of leakage from cable tv networks is causing problems for aircraft navigational systems and air traffic control communications in the USA. VHF radio beacons used for navigation and instrument landing systems have suffered from interference, and vhf links between aircraft and ground controllers have been rendered unusable. In the UK, cable systems may not radiate on frequencies used for aviation communications and navigation: we wish the same were true for frequencies in amateur bands.

We need your postcode

In order to ensure that the Society's membership records are as accurate as possible, it is most important that the omniscient IBM computer at headquarters is kept well fed with postcodes. With the constant development and improvement of software, greater reliance will be placed on postcodes in future, and it is vital that they are known accurately for each member. The postcode which the Society has on record for you is shown on the address label inside the wrapper in which *Radio Communication* is delivered—it would be greatly appreciated if you would check carefully whether the postcode which we are using is correct. If there is no postcode shown, inform the Society as soon as possible. If you do not know your postcode, your local public library will have a local listing which you may consult: alternatively, the local Post Office will be able to inform you. The *Thomson's Local Directories*, which are now given free to each household in many areas of the UK, also carry a local street listing of postcodes.

If either the postcode we have for you is incorrect or there is no postcode on the address label with this issue of *Radio Communication*, please send a postcard with your name, address (including the postcode, of course!) and callsign to the secretary at RSGB headquarters.

Your co-operation would be very much appreciated, and may assist in reducing postal delays in future.

AN OPEN MEETING FOR RSGB MEMBERS IN REGIONS 1 AND 11

will be held at the

QUEEN HOTEL, CHESTER

on Saturday 31 March 1984

commencing at 3pm

The hotel is immediately opposite the main railway station, and has a large car park.

The RSGB President, members of the Membership & Representation Committee, and other Society officials will be present.

Your questions on amateur radio will be welcomed.

Special terms have been arranged for any members wishing to stay at the hotel. These are £19.50 per person, bed and breakfast. Please make your own arrangements direct with the hotel, quoting the event. The address is: Queen Hotel, City Road, Chester CH1 3AH; tel 0244 28341.

Club news

A few clubs seem to have misunderstood the procedure for placing news of their activities in *Radio Communication* and on the GB2RS news bulletins.

GB2RS is produced at Potters Bar, and any items for inclusion in the script must be sent to the Membership Services Department—preferably using the special cards obtainable from MSD—or telephoned in via the dedicated answering machine on Potters Bar 59260.

For publication in *Radio Communication* the normal route for club news is via the representative for the region in which the club is situated—as clearly stated under

the "Club News" headline in every issue. Clubs in regions temporarily without a representative should send the news items direct to *Radio Communication* at Chelmsford—please do not send them to RSGB headquarters.

QSL Bureau changes

After many year's service as sub-manager for Scottish members, Mr David Macadie, GM6MD, has resigned from the post: the Society would like to express its thanks for the sterling service he has given. The new sub-manager for Scotland is: Les Hamilton, GM3ITN, Halls Land, Hardgate, Clydebank.

IARU Monitoring Service

In the annual report of the IARU Committee (*Rad Com* November 1983, Annual Review, pxiii), paragraph 2 should have included VERON and UBA. Both of these societies have recently notified RSGB that they have active monitoring services.

RSGB talks to teachers

The Society's Education Committee wishes to improve the liaison between the Society and the teaching profession, with a view to conveying some basic information on the hobby to young people. In the first instance, contact is being established with the Association for Science Education in order to try and inform teachers of the nature of the hobby and its educational potential, and a programme of talks, displays and demonstrations is envisaged.

Members who are teachers or lecturers in any subject area, and who are interested in assisting, are asked to inform Brett Rider, G4FLQ, at RSGB headquarters. The intention is to complement other efforts in this direction to present amateur radio in a proper fashion, and the Society would welcome contact with the teaching profession in this way.

Mailshot delayed

In last month's issue of the *RSGB News Bulletin* it was reported that the Radio Amateur Licensing Unit of the Post Office was sending a questionnaire to all licensed amateurs in the UK early in 1984. It is understood that the timescale for this has now been revised, and it is not now envisaged that the sending of questionnaires will be completed until May 1984.

Post Office visits Potters Bar

On 14 December 1983 nine staff from the Amateur Radio Licensing Section of the Post Office at Derby and the DTI spent a day at RSGB headquarters. The purpose of their visit was to learn about amateur radio and to see it in action from GB3RS, and to observe the in-house computer system in operation. It is hoped that this will pave the way for the Society to publish the *Call Book* from the basis of the most up-to-date information.

Murphy's Law dictated that hf band conditions were very poor on the day of their visit: however, some semi-local contacts on 144MHz were greatly enjoyed. The Society was delighted to meet the Post Office staff for the first time, and looks forward to happy co-operation in the future.

Overseas news

Some incorrect information received by the Society meant that the news from Indonesia published in the December issue of *Radio Communication* was incorrect. At the moment there are some 40,000 members in the Indonesian national society ORARI, and the majority are in the Novice class: these have callsigns with a YD prefix. The YC prefix implies a General class licensee, and the YB prefix an Advanced class. For overseas visitors, their own country must have a reciprocal agreement with Indonesia, and they must possess a valid Indonesian work permit. A callsign in the AGA-AZZ series will be issued, although portable operation is not permitted. All Indonesian amateurs must also be members of the national society ORARI. ORARI intends to apply for membership of IARU Region 3 during 1984. The new address for the Indonesian QSL Bureau is PO Box 96, Jakarta, Indonesia 10002.

It is understood from the QSL manager for the Gibraltar Amateur Radio Society that there are mistakes and omissions in the latest edition of the American *Call Book*. An up-to-date list of ZB2 callsigns is available from the Gibraltar ARS, PO Box 292, Gibraltar, and the cost is one irc and a self-addressed envelope. The ZB2 Net takes place at 1900gmt each Thursday on 21,380kHz, band conditions permitting, and a ZB2 Award is available for working five ZB2 stations (not including maritime mobile). The cost is $3, and proceeds go the the ZB2 Repeater Fund.

No-code is no more

The concept of a "no-code" licence in the USA appears to have been finally overruled, with the commissioners of the FCC voting unanimously to abandon the proposals for this class of licence. The FCC noted that the use of morse was still considered ". . . relevant and necessary overseas", and that even handicapped amateurs had argued strongly against the creation of this new licence, saying that for many of their number morse was the only type of communication available. It was also noted that the comments received from amateurs had numbered about 20 to 1 against. In the final analysis, the FCC stated that a code-free licence was ". . . not in the public interest, convenience and necessity".

The FCC concluded that ". . . the morse code still occupies a significant place in day-to-day amateur operation, particularly in the hf bands. The morse code is used . . . on vhf and uhf frequencies in conjunction with weak-signal communications. The morse code is relied upon heavily for experimentation and the development of new technological advances. The morse code, rather than being irrelevant or obsolete, continues to be an integral part of amateur radio." The FCC also emphasized its belief in the role of morse code during emergency communications by saying: "it is the principal communications mode of last resort in the face of uncertain propagation characteristics or severe interference. Due to international language barriers, it is sometimes the only effective communications mode . . . clearly, morse code is a fundamental communications skill critical to the nature of the amateur radio service."

Long-term USA licences

The FCC has commenced issuing 10-year amateur licences. The appropriate legislation took effect from 15 October 1983, although the change could not be implemented at that stage because of computer difficulties. Licences which specify the old five-year terms will still expire on the date shown: the new 10-year term will only take effect when a licence is renewed or modified.

GB4NEC—RSGB Convention exhibition station

The Solihull ARS is organizing this HF Convention exhibition station at the RSGB National Convention at the National Exhibition Centre, Birmingham, on 28/29 April. It will be operational from 0900 to 1700 on each day and will use all hf bands, conditions permitting. Special emphasis will be placed on 3·5MHz phone, and operation on the other bands will be mainly cw. A special QSL card will be issued.

Further information from G6HSZ, QTHR, tel 021-742 3378, evenings only.

G3PAO Memorial Lecture

The Verulam ARC's annual G3PAO Memorial Lecture will be given this year on 27 March, 7.45pm for 8pm, at the RAFA Headquarters, New Kent Road, St Albans. The speaker will be George Jessop, G6JP, whose subject will be "Power amplifiers, past and present". Ample car parking space will be available, but go early for a good seat. Further details from Hilary Clayton-smith, G4JKS, tel St Albans 59318.

"Noise figure by computer"

The author of this article, *Rad Com* November 1983, p984, apologizes for an error in the program, which was pointed out by J. R. Miller, G3RUM.

Line 200 should read:

200 T2 = (FNB(L2 + N2))/FND (G1 – L1).

For a fuller treatment of the subject of noise, account should also be taken of external noise.

Stolen equipment

On 31 December 1983 from a car in Portslade, Brighton: KDK FM2030 transceiver, serial number 6893, modified to cover 144-146MHz continuously. Information to detective constable Saville, Hove police station, tel 0273 778922.

Sidebands

Far northern GB2RS newsreader Mrs K. Gee, GM4LNN, has unfortunately had to give up the job due to family commitments, and the Society thanks her very much for her efforts, which were greatly appreciated by the local community. Any offers for a replacement Orkney reserve reader?

Bill Bramham, G3OPI, who was very active on the dx bands and 144MHz from 1959 to 1975, is keen to get back on the air after a period of inactivity, and he would be delighted if old friends and local amateurs would write to him at 11 Falmouth Street, Walney Island, Barrow in Furness, Cumbria.

Several of our advertisers have asked us to mention that, due to wide fluctuations in exchange rates, the prices of imported products are liable to change at quite short notice. Because of necessary lead-times in the preparation of advertisements, quoted prices may have changed and it would be wise to check the current price of items of equipment before ordering.

John Morris, GU6BGI, author of "Confessions of an RAE instructor" (*Rad Com* June 1983) tutored a further five members to success in the December 1983 RAE, making a total of 20 before his nineteenth birthday.

Possibly as a result of the recent incidents in Grenada, a permanent third-party traffic agreement is now in effect between the USA and Grenada.

Mobile Rallies Calendar

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

18 March—Pontefract & DARS Components Fair, Carleton Community Centre. Open 11am-4.30pm (10.30am for disabled people). Talk-in on 144MHz fm, S22. Aimed at home constructors. Trade stands, RSGB bookstall, bring & buy and raffle. Details from A. Mason, G4TGU, tel 0532 871484, or N. Wittingham, G4ISU, tel 0977 792784.
1 April—White Rose ARS Rally, The University of Leeds. Details from A. N. Bramley, G4NDU, QTHR.
8 April—Buxton Mobile Rally, Pavilion Gardens, Buxton, Derbyshire. Open 11am (10.30am for disabled). Admission 50p, under 14yrs free if accompanied by adult. Talk-in on 144 and 432MHz. Ample car parking. Snack bar and cafeteria. Numerous trade stands. Details from G6MIF, tel Buxton (0298) 6174.
8 April—Swansea ARS Rally. Patti Pavilion, Swansea (next to St Helens Cricket Ground on A4067). Open 10.30am to 5pm. Trade stands, RSGB books, local repeater groups, bring & buy, licensed bar, refreshments. Talk-in on S22. Good car parking. Details from GW4HSH, QTHR. Tel 0792 404422.
15 April—East Cleveland ARC. Mammoth bring & buy. Leisure Centre, Marske by the Sea. Open 1100. Talk-in S22. Traders, bring & buy. For details send an sae to sec Ken Turner, G8JLA, QTHR.
15 April—Lough Erne ARC Mobile Rally, Killyhevlin Hotel, Enniskillen. Open 12 noon. Trade stands, bring & buy, and auction. The hotel is offering a "mini-weekend" from £30 per person. Admission £1. Details from Joe Maguire, GI4JHA, 124 Hillview Road, Enniskillen.
6 May—Anglo-Scottish Rally, Kelso, organized by the Kelso ARS. Junk, bring & buy and trade stalls. Full catering facilities and bar. Details from Bruce Cavers, GM4UIB, Kelso ARS, c/o Community Centre, Kelso, tel 0573 24654.
13 May—Swindon Radio & Electronics Rally. Oakfield School, Marlowe Avenue, Swindon, Wilts. Doors open 10am. Talk-in on S22 and SU8/GB3TD. Trade stands, cartoon film show, displays, refreshments, free car parking. Details from Ken Saunders, G8SFM, QTHR, tel 066-689 307.
13 May—Otley ARS Northern Mobile Rally. Flower Show Hall, Great Yorkshire Showground, Harrogate. Open 10.30am. Overnight accommodation and caravan site available. Details from H. Moore, G3CQQ, 269 Leeds Road, Ilkley, LS29 8LL.
20 May—Drayton Manor Mobile Rally. Drayton Manor Park, nr Tamworth, Staffs. Organizer N. Gutteridge, G8BHE, QTHR, tel 021-422 9787. Full details to follow.
27 May—East Suffolk Wireless Revival. Suffolk Showground, Ipswich. Organized jointly by Ipswich RC and Martlesham RS. Details later. Information from J. Tootill, G4IFF, QTHR.
3 June—Spalding & DARS Mobile Rally. Springfields, Spalding. Talk-in on S22 and SU8. Trade stands, 25 acres of garden, bars, restaurants. Details from I. Buffham, G3TMA, tel Spalding 3845.
3 June—Welsh Mobile Rally, organized by Barry College of Further Education RS. New venue: Barry Leisure Centre, Holton Road, Barry, near Cardiff. Well signposted. Open 11am-5pm (disabled from 10am). Trade stands, bring & buy, refreshments, swimming pool in leisure centre, etc. Free car parking, 5 min from the famous Barry Island Pleasure Park and beach. Enquiries to Reg Rowles, GW4FOM, tel 0222 565656 or 563123, evenings.
10 June—Elvaston Castle Mobile Rally, Elvaston Castle Country Park, 5 miles south-east of Derby on the B5010. Organized by the Nunsfield House ARG. Opens 10am. Talk-in will be provided by GB2ECR on both 144 and 432MHz. All the usual facilities including bring & buy sale and flea market. Full on-site catering facilities. Further details from Ian Cage, G4CTZ, QTHR, tel Derby (0332) 799452. Trade enquiries to Mr R. Woolley, G4HIJ, tel Ashbourne 43241.
17 June—RNARS Mobile Rally. HMS *Mercury*, near Petersfield, Hants. Open 1000-1730. Talk-in on 144 and 432MHz. Hot and cold refreshments available all day. Many arena events for the family; steam train and engine rides; historic aircraft flypasts etc. Details from A. G. Walker, G4DIU, QTHR, tel 0705 667889.
17 June—Denby Dale Mobile Rally, Shelley High School, nr Skelmanthorpe, Huddersfield. Open 11am. Talk-in on S22 and SU8. Trade stands plus something of interest for the ladies and children. Refreshments, bar. Admission and parking free. Details from G3FQH, QTHR, tel 0484 862390.
24 June—Longleat Amateur Radio Rally. Longleat Park, Warminster. The Bristol Unicorns Marching Band will be with us again this year, plus all the usual Longleat Park attractions for the family. Details from B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, tel 0272 848140.
1 July—Worcester & DARC Annual Mobile Rally. Droitwich High School, Ombersley Road, Droitwich. Open 11am to 5pm. Attractions will include "Strawberry Fields" and children's fancy dress competition. Details from sec A. C. Lindsay, G4NRD, QTHR.
21 July—West Kent ARS Radio & Electronics Fair. Royal Victoria Hall, Southborough. Open 9.30am-5pm. Car parking nearby. It is hoped to attract many suppliers and traders and there will be a special event station. Details from Dave Green, G4OTV, 13 Culverden Down, Tunbridge Wells, Kent, tel Tunbridge Wells (0892) 28275.
22 July—Anglian Mobile Rally, Stanway School, Colchester, Essex. Open 1000-1700. Talk-in on 144MHz. Further details from G3YAJ, tel 0206-39 3938.
22 July—McMichael ARS Mobile Rally. Bells Hill, Stoke Poges, nr Slough. Open 11am. Talk-in on S22. Attractions include trade stands, flea market, atv exhibitions and special event station GB2MRS. There will also be vintage wireless, family entertainment, refreshments and a CAMRA beer tent. Free parking. Details from G8IHF, c/o McMichael Ltd, Wexham Road, Slough, Berks.
29 July—Scarborough ARS Rally. The Spa, Scarborough. Open 11am. Talk-in on 144MHz (S22) and 432MHz (SU8). Further details from sec N. Lill, G6CXK, QTHR, tel 0723 60587.
29 July—Rolls Royce ARC (Barnoldswick) Mobile Rally. Sports & Social Club, Barnoldswick. Open 11am. Details from Leslie Logan, G4ILG, QTHR.
12 August—27th Annual Derby Mobile Radio Rally. Lower Bemrose School, St Albans Road, Derby. Talk-in by GB3ERD on 144 and 432MHz. Free admission and parking, but not before 10.30am. All usual attractions including trade stands, prize draw, flea market, refreshments and "Derby junk sale" at 1.30pm. Ample accommodation if wet. Organized by the Derby D&DARS. Details from G3SZJ, QTHR, tel 0332 556875.
19 August—Hamfest '84, Wimborne, Dorset. Organized by Flight Refuelling RS and Bournemouth & D RAIBC. More details to follow. Further information and booking forms from sec M. J. Owen, G8VFY, QTHR. Tel 0202 882271.
26 August—Preston ARS 17th Annual Rally. Lancaster University. Details to follow.
16 September—Peterborough R&ES Mobile Rally. Wirrina Sports Stadium, Bishops Road, Peterborough. Open 10.30am until 5pm. Situated on the river embankment, good car parking, free on Sundays, caravans by arrangement. Food and bar meals in adjacent Gildenburgh Rooms, bar until 3pm. Details from D. T. Wilson, 4 Conway Avenue, Peterborough, tel Peterborough 76238.
23 September—Lincoln Hamfest, organized by the Lincoln Shortwave Club, on the Lincolnshire Showground (4 miles north of Lincoln City on the A15). Opens 11am-5.30pm. Talk-in on 144MHz (S22) and 432MHz (SU8). Ample car parking, caravan and camping facilities, refreshments, licensed bar. More trade stands than in previous years, many attractions for junior ops. Facilities for the disabled. Further details from G8VGF, c/o City Engineers Club, Central Depot, Waterside South, Lincoln.
30 September—Harlow & DARS Annual Mobile Rally. Harlow Sports Centre, Hammarskjold Road. Open 10am. Talk-in on 144MHz (S22). Ample car parking. Refeshments and licensed bar. Bring & buy and usual features. Details from G4TLU and G6STB, c/o Harlow & DARS, The Barn, First Avenue, Harlow, Essex.

Special Event Stations

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

1 March, GB2SDD
The St David's Day station will again be operational from midnight 29 February, to midnight 1 March. Activity, conditions permitting, will be on all hf and vhf bands. All QSOs will be acknowledged with the special event QSL card, and operators will also be very pleased to respond to reports sent in by swls.

An award is available to radio amateurs who make contact with the station on St David's Day and with (outside the UK), five other Welsh amateur stations or with (inside the UK), 10 other Welsh amateur stations, during the months of February and March. To claim the award, you should send copies of your log sheets, along with six ircs, or POs, cheques, or money, to the event co-ordinator, (see below) who will then pass your claim on to the QSL Manager.

The station will again operate by kind permission of the Afan District Borough Council from the Afan Lido Complex, where a warm welcome is extended to anyone interested in visiting the station. Co-ordinator R. R. Jones, GW4HOQ, "Bryn-Yhys", Strawberry Place, Morriston, Swansea SA6 7AG.

14-15 April, GB2CAG
The station (GB2 Cornish Associations Gathering) will be operated by Gloucester ARS from the College of St Paul & St Mary, Cheltenham, on the occasion of the biennial "Cuntelles Kerneweck" (Gathering of the Cornish) when members of the Cornish Associations & Societies meet at a Cornish seminar. Activity will be on all hf bands except 1·8MHz, and on 144MHz. A special QSL card will be available. Details from E. Perkins, G3MA, 40 Calton Road, Gloucester.

21-22 April, GB8IKB
The station will operate from the SS *Great Britain* in Bristol from 10am to 6pm local time on both days. QSL cards will be sent via the Bureau, but no cards should be sent to GB8IKB. A special award in the form of a certificate will be available, depending on response. The station will be run by G6LOG and G6MHB, tel Bristol 554967, evenings only.

23 June, GB2HAS
The RAF Halton Amateur Radio, Electronics & Computer Club will operate the station at the RAF Halton Show. Operation will be on hf and vhf. A special QSL card will be issued and contacts with the station will be valid for the "RAF Halton Award". Details from club sec, G8BVJ, tel 0296 623535, ext 5014 (office hours).

Other Events

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

24 March—RSGB National VHF Convention, Sandown Park Racecourse, Esher, Surrey.
7-8 April—Northern Amateur Radio Societies Association Exhibition, Pontins Holiday Village, Ainsdale, Southport (see page 261 for details).
28-29 April—RSGB National Amateur Radio Exhibition, National Exhibition Centre, Birmingham.
8 September—Scottish Amateur Radio Convention, organized by West of Scotland ARS, Cardonald College, Glasgow. Details to follow.
30 September—Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent. Details from R. B. Davies, GW3KYA, QTHR.

COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 12 November 1983

Present: Mr D. E. Baptiste, CBE, (President, in the chair), Dr E. J. Allaway, Messrs R. G. Barrett, J. Bazley, G. A. Griffiths, L. N. G. Hawkyard, Mrs J. Heathershaw, Messrs H. M. Holmden, T. I. Lundegard, W. J. McClintock, H. S. Pinchin, D. M. Pratt, K. E. V. Willis (members of Council), D. A. Evans (secretary/general manager), A. W. Hutchinson (editor), and Ms H. M. Norman (minutes secretary).

The President referred to the death of Mr Si Oxley, G8MW, who had resigned as chairman of the Education Committee shortly before his death. Council stood in silence as a tribute to Mr Oxley and an acknowledgement of the work he had undertaken for the Society.

Apologies for absence were received from Messrs Cornish, Fisher, Hall, Jessop and Kyle.

Secretary's report

Mr Shozo Hara, JA1AN, the president of the Japanese Amateur Radio League, had made a special visit to the UK to see the new RSGB headquarters on 3 November. He had been impressed with the new facilities available, in particular, with the comprehensive computer system.

The *Council Letter* was now circulated to all affiliated clubs, which meant that its circulation was over 1,000 per month. Mr Evans considered that the extension to affiliated clubs, groups and societies was most worthwhile, and described his plans for speeding the production and posting of the newsletter in 1984.

Details of the new news service to members—the *RSGB News Bulletin*, which would be loose-inserted in each copy of *Radio Communication* every month—were given. By this means it would be possible to provide all members with written news with a circulation time-scale of less than two weeks.

During the first four months of the current financial year, membership had increased at a rate of about seven per cent per annum.

A written question for the annual general meeting had been received. After discussion, Council agreed that priority must always be given to questions from those present at the agm. Mr Evans was instructed to reply, saying that if the member were either present at the agm, or someone present could ask on the member's behalf, then the question would be considered in the question-and-answer session of the meeting.

Recommendations arising from committee minutes

Microwave

(i) "that the 1983 Marconi Award be presented to Mr L. Sharrock, G3BNL."

(ii) "That the 1983 Fraser Shepherd Award be presented to Mr C. Elliott, G4MBS."

Both were accepted.

Raynet

"That the Raynet Trophy for 1983 be awarded to Mr J. Houlihan, G4BLJ, in recognition of his long and valuable services to Raynet in the County of Sussex."—accepted.

Technical & Publications

That the following awards be made:

"Ostermeyer Trophy to Mr G. N. Fare, G3OGQ; Courtney Price Trophy to Mr R. Blackwell, G4PMK, and Dr I. White, G3SEK; Norman Keith Adams Prize to Mr A. J. Oakley, G4HYD."

All were accepted.

VHF Contests

(i) "That the VHF Manager's Trophy be awarded to the South of Scotland VHF Group (GM3WOJ/P) as winners of the 70MHz Trophy Contest 1983."

(ii) "That the Thorogood Trophy be awarded to GJ4ICD as leading fixed station, and the Mitchell-Milling Trophy be awarded to the Parallel Lines Contest Group (G4LIP/P) as overall winners of the September 1983 144MHz Trophy Contest."

Both were accepted.

Membership and representation

In reply to a question on reduced subscriptions, Mr Evans outlined the qualifications for this membership category, which was automatically granted if the applicant was over 65 years of age and had continuous membership of the Society of at least 15 years. Council noted that reduced subscriptions had been granted to a further seven members.

The availability of waived subscriptions had recently been explained in *Radio Communication*, hence the unusually high number of applications noted for this meeting. Council noted that subscriptions had been waived in respect of a further 29 members on health and disability grounds, again following the laid down procedure.

Council noted that the following had been granted affiliation:

Bromsgrove ARS;
Central Nottinghamshire VHF Group, Mansfield;
Dengie Hundred ARC, Burnham-on-Crouch, Essex;
Dorking & DRS;
Dunoon & DARS, Argyll;
N Bucks Contest Group, Olney;
Robin Hood ARC, Retford, Notts;
South Devon RC, Torquay;
Street & DARC, Somerset.

The appointment of the following area representatives was noted:

T. M. Emery, G3KWU, Southampton;
N. A. Gunn, G8IFF, Milton Keynes;
N. J. A. Hearn, G6IEP, SW Devon;
A. P. Rider, G6GLP, S Devon;
S. Thompson, G4RCH, Leeds & Morley;
M. J. Valentine, G4ANP, Mexborough & District;
S. G. Williams, G3LQI, Worth & District.

IARU HQ—Proposal number 118

Council approved the admission of the Belize ARC to IARU.

Proposals for vice-Presidents

Council approved the proposals in respect of Mr F. C. Ward, G2CVV, and Mr E. W. Yeomanson, G3IIR.

Chairman of the Education Committee

The appointment of Mr G. Benbow, G3HB, was approved unanimously.

IARU Region 1 Conference 1984

The composition of the RSGB delegation, as recommended by the IARU Committee, was agreed as follows:

Dr E. J. Allaway, G3FKM Mr D. Thom, G3NKS	hf matters
Dr D. S. Evans, G3RPE Mrs P. Suckling, G4KGC	microwave matters
Mr K. A. M. Fisher, G3WSN Mr M. S. Appleby, G3ZNU	vhf matters
Mr R. J. Hughes, G3GVV	delegation leader

Mr McClintock emphasized that the vhf delegates should be well briefed by the VHF Contests Committee, and Mr Griffiths and Mrs Heathershaw also voiced concern that delegates were briefed adequately on Raynet matters.

Mr Evans commented that a telex would be in use at the conference, making daily contact possible if necessary.

1984 Council election ballot

The list of scrutineers was approved as follows:

D. S. Booty, G3KKQ, Staines;
I. R. Brothwell, G4EAN, Nottingham;
A. C. Butcher, G3FSN, High Wycombe;
W. M. Dunell, G3BYW, Cambridge;
R. S. Hewes, G3TDR, Staines;
R. W. Jones, G3YMK, Kent;
J. J. King, RS51603, Kent;
M. McBrayne, G3KGU, Epping;
K. I. Matthews, G8CWI, Swindon;
L. E. Newnham, G6NZ, Hants;
C. J. R. Reed, G8MFP, Rugby;
G. F. Stancey, G3MCK, Staines;
T. Winchcombe, G6ZN, London.

Retiring President

Mr Hawkyard proposed a vote of thanks to the President for his efforts during the last 12 months. This was endorsed by all present. Mr Baptiste said that he had found his Presidency a rewarding experience and had encountered friendliness not only within Council and committee meetings, but also at clubs and other venues he had attended during the year.

OBITUARIES

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

Mr G. Bird, G2AIA

Graham Bird died on 3 January, aged 66. He had been interested in radio all his life, obtaining an artificial aerial licence while a teenager in the mid-'thirties. He worked as a research engineer for the Post Office at Dollis Hill. In the latter part of the second world war he served in Royal Signals as an intercept operator with SCU7 in the UK, Ceylon and Singapore. After demob he continued his career with the Post Office until he retired. He was a founder member of Verulam ARC, and had been a member of the RSGB for over 40 years.

Mr W. E. Butt, GU2FZC

Walter Butt died on 6 January. At 82 he was the oldest founder member of the Guernsey ARS. He obtained his callsign in 1938, constructed his own equipment, including vhf and uhf equipment, and did so in the days when coping with the technical problems of building this equipment was a considerable achievement. He was awarded a certificate for making 100 vhf contacts, quite a feat in the early 'fifties, which included a long list of records for being the first to make contact from Guernsey with many Continental countries on 144MHz.

In recent years Walter was also the first Guernsey amateur to make contact with the UK on 432MHz, and again, the first to work via the amateur satellites. In addition he was the local co-ordinator of the International Geophysical Year in 1958, and made numerous daily observations to assist in this work. He also supported the RSGB over many years, and more recently he was QSL sub-manager for GU.

Mr T. England, G8WXE

Trevor England, who died recently, aged 61, had spent all his working life with the Post Office and British Telecom involved in radio, but had only been a radio amateur for the past three years. He was very active on 144MHz ssb, and a keen supporter of the local club and repeater group.

Mr S. J. Harden, G2AXI

Syd Harden died at the end of November 1983, aged 68. Until his illness his was an active and well-known callsign on the vhf and uhf bands, and he used equipment which was all home-built, despite the handicap of failing eyesight. Syd was always ready to give help and advice, particularly to newcomers.

Mr N. V. McCaffery, G4GKF

Norman McCaffery died in December 1983. He was a founder member of the Sefton Radio Club, and had been an active and dedicated radio amateur ready to give help to all, in particular in passing the morse test. He was a regular cw and phone operator on the hf and lower frequency bands.

Mr J. Murray, GI3HGV

John Murray died on 11 September 1983. He had been a keen radio amateur for over 30 years.

Mr J. R. G. Pegge, G3MI

Bob Pegge died on 19 December 1983. As a member of the civilian wireless reserve he was mobilized into the RAF prior to the second world war, and served both at home and in the Far East. He was interested in both hf and vhf communication and in home-constructed equipment.

Also:

Mr R. F. Barrs, G3PKN, on 22 November 1983;
Mr N. G. Cox, G3MUY, on 2 December 1983;
Mr A. J. Griffee, G4NSQ, on 24 May 1983;
Mr L. W. Homan-Berry, G3OXZ, on 9 December 1982;
Mr P. J. Lee, G8DVT;
Mr F. Monk, G3AKP;
Mr D. J. Slater, RS52615, on 8 September 1983;
Mr I. H. M. Taylor, RS53037, on 9 April 1983;
Mr W. Taylor, G3JER, on 23 November 1983;
Mr F. Wilson, G3EZH, on 21 November 1983.

Apology

For an error in respect of the late Mr D. Sutherland, G4DJI, whose callsign was inadvertently given as G4OJI in the January issue.

Members' Mailbag

EMC PROBLEMS

Sir—The timely comments by Pat Hawker, G3VA (*Wireless World* November 1983), and in *Radio Communication*, highlight a growing problem of emc difficulties which beset many amateurs, new and old.

All of us are aware of the growing amount of susceptible domestic equipment, with the vcr being a threat to any amateur in both hf and vhf transmissions. Many will be aware that in the USA legislation has been achieved by Barry Goldwater, with ARRL assistance, which gives the FCC much increased powers to not only regulate emissions from unwanted sources, but to enforce manufacturers of equipment to improve its emc performance.

Of course such legislation will not change matters overnight, but at least it represents some hope for the future in the USA, What, however, is happening in this country? "Nothing" would seem to be the honest answer, and worse, nobody seems to be trying to do anything about a steadily-worsening situation. The attempts by the RSGB to influence associations such as BREMA, and importers, have had little or no effect, and the UK amateur is faced with a plethora of equipment that has little capability of withstanding even a few watts of localized rf.

As an amateur residing in a typical urban "estate" environment, I seriously wonder how anyone can operate a hf/vhf station without major interference problems occurring. Those who are either able, or have co-operative neighbours, to solve the problems are indeed fortunate. In my case the PO Interference Dept has visited several times, but the outcome is negative. No long-term solution has been found, and the social antipathy wins.

On the other side of the coin, I suffer severe QRM to my reception from noise sources, such as a large number of thermostats, and a noise source which ruins reception for 8h daily. I have no "right" of complaint, as the affected service is not tv or radio broadcasting.

I believe the emc problem is serious in this country, and effectively out of control. It is eight years since the RSGB conducted a survey, and much has changed—perhaps it is overdue for a major survey of the current and likely problems (cable tv, satellite tv etc) to be conducted. If nothing is done, amateur radio could well find itself a hobby of the past.

Owen Jackson, G3LKZ

Mr Jackson paints a dismal picture of the present situation. Breakthrough problems to domestic entertainment equipment manifest themselves in a variety of forms, and any licensed amateur will at least be aware of the reasons why they happen in the first place. It is a fact of life that if one wishes to operate with the full licensed power on all bands and with different modes, it will be necessary to be prepared to tackle some cases of breakthrough: it will also be necessary to exercise some care in the siting of antennas. If you happen to live in an area with a high density of housing, the knock on the door is almost a foregone conclusion. The Society produces books which aim to educate radio amateurs in all aspects of breakthrough problems so that they can, to some extent, solve the technical problems: books, however, cannot help very much with the social problems which can arise.

Should a particular case prove intractable, then either the Society's EMC Committee (write to the chairman c/o headquarters) or the official Radio Interference Service might be able to assist: both groups can and do provide effective cures in some cases. Only a few months ago, the RIS provided a complete cure for a member of headquarters staff during a visit lasting some 20min, and the EMC Committee deal successfully with very many members' cases each year. There are signs that the latest types of tv are much more immune to breakthrough than was previously the case.

In cases where there appears to be apathy or unwillingness, the amateur must be patient and should be prepared to press for progress when necessary—see the comments from the DTI (Rad Com *November 1983). As a final piece of advice, try to solve one problem at a time rather than taking on the entire street at once. While difficulties are being resolved, try changing your operating habits by using different bands or beam headings. Even the most difficult cases can be solved eventually if patience is exercised. The Society feels that good neighbour relations are three parts of the battle when breakthrough is involved, and a leaflet from the membership services department is available to explain, in non-technical language, what exactly is happening and how it can be cured. It is available at no charge.*

CHANGING THE G5s—continued

Sir—In reply to my letter on the question of G5 callsigns (*Rad Com* January 1984) the RSGB states that the DTI intends to "upgrade the holders of permanent UK reciprocal licences to full UK A or B status". This sentence contains two inaccuracies:

(1) The term "reciprocal licences". A reciprocal licence is a licence issued to a radio amateur on the strength of an amateur radio licence obtained in another country. However, at least one third of those holding G5 callsigns obtained these by passing the British RAE!

(2) The statement implies that G5 licences are inferior to "full" British licences—indeed, some of us have had letters saying that we ought to be pleased we are being "upgraded". I think it ought to be pointed out that there is really very little difference between our licences and those issued to British citizens (Class A and B). Until a few years ago Class C and D licences were virtually identical to Class A and B, the only differences being that
   (a) Our licences contain a clause tying their validity to the validity of the holder's residence permit or visa; and
   (b) our licences contain a few very minor and insignificant restrictions—we are not allowed to send cw at more than 20wpm, we are not allowed to let other radio amateurs "borrow" our callsigns, and we have to let the licensing authority know if we have used someone else's callsign or a club callsign.

   The situation changed slightly when, after the abolition of specal tv licences, Class A and B licences were amended to include the transmission of tv pictures and this amendment was, for some reason (some people think it was an accidental omission!) not included in Class C and D licences.

   Except for the non-inclusion of television, however, our licences are, to all intents and purposes, ordinary British amateur radio licences and NOT, as the RSGB is trying to make us believe, some kind of second-class licence.

May I also say that I find the arguments put forward by the Society rather unconvincing—I still feel that with a bit of intelligent planning the whole unpleasant episode could have been avoided! Instead of re-issuing the whole G5 series, for example, one could simply have used the remaining G5 callsigns, ie the G5F—G5L series and G5N?? to G5ZZZ. Of course this would have necessitated splitting the G5 series between Class A and B licences, but surely that can't be that much of a problem—after all, G6 and G8 +2 letter callsigns are Class A licences! Also why can't the G7 and G9 series (or at least one of them) be cleared for use by radio amateurs? Surely it is not necessary to reserve two entire blocks, a total of 34,000 callsigns, for a handful of experimental stations? In any case these experimental stations could just as easily use a different prefix, such as GR or GS (for Research or Science).

Finally, has it ever occurred to anyone that the current boom in amateur radio licensing may, some day, come to an end? Quite a few countries have seen a boom in amateur radio following the introduction/legalization of cb, but these booms never lasted more than a few years.

Angelika Voss, G5CCI

In replying to Miss Voss' second letter, one fundamental point must be restated first of all—this is, that had the DTI accepted the RSGB solution to the alleged "callsign shortage" problem, there would have been no necessity for the holders of permanent reciprocal licences to have had their G5 callsigns exchanged for a G0 or G1 callsign. To set out an account of the entire episode would take several pages, but the initial starting point was an item in Rad Com *March 1983, p215, which outlined some proposed changes to the format of the Class C and D licences. Miss Voss raised a telephone query concerning this item, which was answered in a letter from headquarters dated 22 March 1983.*

At that time the Home Office (as it then was) had advised the Society that existing holders of G5 callsigns would retain their callsigns, and that the cut-off date after which applicants who would have hitherto received G5 callsigns would receive standard Class A or B licences with appropriate callsigns was 1 January 1984. This information was given to Miss Voss in the letter mentioned above. However, the Home Office wrote separately to Miss Voss on 19 April 1983 setting out a rather different version of the new procedure and implying that all holders of permanent reciprocal licences, including Miss Voss, would receive new callsigns. Not unnaturally, Miss Voss was somewhat confused: she wrote again to the Society on 25 April 1983 seeking clarification and stating, among other things, ***"I think most of us would dearly love to keep our callsigns—but if that is not possible (eg if the Home Office wants to use the G5 series when the current G4 or G6 series has run out) then maybe the Home Office could at least be persuaded to issue proper callsigns to those of us who are in Britain for more than just the duration of a university course or army placement. If we are to lose our callsigns, then I feel we should be given at least another year."***

This statement did not seem to imply that Miss Voss would regard the loss of her old callsign as a shattering blow. Equally, the Society only received one other letter on this subject from a G5 licence-holder, and much the same impression was given in his letter. However, when the DTI clarified the position (Rad Com *September 1983, p775), Miss Voss wrote again to the RSGB on 14 October 1983 in terms which suggested that she had now changed her mind and emphatically did not wish to lose a cherished callsign. No other correspondence whatsoever was received as a result of the news item, and so it appeared that no other G5 licence-holder felt strongly about the change. However, following Miss Voss' letter the Society again made representations to the DTI and, as a result, it was agreed that the same call letters could be reserved for G5 licensees when their callsigns were changed: Miss Voss, for example, would have had the option to have taken up the callsign G0CCI as a replacement for G5CCI if she so wished. As originally suggested by Miss Voss in her April 1983 letter, the DTI also extended the changeover period. In other words, there was only one*

comment expressed about the new arrangements by a G5 licence holder—Miss Voss—and the Society responded even though Miss Voss had not originally implied that she would be particularly concerned by the possibility of her callsign being changed.

Despite Miss Voss' comments in her latest letter, her licence is ***effectively*** *being upgraded in the sense that additional facilities will now be available to her: that is the implicit meaning of the word "upgrade". Insofar as her suggestion to split the G5 series among Class A and B licensees is concerned, the Society is advised that this would be unacceptable to the DTI since it would become impossible to identify readily whether a particular callsign belonged to a Class A or Class B licensee.*

Given that a prime function of the RSGB is to represent the feelings of its members, it can only do so effectively if it is aware of what those feelings are. In this connection we receive a heavy mailbag, visit clubs to give lectures and receive feedback on grass-roots feeling, hold numerous open meetings, and attend major rallies and exhibitions all over the UK—Miss Voss paid a visit to the RSGB stand at the 1983 Scottish Convention, for example, in common with many other members. A very great deal of feedback comes our way by these means, without which the Society could hardly be said to be representative of either its members or UK radio amateurs overall. However, and without remotely wishing to be facetious, we stop short of being clairvoyant! In the context of the present issue, it is suggestive that only ***two*** *G5 Licence holders have expressed their feelings to the Society: only* ***one*** *now appears to feel strongly about the matter of a change of callsign and her feelings appear to have changed in the course of the year. It is also understood, in the same context, that the vast majority of G5 licence holders HAVE reserved the same call letters for their Class A and B licences with little demur. We assume that, by now, Miss Voss has reserved G0CCI: we would also imagine that, as far as the issue of her losing her identity is concerned, in practice the reverse may well be true!*

SHUTTLE SHAMBLES

Sir—Many of us can recall with a smile the hilarious comedy sketches on tv and radio by the late Tony Hancock, notably "The Radio Amateur" and "Test Pilot" classics combine in mind at this time. What a pity he missed the scheduled space shuttle passes on Sunday 4 December, and what a pity I didn't!

All who care about our image will surely be examining the totally undisciplined downlink shambles that followed the excellent HQ/BBC-TV feature earlier. So what went wrong? We RSGB members with genuine interest in this event would have appreciated a clear channel, and "sweepers" were endeavouring to maintain this.

However, not every licensed radio amateur is an informed member of the Society, nor interested for that matter in space shots above the Sunday morning net, so that apparently many operators on S22 were oblivious to, or nonchalant about the planned requisition of this channel at due orbit times. Having obtained their licences, and using a channel within this authorization, they became irate at "sweepers" instructions to QSY, and the more the verbal battle raged, the more pitched in, and one could only listen in despair. Had W5LFL listened on S22 he would have copied more signals than on the nine up-link channels!

Notwithstanding the well intentioned gesture to afford all an equal opportunity to get in on the show, would it not have been more successful and prestigious if RSGB HQ alone had handled this event?

All beams should remain at half mast until our image and pride are restored.

John Jarvis, G3SUG

The Society has received some further letters about the shuttle flight: see last month's article on the same subject. We do not feel that the answer is for the headquarters station to be the only one which has a chance to work the shuttle during the next opportunity—the real answer is a better standard of operating and more awareness of how to go about the job from those few who caused problems for the majority.

MORE VIEWS ON CONTESTS

Sir—I should be glad of the opportunity to comment on the letter of Norman O'Brien, G3LP (*Rad Com* December 1983) about contests monopolizing the amateur bands at weekends, because it enables me to explain just one of the subjects being considered by the International Amateur Radio Union, Region 1. (Region 1 consists of national societies in Europe, Russia, and the African continent—54 in all.)

The IARU is well aware of this problem, and its successive HF Working Group meetings have formulated proposals for "contest-free-segments". The purpose of these proposals is to bring into Region 1 rules for contests, a plan whereby a segment of each band used for contests, in the cw portion and in the phone portion, would be barred to contestants. These proposals are already the subject of conference papers to be presented to the next IARU Region 1 Conference in Sicily in April 1984. If successful, they will be accepted by all Region 1 societies; and contestants who do not comply will be disqualified. Another outcome of the proposals, if successful, is that Region 1 would enter into discussions with Region 2 [the Americas] and Region 3 [the Far East] and hope to persuade them to our view.

While I have pen to paper may I reply to J. A. Holmes, G4LRS about making amateur band plans mandatory. We would rue the day. Once it began, we would lose control, and who knows what *unnecessary* constraints would be placed on our operating. Far better to have freedom and to use persuasion on the minority—they are in every arena of life!

C. Eric Godsmark, G5CO
Secretary, IARU Region 1

Sir—The majority of radio amateurs would agree with Mr O'Brien, G3LP, on the subject of contests. Remarks such as "there is a good deal of support for contests" shows just how much out of touch the Society is with the general run of amateurs. In fact, there is a minimal interest in contests.

Judging by the difficulty encountered by local clubs in persuading members to participate, one might even go so far to say that the contest is regarded by most as a confounded nuisance to normal operating.

Contests did serve their purpose years ago, when amateurs spent most of their time constructing rigs, and band occupancy was low, and they enabled the constructors to test their efforts and improve on them. But today, when 99 per cent are using commercial black boxes and commercial antennas, and band occupancy is high, do we really need contests? The answer is no, as far as hf and vhf bands are concerned, although there is still a slim case for them on 23cm and below.

The ability of amateurs to work portable under emergency conditions is taken care of by Raynet and National Field Day, so that argument is also a hollow one. I will gloss over the rumours about 1kW linears being "blown up" on 160m contests, as these may just be rumours, but the end result is that the station with the favourable QTH, the highest mast, and the most stamina is the winner. So what? Nothing worth while has been achieved. "Team spirit" is not an asset to amateur radio, either, for "team spirit" today means "us against them", while we should be working towards the common good.

It should be obvious to all that contests are more likely to reduce activity on the popular bands rather than create the same.

Is it really necessary to take up so much space in *Rad Com* with contest information? This is not of general interest, and therefore, apparently conflicts with your editorial policy. Surely lists could be supplied cheaply and easily by the Society's computer, and sent on receipt of a reply paid envelope to those few who are interested in the contest programme and in the resulting scores? Although it would create a problem—what on earth could you find to replace them? More news about repeaters?

R. A. Davis, G3RLO

Although a superficially attractive point of view, Mr Davis omits a very important factor in his letter. The competitive spirit is innate in all of us, and amateur radio contests are very much enjoyed by a great many operators who have no intention of sending in an entry. We suspect that interest in contests is very far from "minimal", especially because they also offer a chance to work dx which would not otherwise be available—this is true both for hf and vhf/uhf contests. Contest information is very much of general interest, contrary to Mr Davis' views, and is given in Radio Communication *for precisely that reason, as is other information for the many different "interest groups", large and small, which make up the Society.*

PHONETICS AGAIN

Sir—I have followed with interest the recent letters on the development and use of the phonetic alphabet in the history of amateur radio, particularly in defining callsigns.

In my quest to work all the American counties, over a period of five to six years, it has been my great pleasure to contact thousands of USA "hams" and have always found a great deal of amusement in their sometimes light-hearted or "fun" approach to the matter of callsign identification.

I operate almost exclusively on the USA Independent County-hunters Net, and frankly things wouldn't be the same without: WA8Ten Quacking Ducks, WD0Early Morning Sunshine, W8Kentucky Fried Chicken, WD9Good Morning America, K2High Voltage Noise—to name but a few. I suppose for GPO/Home Office purposes I shall always remain as I started way back in 1947, plain GW3Charlie Delta Hotel. But when I got hooked on county-hunting, I could have been GW3Counties Desired Here; or when we operated over Christmas 1979, with 2ft of flood water swilling around downstairs, GW3Cold Damp and Horrible; and now that I'm retired—though I don't feel like it—it could be GW3Coasting Down Hill. If not entirely legal, it sure sounds a lot more interesting and romantic . . . Hi . . . Hi.

Ellis Evans, GW3CDH

The use of the NATO phonetic alphabet is not, of course, mandatory; however, it is recommended for reasons of uniformity with the UK licence, and has the merit of being internationally recognized. It is, however, not the best which could be devised and many amateurs do use other phonetics occasionally. Some well-known callsigns would not sound the same if the NATO phonetics were used!

Sir—My late father served in the Royal Corps of Signals during the last war from which, I assume, he learnt an amusing phonetic alphabet. He could only remember parts of it, and I wonder if any other members know the rest? It went:

A for the 'orse, B for mutton, C the sea,—?—, F for vescent (effervescent),—?—, L for leather,—?—, O for a pint, etc.

John F. Alder, G4GMZ

Anyone care to complete the list?

RADIO SOCIETY OF GREAT BRITAIN

(Limited by guarantee)

Registered office

Alma House, Cranborne Road, Potters Bar, Herts EN6 3JW

FIFTY-SEVENTH ANNUAL GENERAL MEETING

Minutes of the fifty-seventh annual general meeting of the Radio Society of Great Britain held at the Institution of Electrical Engineers, Savoy Place, London WC2, on Saturday 10 December 1983, commencing at 2pm

Present: Mr D. Baptiste, CBE (President, in the chair); Mr R. G. Barrett, GW8HEZ, executive vice-President and President-elect; Mr P. F. D. Cornish, G3COR, honorary treasurer; Dr E. J. Allaway, G3FKM, immediate past-President; Mr D. A. Evans, G3OUF, secretary/general manager; and 111 corporate members.

The President welcomed members to the meeting and introduced those present on the rostrum: he also introduced Council members and outlined the format of the meeting. He added that he was sorry to have to inform the meeting that two good friends of the Society had died recently. One was Si Oxley, G8MW, who had been chairman of the Education Committee: he had been very prominent in the Society's affairs and had done a great deal of work in connection with the City & Guilds of London Institute. The second was Vic Clark, W4KFC, the president of the American Radio Relay League. The President requested the meeting to stand in silence for one minute in tribute.

Apologies for absence were then read by the President.

Notice convening the meeting

The President stated that the notice calling the meeting was set out on page 2 of the Annual Report & Accounts which had been circulated to all members in the November 1983 issue of *Radio Communication*. The secretary read the first part of the calling notice and proposed that, to save time, agenda items be read as they arose.

Minutes of the 56th annual general meeting

The minutes of the 56th annual general meeting had been circulated with the November 1983 issue of *Radio Communication*. The President said that there were two amendments to these minutes: the presence of Mr B. O'Brien, G2AMV, immediate past-President, had been inadvertently omitted, for which he apologized, and there was also a minor amendment to the section dealing with the presentation of awards. Mrs Frances Woolley was to become an honorary vice-President of the Society, and Sir Evan Nepean and Messrs S. Cook, R. Flavell and C. Newton were to become vice-Presidents, not honorary vice-Presidents. The President had suitably amended the minutes in the minutes book. Mr J. Bazley, G3HCT, proposed, and Mr R. Broadbent, G3AAJ, seconded, that the minutes be confirmed. This was accepted with two abstentions.

Accounts for the year ended 30 June 1983, and the reports of Council and auditors

The President invited the honorary treasurer to introduce and comment on the accounts which had been circulated to members. Mr Cornish read out the formal report of the auditors, which was satisfactory and unqualified: he apologized for a printing error which had displaced a line of figures in the Income & Expenditure Account in the section dealing with editing and dispatch staff costs. The printers had accepted responsibility for this mistake, which had made no difference to the sense of the figures but had been inconvenient to read.

Mr Cornish said that, before adding in the surplus which arose on the disposal of the Doughty Street headquarters and also before tax, the Society made a surplus of £29,520. In arriving at that figure, it had been noted in the financial report that miscellaneous costs of some £20,000 in connection with the move of headquarters from Doughty Street to Potters Bar had been incurred: had it not been for these the surplus would have been more substantial. The surpluses which had been generated over the course of a number of years had contributed to the fund which had enabled the Society to purchase outright the new headquarters, but Mr Cornish added that some of the surpluses of previous years had been due to the fact that some of the staff which the Society would have liked to employ could not have been housed in the old headquarters at Doughty Street. Since the Society would now be able to engage more staff, to give a better service to its members, the levels of surplus income of previous years were not necessarily to be expected in the future.

Mr Cornish had received four written questions from Mr T. Winchcombe, G6ZH. The first concerned book postage, which was apparently not included under book sales and not explained in the notes. Mr Cornish said that in respect of cash-with-order sales from members, the sale price included postage and packing; for both internal accounting purposes and for the calculation of VAT, the figure for postage and packing was extracted and was shown under the heading "Telephone, postage, printing and stationery" in the accounts. Amounts to trade customers in respect of carriage and packing were treated in the same way, and some £14,500 had been credited against that section of the accounts during the year under review.

Mr Winchcombe's second question involved staff costs. There was no reference to these in either the Income & Expenditure Account or the Balance Sheet, and Mr Winchcombe was unable to reconcile the figure of £24,619 for social security costs with any items shown elsewhere. Mr Cornish explained that the analysis of staff costs which appeared in Note 6 to the accounts was there because the Companies Act 1981 now required such information to be shown for the purpose of harmonization of accounts between EEC countries. As an aside, Mr Cornish mentioned that social security costs were a good deal higher in some European countries than in the UK, and that the object of the particular clause in the 1981 Act was to make comparisons between one country and another in terms of labour much easier. There was no way in which the figure mentioned by Mr Winchcombe could itself be reconciled or identified within the body of the accounts themselves since it was a part of staff costs in general. Mr Cornish added that the total given in Note 6 was £247,000, which included the social security costs and which applied to all areas to which salaries were charged. Some £50,400 was charged under book sales, £167,000 for headquarters and £28,900 under the heading of *Radio Communication*. It was not possible to give a division of the figure quoted by Mr Winchcombe because it was a part and parcel of total staff costs.

The third question was a request to itemize the cost of *Radio Communication* in the same manner as had been done for book sales under the heading of Note 8. Mr Cornish said that *Radio Communication* expenses given in Note 8 comprised the whole of the cost of printing and distribution, the cost of editorial and advertising staff and the Chelmsford office. The cost of advertising and editorial staff had been given earlier as £28,900: Mr Cornish regarded the other part as commercial information which it would not be proper to give in open forum, but members could draw their own conclusions from the figures already quoted.

The fourth question had asked when the purchase of additional land at Alma House had been completed. Since the Society had no immediate use for that land, Mr Winchcombe presumed that completion had been delayed until October 1983—Mr Cornish said at this point that this was presumably a misprint for 1984—and that, therefore, the deposit of £5,000 should be visible in the accounts, and provision for the balance of £45,000 should appear under the heading of "Creditors", with the balance falling due within one year. Mr Cornish said that the deposit was included in the balance sheet under "Current assets" and in fact the sixth item under that heading, "Prepayments and accrued income", contained within its figure of £38,000 the amount of £5,000 in respect of the deposit. The balance of the purchase price of £45,000 was not in the accounts but it had been outlined clearly in Note 12.

Mr Cornish then said that he would be pleased to answer any other general questions with regard to the accounts.

Mr J. Bluff, G3SJE, asked whether Mr Cornish could explain how staff costs had risen by 54.5 per cent over two years, and 19·5 per cent over the last year, given that the Society had taken on few new staff. Mr Cornish asked Mr Bluff to indicate how he had arrived at those percentages, and Mr Bluff said that they were from the expenditure account: he had taken the 1982 and 1981 sums of staff costs. Mr Cornish outlined the method used to derive the figures in the accounts: on the basis of the total staff costs, including those involved in *Radio Communication*, the figure was about £247,000. The equivalent figure for the previous year had been £214,000, which was an increase of some 15 per cent, not 19 per cent. In 1981-2 the average number of staff during the year had been 24. The average cost per staff member had therefore been £8,957. The corresponding figure for 1982-3, when there were 26 members of staff on average, had been £9,503, which represented an increase over the 1981-2 figure of some six per cent. Comparing the two year-ends, there had been two extra staff and there had been, on average, two more staff during the year. This explained the increase. Mr Bluff felt that, comparing like with like, there was still an increase of 19·4 per cent and this

Mr Fred Ward, G2CVV, receives his vice-President's certificate. At the end of December 1983, Fred retired from his position as a radio interference investigation officer after 38 years' service with the Post Office/British Telecom

implied an extra £20,000 which he did not understand. Mr Cornish explained again in detail how the figures had been derived, and pointed out that the main reason for the increase was the cost of two extra staff. He could not perform a similar calculation for 1980–1 since he did not have the figures, but looking at the minutes of last year's meeting it appeared that the overall increase in staff costs had been some 12 per cent. The fact that the actual figure appearing in the accounts suggested an increase of 34 per cent was because of additional and temporary staff taken on during the year. Mr Bluff said that he merely wished to have a clear idea of the trend of the figures, and that some sections of the 1982–3 accounts were presented in a way which did not facilitate comparisons. Mr Cornish stressed that the requirements of the Companies Act 1981 were chiefly responsible for most of the changes in presentation which had had to be made.

Mr A. Veitch, G8FRB, thought that the sum of £100 shown under "Pensions" was extremely low. Mr Cornish explained that this was the residue of a pension granted by the Society many years ago to the widow of John Clarricoats, G6CL, and that the figure of £100 represented a small proportion of it that was paid at the beginning of the 1982–3 financial year. It had been shown in that way since it was an ex-gratia payment, which had been approved by Council and the Society at its annual general meeting many years ago. Mr Cornish added that Mrs Clarricoats had died in 1982.

Mr P. Crosland, C30AKA, asked why the cost of insurance had, in round terms, trebled. Mr Cornish said that this was largely because there were more assets to insure: there had also been a thorough examination of the Society's insurance needs before the move from Doughty Street.

Mr C. Newton, G2FKZ, thought that the Society had possessed some shares in various organizations, and asked whether they had been redeemed. Mr Cornish said that the Society had had an investment in gilts which had been sold several years ago.

An unidentified member said that there did not appear to be any figure in the accounts which suggested that the exhibition at the NEC had been profitable. He was surprised that all he could see in the accounts was a loss; he would have liked to have seen the Society making a profit. Mr Cornish replied that, although he did not have the exact figures to hand, the exhibition had shown a small loss when all relevant factors had been taken into account. However, book sales were not credited to the exhibition account and there was also the point that many new members were recruited at the NEC.

Mr M. Jones, G6GOS, said that he had had experience of several exhibitions during the year, and that he sympathized with the Society in attempting to balance the books. He wondered whether the profits from book sales should, in fact, be used to underwrite the costs of the NEC exhibition. Mr Cornish said that this was a matter of internal cost management accounting, which was not normally considered at this level and identified in the accounts. The President felt that the matter could be better explored later during the informal question-and-answer session: the general manager and the chairman of the Exhibition & Rally Committee could comment then.

Mr P. Chadwick, G3RZP, noted that a sum of £1,218 was mentioned in the accounts for "International meetings and conferences". He hoped that the Society was not represented by people paying for themselves, and it seemed to him that the sum in question implied very little representation otherwise. Mr Cornish said that in the past some of the Society's representatives had been generous enough to bear their own expenses and that, generally speaking, anyone going abroad on behalf of the Society would find themselves out of pocket. However, the specific answer to Mr Chadwick's question was that there had only been one event in the year. Mr Chadwick considered that it was still very good value for money, and Mr Cornish said that, in his opinion, the Society received excellent value for money from all its representatives, since they were giving both money and time.

There were no more questions on the accounts.

Members to serve on Council for 1984

The President read the letter from the scrutineers announcing the results of the recent Council election in which Dr D. S. Evans, G3RPE, and Messrs B. O'Brien, G2AMV, and G. R. Smith, G4AJJ, had been elected. The total number of votes accepted had been in the region of 5,500 and there were 185 spoilt papers. The President wished to congratulate those who had been elected, and to commiserate with those who had not and wish them better luck next time. He asked those newly-elected members who were present to identify themselves.

Reappointment of auditors

The motion to appoint Messrs Edward Moore & Sons for the 1983–4 financial year, and for their remuneration to be fixed by Council, was carried.

Any other business

No written questions had been received under this heading, and the President said that it was his pleasure and duty to present two members with certificates as vice-Presidents.

First, he was pleased to announce that Mr Fred Ward, G2CVV, had been elected a vice-President. He had joined the Society in 1937, had been its President in 1971, and a member of Council from 1970 to 1975. He had also been an active member of the Education Committee and of the MPT Liaison Committee, which was now known as the Licensing Advisory Committee. Mr Ward was a well-known member of the Derby & District Amateur Radio Society, which was the first formal amateur radio club in the UK—founded in 1911, it was two years older than the Radio Society of Great Britain. He also had a keen interest in the historical side of amateur radio, and was a GB2RS broadcast newsreader. The President said that some members present at the meeting would not know that Mr Ward had been ill, and he was delighted that Mr Ward had been able to make the journey to the meeting to receive his award.

In reply, Mr Ward said that he was greatly surprised and touched to receive such an honour, which he had never expected.

The President then announced that the second vice-President was Mr Eric Yeomanson, G3IIR. He had joined the Society in 1949, had been President in 1965, and a member of Council between 1958 and 1972—first as a zonal member and then as an ordinary member. Mr Yeomanson had been concerned in the establishment of Raynet through the then George Wallace MP, now Lord Wallace of Coslany. He had served on the Raynet Committee

L to r: Les Sharrock, G3BNL, being presented with the Marconi Medal; Norman Miller, G3MVV, receives the Founders Trophy; and Mr C. Elliott, G4MBS, the recipient of the Fraser Shepherd Award

L to r: Mr G. N. Fare, G3OGQ, receiving the Ostermeyer Trophy; the Courtney Price Trophy being presented jointly to Mr R. Blackwell, G4PMK (l) and Dr. I. White, G3SEK (r); and Mr J. Houlihan being presented with the Raynet Trophy

for many years and had been its chairman for part of the time: he had also been zonal representative for London Raynet until earlier this year, when he had been forced through ill-health to resign. Mr Yeomanson had also been chairman and an ordinary member of the Exhibition & Rally Committee, and had been instrumental in ensuring the Society's representation at many exhibitions as well as the Society's own events. He had also pioneered a good deal of work in radio-teletype, and was a strong supporter of the Crystal Palace club.

The President said that, as many of those present at the meeting would know, Mr Yeomanson was not well enough to attend the meeting, and he wished to record on the meeting's behalf its good wishes. Mr Yeomanson had asked Mr H. Bellfield, G3SBV, to accept the certificate on his behalf, and Mr Bellfield said that Mr Yeomanson had asked him to thank the Society on his behalf for the honour. (*We regret that Mr Yeomanson died on 21 December 1983.*)

The President then called for volunteer scrutineers for the 1985 Council election. The various names and callsigns were recorded by the secretary.

The President then declared that the formal business of the meeting had been concluded, and that since the meeting was running slightly ahead of schedule he would continue with the presentation of awards.

Presentation of awards

The Founder's Trophy was awarded to Mr Norman Miller, G3MVV, for services to the Society, and in particular his work in connection with the NEC exhibition earlier in the year. In his acceptance speech, Mr Miller said that he was delighted to be given the award, and that he also wished to thank the members of the Exhibition & Rally Committee who had given him a great deal of help during his chairmanship: he wished to accept the award on their behalf as well as his own.

The Marconi Medal had been awarded to Mr Les Sharrock, G3BNL, who had been in the forefront of operation in the microwave spectrum. It was presented by Mr David Speake, who had been the director of Marconi Research Centre and who was now deputy-director of GEC Research Laboratories.

There being no further formal business to transact, the meeting closed at 3.15pm

---

QUESTION AND ANSWER SESSION

The President, Mr Don Baptiste, opened the informal session by outlining his involvement with radio during his professional career. He joined the Radio Services Department of the Post Office and had initially become head of what was then known as VHF Branch 2, dealing with the licensing of private radio services. He then became head of the VHF 1 Branch, which essentially dealt with the management of the frequency spectrum: along with this he had served as secretary of the Frequency Advisory Committee. The Society was represented on this committee by Mr L Newnham, G6NZ, at the time, and this was the President's first contact with the RSGB.

During this period the first World Administrative Radio Conference concerned with space services took place. The UK alone had made provision for amateur space services. There was strong opposition from many other countries represented at the conference, and the problems had been very difficult to solve. He said that even today there were developing countries which were very suspicious of amateur radio for political reasons. However, the problems had been solved in the end, with the strong opposition being overcome and agreement finally reached.

He had transferred to other parts of the Post Office in 1966, and did not return to radio matters until 1969. He said that he had enjoyed the world of international radio regulation, with its flavour of diplomacy, and he became head of the Radio Regulatory Division of the then Ministry of Posts & Telecommunications.

The 1971 conference dealing with space had gone relatively well. There had been various difficulties, and much more opposition, but agreement was reached on frequencies for the amateur satellite service, with the UK strongly supported by the USA and the USSR.

The 1979 World Administrative Radio Conference had been of the greatest importance. Proposals to conferences could only be made by countries, not by organizations, and the Home Office had had discussions with the Society in order to establish the requirements of the International Amateur Radio Union. He stressed the importance of a responsible national society which could provide proper input to conferences in the preparatory phase—which lasted for some four years in the case of the 1979 WARC—and he had had contact with various parts of the Society during that time.

The President said that, from the standpoint of the professional, the standing of an organization such as the RSGB depended on the personalities and effectiveness of its representatives: this was true both in committee and informal meetings. Whether or not one was impressed depended on the cogency of their arguments, their grasp of events, their ability to see problems from several points of view and the kind of persons they revealed themselves to be. He felt that it was true to say that the Government welcomed responsible organizations representing sectional interests such as amateur radio because they represented a focus for opinion and had an authoritative voice. He added that it was a two-way process: trying to solve the interlinking and conflicting problems associated with the regulation of the entire radio spectrum—some 37 radio services—was not easy, and a responsible organization with which to deal was very valuable. It became possible to report to Parliament that the representative body had been consulted.

Mr Baptiste said that the RSGB worked on two planes: the national one with the UK government, and the international one which was of equal importance. It was important that the RSGB should have an effective influence on world amateur opinion because a great deal of attention was paid to the views of the IARU as expressed at international conferences. International conferences were, in essence, treaties between governments and each country had an equal vote—it was vital to persuade countries to vote in the right way, and this was particularly true of the developing countries since their votes would shape the form of the treaties which were signed and ratified.

Continuing his theme, he said that he had been very impressed by the work which the RSGB had done in preparing for the IARU Conference in 1984. Some 49 papers had been supplied by the RSGB, out of a total of about 185, and the RSGB's contribution had far outstripped any other country in this respect. Germany and Holland had each provided about 12 papers, and Switzerland and Italy some six each: " . . . the RSGB towers like a giant in all this." It had been his experience that a good deal of work had to be done to achieve what was required, which was why the UK proposals had been painstakingly prepared: it seemed to him that RSGB members owed a debt of gratitude to the committees which had co-operated to produce papers for the IARU Committee to correlate and send forward, and that the Society had performed excellent work in this area.

He had been pleased to note that the Secretary-General of the ITU had attended the recent World Amateur Radio International Conference in Tokyo. He felt that for someone so central to world telecommunication matters, with the virtual status of a head of state and operating at the highest levels, to make the long journey to Tokyo and deliver a speech was important. He quoted the following paragraphs from the Secretary-General's speech:

"Although amateur radio has made important contributions to the development of radio technology, it did not always enjoy the prestige to which it was entitled. However, this universal prestige is now a reality.

"Radio amateurs are in a position to offer a broadening base of technical engineering and traffic handling expertise. The record of technological achievement consistently shows that today's radio amateurs must be proficient in their communications and their electronics ability, and that they have made many valuable contributions to technology in general and to their nations' overall communications capability in particular. These facts have led to the significant support which is being given by most ITU member countries at international conferences such as WARC 1979, which gave special consideration to the recognition of the amateur service."

The President next spoke of his impression of the Society, having seen it, as it were, from the inside. He had been struck by its complex structure, and

the range of its commercial activities which were responsible for a turnover of some £1m. He had also been impressed by the Society's large and effective committee structure, and had been pleased to take part in discussions with committee chairmen and to play a part in improving the liaison between committees and Council. The new headquarters at Potters Bar had given the staff much better facilities for the use of their skills, and the improvements in technology had helped them to assist the membership in a more effective manner. There were good links with the media which, with the first-class amateur radio station at headquarters, had been used to good effect during the recent space shuttle flight.

He then mentioned the Telecommunications Bill, which was scheduled to become law in March 1984. He felt that this would be of benefit to amateur radio, but he warned that good legislation by itself was insufficient: there had to be an effective force in the field with which to back it up, and the Society needed to bear this very much in mind.

Outlining other areas in which the Society was currently active, Mr Baptiste said that the RSGB had a first-class field organization of volunteers, and also a first-class staff at headquarters: however, he felt that the interlinking between local clubs and the Council and committee level of the Society required some attention. He ended his speech by saying that the general manager and headquarters staff were to be congratulated for their achievements during the year.

The meeting was then declared open for questions

An unidentified member raised the question of the RSGB becoming involved in morse tests for the radio amateur. He outlined some of the disadvantages of the present system, and made the point that if the Society became responsible there would be considerable cost savings. He said that there was a precedent: the Royal Yachting Association had been given authority to carry out practical tests for the use of vhf ship-to-shore radio by yachtsmen and to register the results, and he felt sure that the RSGB could perform the same function since there were many people with wide experience of morse teaching in technical colleges and clubs. In reply, Mr D. A Evans, G3OUF, general manager, said that the Society had been asked to consider running morse tests about a year ago, and that the matter had been discussed by the Licensing Advisory Committee. Some draft proposals had been submitted to the DTI and a reply was awaited. The proposals envisaged would imply very reasonable costs to the candidate and considerably more locations where the test could be taken.

G3IEE felt that "Alma House" was not an appropriate name for the Society's headquarters, and that the time had come to consider re-naming it. He proposed some alternatives, and said that possibly the most relevant and most suitable was "Mountbatten House". Mr B. O'Brien, G2AMV, chairman of the Finance & Staff Committee, said in his reply that he had proposed the name "Lambda House" to a recent meeting of that committee, on the grounds both that the name had a connotation in radio technology and that it was the name of one of the Society's subsidiary companies.

Mr H. Bellfield, G3SBV, noted that in the "Year in Review" section of *Radio Communication* there had been no report from the QSL Bureau: he wished to know why this was. The general manager pointed out that the sub-heading to this section was "*Some* of the activities of the Society in the year ended 30 June 1983" which was a reflection of the limited amount of space at his disposal. Membership services in general had been extensively dealt with in the previous year, and since there were many topics to be mentioned in the current year's review, the QSL Bureau had not been reported on. Mr Bellfield asked whether the QSL Bureau manager had submitted a report, and Mr Evans pointed out that all members of staff supplied reports and statistics as a matter of course. There was insufficient space to feature them all in the magazine; the choice rested with himself.

RS42665 asked what the increase in staff costs in actual terms had been and to what they could be attributed. Mr P. F. D. Cornish, G3COR, honorary treasurer, explained that the figures equated to about six per cent in round terms. RS42665 said that he had meant cost increases in all areas, such as those imposed by service organizations and he was wondering whether the Society would look elsewhere in order to reduce costs wherever possible. Mr Cornish said that part of the general manager's job was to monitor overall costs and, if necessary, to seek alternative suppliers: he added that standard business practice required this approach as a matter of course. Budgets were laid down with generally, a 12-month period in mind, and close attention was paid to them.

Mr A. Milne, G2MI, wished to raise the question of the 80m GB2RS news bulletin frequency, which had for many years been 3,600kHz. This had been changed to 3,650kHz, but a facsimile transmission probably originating in Spain used this frequency and it was much less satisfactory than the earlier one. Mr Milne suggested that the RSGB take the appropriate measures to regain the use of 3,600kHz.

At this point the general manager said that the honorary treasurer had another engagement and would have to leave the meeting shortly, and the meeting was asked whether there were any more questions relating to the accounts. Mr P. Tucker, G4DWZ, said that he felt the treasurer's report had been very satisfactory and he enquired whether he or the general manager would care to comment on the financial prospects of the Society for the coming year. Mr P. F. D. Cornish replied that the underlying general trend was satisfactory and he had no particular qualms at the moment. He thought that the next increase in subscription levels could not long be delayed, since prices had increased some 12 to 15 per cent in the past two years. However, a close monitoring of past and future budgets was maintained. Mr D. A. Evans, the Society's general manager, added that it was well worth noting that the RSGB had survived the recession well: both membership and book sales remained buoyant, and in fact the number of members had passed 35,000 in the week before the meeting. This represented an increase in membership of 75 per cent in six years, which he felt was a good performance for any organization.

Mr A. Veitch, G8FRB, enquired as to the situation in regard to 50MHz, asking whether there was any likelihood of an allocation to the amateur service and whether Class B licensees would be permitted access. The Society's vhf manager, Mr K. Fisher, G3WSN, said, first, that the matter of a permanent allocation in the UK in the 50MHz band should not be confused with the 50MHz experimental research permits which were currently held: the two factors were not necessarily related. The propagation research experiment was working very well and some of the results so far had been remarkable—a good deal of information had been received and was being supplied to the Propagation Studies Committee and the VHF Committee. There was some hope of extending the number of permits available.

With regard to the issue of a permanent allocation at 50MHz, negotiations were under way and had been for some time. The interim report of the Merriman Committee on the future of the radio spectrum between 30 and 960MHz had recommended an allocation in the 50MHz region to the amateur service, and it was in this light that negotiations were currently taking place. Mr Fisher stressed that the intention within the Society had always been that both Class A and Class B licence holders would have access to the band. He realized that some people were confused by the fact that experimental permits had only been allocated to Class A licensees, but this had been a DTI requirement for the issue of the permits and was not necessarily related to what would happen in the event of a permanent allocation at 50MHz being granted to UK radio amateurs.

An unidentified member raised the matter of the liberalization of telecommunications within the UK, and asked what effect this would have on amateur radio and what steps were being taken to safeguard amateur interests. Dr D. S. Evans, G3RPE, in considering one aspect, said that there were a number of worrying problems, particularly in the context of microwaves. The loss without warning of the 1·3GHz band in Belgium was a case in point, and there was great pressure on frequencies in this area of the spectrum. He said that countries were increasingly tending to take quite arbitrary decisions virtually overnight, and that the greatest care and vigilance were necessary to ensure that potential problems were spotted and that the liaison at international level was such as to make sure that they were properly solved. There was little point in asking questions such as, for example, why was there no report on the QSL Bureau in *Radio Communication* when there were far larger matters at stake which would affect the entire hobby. Without proper technical input at international level, amateur radio itself would disappear: questions about the QSL Bureau would then become academic.

G8VZD asked whether any progress had been made towards a definition of the role of RSGB groups since last year. In reply Mr R. G. Barrett, GW8HEZ, the President-elect, outlined some developments which had taken place as a result of the work of the Membership & Representation Committee, of which he was chairman. He said that the committee would be interested in any input from members of RSGB groups, and that such input was extremely important.

G2RX asked, first, whether the RSGB could do anything about the bad behaviour which had been manifest during the recent space shuttle flight with W5LFL aboard. He also commented that he also experienced difficulty in hearing the 3·5MHz GB2RS broadcast at 9am, and asked whether the frequency of 3,650kHz was something to which the Society was tied. Replying to his first question, Mr D. A. Evans said that there was no doubt in his mind that in terms of public relations the shuttle flight had been a huge success, with a superb response from the media. However, what G2RX had referred to as the "inane interference from idiots" had undermined the enormous effort put in by headquarters and others to give a good image of amateur radio. He did not know what could be done about the problem; human nature was such that there would always be a small minority whose chief involvement with any field of human affairs would be a destructive one, and that in his opinion this was vandalism. In the context of the behaviour associated with the space shuttle flight, Mr Evans hoped that the culprits were unlicensed and that the forthcoming Telecommunications Bill would provide some relief. If, however, those responsible were licensed radio amateurs, there was no doubt in his mind that the standard of the Radio Amateur's Examination needed to be substantially raised. His final observation was that there was an element in society which was not controllable, and he was not sure what could be done about the problem, though the Society was continuing its efforts.

Mr A. Milne, G2MI, commented that he too had been appalled at the standard of behaviour which had manifested itself: he suggested that if someone owned a transmitter without possessing a licence, he should be fined. He failed to understand why some people spent four or five hundred pounds on transmitting equipment simply to advertise to the world that they were fools. Mr Evans added that certainly the new Telecommunications Bill, if it passed into law, would give power to solve some of the problems, but the other important point was the requirement for effective enforcement of that power; one without the other was of no use.

Mr M. Jones, G6GOS, felt that communication between headquarters and the GB2RS newsreaders could have been improved, and he also thought the material which had gone to the clubs had given little information on operating procedures. Mr D. A. Evans pointed out that the material sent to clubs had been devised specifically to aid them in their liaison with local media and had not aimed to give such information. Detailed operating procedures had been included in the December issue of *Radio Communication* which, as Mr Evans commented, had been sent to all 35,000 members.

Mr P. Crosland, C30AKA, said that he had found Mr Fisher's outline of some aspects of the 50MHz research experiment unsatisfactory: he wished to know the specific reason why the DTI had not allowed permits for Class B licensees and what representations the Society had made to the DTI for Class B licensees to be included in the experiment. Mr Fisher stressed that the Society had asked for Class B licensees to be considered but that this request had been rejected.

Mr D. Andrews, G3MXJ, asked what progress had been made with the negotiations for a novice licence in the UK. Mr D. A. Evans explained that the then Home Office had said that they would be unable to consider a further tier of amateur licensing until their records were computerised. This work was now scheduled to be completed in the autumn of 1984. With that in mind, the Society had recently discussed some ideas with the DTI, in conjunction with proposals for the use of morse code by Class B licensees: the Society's Licensing Advisory Committee felt that this was an important factor. The question of the precise nature of a licence for beginners required very careful consideration, since in some countries there had been serious misgivings among existing amateurs. CB organizations were pressing for a beginner's

licence in the UK, but the Society was not yet convinced that this would necessarily be popular or beneficial to the genuine amateur.

Mr Evans added that in the January issue of *Radio Communication* there was an item which set out some of the Society's current thinking on the matter of the beginner's licence, and which asked for input from the membership. Bearing in mind that there was some nine months in hand before computerization of records would be completed, the question could then be examined in depth.

Mr B. Woodcock, G4CIB, wished to ask some questions in his capacity as chairman of the Gloucester Amateur Radio Society. He wished to know whether the RSGB had an up-to-date model constitution, and Mr D. A. Evans replied that it had. He also wondered whether discrepancies in the arrival of *Radio Communication* with members was due to delays in the Post Office or whether there was some form of distribution policy on the part of the RSGB. Mr D. A. Evans said that, to the best of his knowledge, all magazines to be sent to UK members were passed to the Post Office on the same day, and that delays were purely a matter of local distribution of mail by the Post Office. He added that, when last surveyed, on average there was a six-day period between its posting and its arrival.

Mrs H. Claytonsmith, G4JKS, asked whether the provisions of the Telecommunications Bill could be amplified, with particular reference to the manufacturer's responsibility for the resistance to breakthrough of domestic entertainment equipment. The President said that this topic was not covered by the Telecommunications Bill. The policy of the DTI was that if there were complaints concerning breakthrough, it was explained to them that it was up to the complainant to take whatever measures were necessary and also to pay for the cost. Mrs Claytonsmith asked whether anything was being done on the lines of the "RFI Bill" which had been introduced into the USA in 1983, and the President referred her to page 969 of the November issue of *Radio Communication*. In this issue, a reply from the DTI to a letter from the Society had set out its policy in detail.

An unidentified member considered that the greatest danger came from cable television. He felt that the Society needed to be very alert to the potential problems, and he asked what measures the Society was taking to safeguard the position of radio amateurs. In reply, Mr M. Appleby, G3ZNU, the chairman of the VHF Committee, said that 11 franchises had now been granted for cable television in the UK, and one encouraging point was that most of them were to use switched-star technology, which was much less susceptible to interference. He added that the Society was consistently bringing to the attention of the DTI the need to establish proper principles of responsibility on the part of cable operators and the suppliers of associated equipment.

G4UVB, in his capacity as an area representative, felt that the despatch of recent issues of the *Council Letter* had been delayed, and he was receiving some criticism locally for apparently failing to pass on information contained in it. Mr D. A. Evans said that something like 1,200 copies of the *Council Letter* were now distributed, and that the large amount of extra work associated with the production and despatch of press kits relating to the shuttle flight had caused delay in the mailing of the last two issues. It was intended to resume the normal publication and despatch times as soon as possible.

Mr H. Holmden, G4KCC, had three questions which had been sent to him by G3IJU. The first asked whether the Society had any proposals to produce articles in *Radio Communication* which were aimed at the short-wave listener and the Class B licensee: the second asked whether the Society had any plans to cater for the expanding interest in home computing within the UK. Dr D. Evans, G3RPE, chairman of the Technical & Publications Committee, was asked to answer. He said that one of the problems faced by the Society in the past had been that it had to rely totally on voluntary efforts for the technical material published in *Radio Communication:* the Society had had no full-time technical staff at headquarters to produce material which was considered desirable and which had not been catered for by items submitted to *Radio Communication* for publication. However, the move to Potters Bar had already made some changes to *Radio Communication* possible—principally in the areas of news and readers' letters. In addition a full-time member of staff to serve in the role of technical officer had recently been appointed. He would be responsible for generating technical material which the Society felt was required and his appointment was a most important step in the right direction. Dr Evans said that the Society would continue to rely heavily on volunteer effort, and if people wished to submit for publication technical material suitable for beginners, the Society would be very pleased to receive it. Good technical material was appearing in club newsletters, for example, which was not receiving a wider circulation in *Radio Communication.*

With regard to the second question, Dr Evans said the situation regarding computers was under continuous review by the Technical & Publications Committee. One aspect under discussion was whether the Society should, as a matter of policy, adopt a specific computer. The philosophy would then become one of specializing in, and inviting contributions for, this particular computer, with particular emphasis on material with an amateur radio flavour, as opposed to what Dr Evans referred to as "simply finding another use for a computer."

Dr I. White, G3SEK, felt that the Society could not afford to be too selective about which computer it favoured. He said that there was another approach, which was not to concentrate on the computer itself but to deal with the underlying principles of particular programs. Those who were interested in receiving listings could do so for a small charge. Dr White said that he would not like to see space in *Radio Communication* being used for several pages of computer program listings of what were, often, trivial programs.

Mr Holmden then put the third question from G3IJU, which was whether the Society could advise the membership of the reason why the City & Guilds of London Institute did not permit the publishing of past examination papers. Mr M. Shardlow, G3SZJ, of the Society's Education Committee, replied that, according to the City & Guilds examination secretary, Mr Robin Bullough, the reason was that the pool of questions was very small and that they could not afford to dilute it by publicising the questions.

Mr H. Bellfield, G3SBV, asked whether any progress had been made in the matter of allowing unlicensed users to speak into the microphone of an amateur radio station. Mr D. A. Evans said that the Society was currently attempting to extend the "greetings message" facility to cover certain overseas countries, and then it was hoped that further development might take place after that.

Miss A. Voss, G5CCI, raised the question of callsigns issued to foreign nationals resident in the UK. There had been a certain amount of confusion over whether G5-plus-three-letter callsigns were to be replaced by new ones and the G5 series re-allocated. She felt that the RSGB had made no representations to the DTI on behalf of foreign UK residents. Mr D. A. Evans explained that only two holders of G5 callsigns had contacted the Society, Miss Voss being one of them; the Society had then spoken again to the DTI and a compromise had been reached by which the call letters associated with the G5 callsign could be retained with a G0 or G1 prefix as appropriate. Miss Voss said that she was surprised that the Society had only heard from two G5 licence holders since she herself had had 40 letters.

Mr P. Hawker, G3VA, noted that the Society's QSL sub-managers were now proposing to destroy unclaimed QSL cards after one month if no envelopes were supplied. He doubted the legality of this and wondered whether a longer period might be more helpful. Mr E. G. Allen, G3DRN, the RSGB QSL Bureau manager, said that there was only a certain amount of space at the bureau's disposal, and it was now the practice to dispose of unclaimed cards to prevent a large accumulation of unwanted material.

Mr D. Lawley, G4BUO, requested Council to consider holding more open meetings during the course of the year so that questions could be put to Council members and other officials of the Society: he felt that the period of one year between the annual general meetings was much too long. Mr R. G. Barrett, chairman of the Membership & Representation Committee, said that such meetings already existed: his committee had met at various venues around the UK during 1983, and these had been followed by informal meetings with local amateurs during the evenings. There had also been one meeting in the autumn when all RSGB members from a particular zone had been invited, which had been relatively successful. Finally, there were official regional meetings throughout the year: in other words, there were several opportunities other than the agm to ask questions throughout the year.

Mr J. Bluff, G3SJE, felt that the minutes of the annual general meeting should be published much earlier in the year than the month before the next meeting, as had been the custom. The President said that this change would, in fact, take place with immediate effect, and that the intention was that the minutes of the present meeting would appear in the February or March 1984 issue of *Radio Communication.*

Mr R. Broadbent, G3AAJ, wished to return to the topic of official regional meetings. As regional representative for Region 19, with some 9,000 members in his area, he had organized such a meeting earlier in the year: the number of members who had attended the meeting had been 39.

Mr G. P. Stancey, G3MCK, asked whether Council would ensure that prospective Council members who were candidates for election gave proper comments on their intentions if they were elected. He also hoped that if any incentive licensing scheme were introduced, due weight would be given to the importance of operating techniques.

Dr D. Evans, G3RPE, said in reply that the chief difficulty was in devising a statement which would genuinely assist the member intending to vote to make his decision. In other words, it was not permissible for prospective Council members to make statements whose intention could not be fulfilled.

Mr C. Newton, G2FKZ, felt that the knowledge and use of morse code was an important factor in raising operating standards. He wished to support the concept of on-air use of morse for training purposes being available to Class B operators, since he felt that this would assist in improving current standards. The President said that the Society had put the request to the DTI, and that the DTI were presently investigating the position on bands shared with other users: he was hopeful that the concept would come to fruition.

Mr R. Flavell, G3LTP, asked whether the Society had any plans to open a bookshop in central London for the benefit of members: it would also be useful as a meeting-place. Mr D. A. Evans said that some 55 per cent of the Society's publications were currently sold through bookshops, and he was not sure that an RSGB bookshop in London would be cost-effective. Mr C. Lee, G6BQJ, said that his local bookshop had informed him that the RSGB would not deal with them, but Mr Evans said that the Society would sell books to any bookshop wishing to buy them, and that several methods by which the transaction could take place were available. He cited trade credit accounts or *pro forma* invoices. He added that the matter of opening headquarters on Saturdays for book sales had been considered but, here again, the question of cost-effectiveness arose.

Mr M. Dixon, G8IQX, asked that other liquid refreshments be provided at the annual general meeting since a minority of people did not drink tea.

The final question came from Mr R. Lamberton, G4LAM, speaking on behalf of Mr T. Winchcombe, G6ZH. He had asked whether the difficulties of the partially sighted could be taken into account when the matter of typeface and colour of the RSGB's "Books for Christmas" leaflet was being considered; the 1983 insert had been very difficult to read. Mr A. W. Hutchinson, the Society's editor, said that the contrast in the final production of the leaflet had not been as good as had been intended, and he apologised for the difficulties which had resulted.

The President concluded the meeting by saying that the Bermuda Amateur Radio Society had sent its best wishes to the RSGB for Christmas, and he himself wished all those present at the meeting a merry Christmas. □

THE MEETING CLOSED AT 6.11PM

The G4BWE MULTIMETER

by Steve Price, G4BWE*

Steve, who obtained his amateur radio licence in 1973 at the age of 18, does not work in the electronics industry, and has no plans at present to give up his daytime job as a civil servant working in one of Bristol's social security offices.

Apart from an abiding interest in all aspects of electronics and telecommunications, he also enjoys foreign travel, photography, the occasional pint of real ale, and consumes copious amounts of Indian food.

Noted as one endowed with a creditable impartiality in all matters, Steve further informs us that he is an active member of the finest radio club in the country, the Shirehampton ARC, Bristol!

*458 Soundwell Road, Kingswood, Bristol BS15 1JU.

MANY WOULD ARGUE that an instrument capable of accurately measuring voltage, current and resistance over a wide range of values is the single most useful item of ancillary equipment likely to be found in the amateur's shack or workshop. As testimony to this belief, the multimeter —to employ its highly-descriptive title—may now be obtained in a bewildering variety of forms. Prices vary from cheap to astronomic, and retailers, always keen to stress the versatility of manufactured products, entice us with the prospect of being able to measure not just the constituents of Ohm's Law in their familiar units, but also decibels, capacitance and, where a special probe is provided, temperature. Indeed, studying some of the current advertisements might well lead one to conclude that the only major omission from many designs is a facility to measure the specific gravity of beer!

Unfortunately, and perhaps because the multimeter is perceived as such a fundamentally important item of equipment, many amateurs are quite simply "scared" into buying a ready-built unit. The belief that long-term reliability, dependability and accuracy of measurement are qualities that can only be bought is, however, something of a fallacy. First, reliability is attained through the adoption of a simple, well-proven design employing components of known quality and adequate rating. It should be borne in mind here that many of the surplus items offered for sale at mobile rallies and amateur radio exhibitions are of very high quality indeed. Suitable building blocks for a homebuilt multimeter are therefore readily available, often at surprisingly low prices.

The dependability of a multimeter hinges, in practice, on the user's understanding of the meter's shortcomings. All meters, however expensive, are quite capable of producing erroneous readings under certain conditions, eg when the operator attempts to measure voltages within high impedance circuitry. The advantage to be gained by building a multimeter from scratch is that the constructor will be well aware of the meter's operational shortcomings, and due allowance for suspect readings can therefore be made with confidence. Accuracy of measurement is a factor that must be considered in the context of the meter's day-to-day use. Typically, we might wish to measure dc voltages generated by a network composed of five per cent tolerance fixed resistors. Clearly, where the individual circuit elements, and hence all associated voltages and currents, are subject to such latitude, it would be foolish to insist on an accuracy of 0·5 per cent. What we require in practice is a robust meter which remains insensitive to variations in ambient temperature and possesses low sensitivity drift as recorded over both the short and long term. Finally, the meter must be capable of delivering consistent readings which are within the limits of accuracy demanded for correct operation of the circuitry under observation. In typical systems an accuracy of measurement within ±2 per cent may be deemed perfectly adequate.

The digital age is upon us, and it might seem inevitable that multimeters featuring digital presentation will quickly eclipse all other designs. This, the author feels, would be a regrettable trend. Analogue meters will always offer considerable advantages, particularly where it is necessary to observe changing values, or make quick approximations of the ratio between one value and another. In low-speed digital systems (eg electronic keyer circuitry) the cyclical motion of the meter pointer imparts a wealth of information concerning the amplitude, frequency and mark-space ratio of

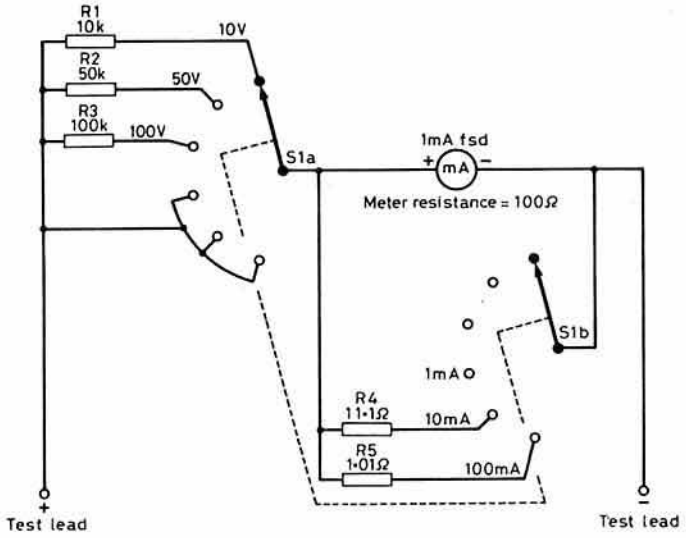


Fig 1. A simple dc multimeter of traditional design

the various pulse trains. In contrast, the flickering jumble of figures presented by the digital multimeter serves only to confuse.

The analogue multimeter to be described is based around a single third-generation op-amp. It boasts 12 separate ranges for dc voltage and current, plus the equivalent of four additional ranges for the measurement of resistance. A sensitivity of 100kΩ/V is achieved, irrespective of the meter movement employed. Range selection is accomplished through the use of a plug and panel-mounted sockets, thus ensuring high reliability.

Traditional multimeters

Fig 1 features the circuit diagram of a simple multimeter which is based on a 1mA moving-coil meter movement. The facility to measure dc voltage is obtained by switching resistors in series with the meter. Each "multiplier" resistor (R1, R2 and R3) will therefore provide a different range. For instance, Ohm's Law dictates that when the multimeter is switched to "10V" and a potential difference of 5V is presented across the test probes, a current of 500μA flows through the series combination of R1 and the meter movement. This current will cause the meter pointer to be deflected half-way across its scale, thus accurately registering the voltage under measurement. It should be noted that in the above example the meter coil resistance (100Ω) has been ignored, as its effect is minimal.

The greatest disadvantage of such an arrangement is that the current required to propel the meter pointer must be drawn directly from the circuit under test. Consequently the use of a relatively insensitive meter movement involves the penalty of circuit loading, ie the situation where connecting the meter across a high-value resistor will, in effect, lower considerably the value of the resistor, and thereby make any reading obtained virtually meaningless.

An obvious way of improving the multimeter's performance is to employ a more sensitive meter movement. This enables higher value multipliers to be used, thus increasing the multimeter's impedance. Typically, a 50μA movement would be selected, and the correct value for a 10V multiplier now becomes 200kΩ. This increase in impedance, or sensitivity, which would commonly be expressed as 20kΩ/V is a marked improvement over that provided by the use of a 1mA movement (1kΩ/V) but significant loading of high impedance circuitry is still unavoidable.

The second disadvantage of such metering systems is their vulnerability to overload, and the subsequent destruction of the meter movement. Inexpensive multimeters do not normally contain adequate protection for their meter movements, and are easily damaged beyond repair. A 1mA meter will generally prove more robust than instruments of higher sensitivity, but the use of such a meter is clearly in conflict with the requirement for high impedance discussed earlier.

Returning to Fig 1, it can be seen that a facility to measure direct current over the ranges 0–10mA and 0–100mA is provided by resistors R4 and R5. These shunt resistors operate in parallel with the meter, their purpose being to divert a predetermined proportion of the total current away from the meter coil, thereby reducing the meter's sensitivity. The meter movement operates in isolation to provide a 1mA range. If lower current ranges were required (eg 100μA) it would be necessary to employ a movement of correspondingly higher sensitivity. The above arrangement has a practical drawback in that the use of a specialized multiway switch possessing overlapping contacts is almost mandatory. If a standard switch is pressed into service it becomes inevitable that the pole contact will be momentarily isolated as the operator switches between current ranges. This has a potentially disastrous consequence in that when switching from the 10mA to the 100mA range both shunts are simultaneously disconnected for part of the time that the pole contact is in motion. During this period the multimeter's sensitivity reverts to 1mA and a serious overload may occur.

The op-amp multimeter

It is possible to overcome both the operational limitations and practical drawbacks catalogued above by adopting an electronic design. Fig 2 shows an effective voltmeter based around just one integrated circuit operational amplifier. As the TL071 op-amp boasts an exceptionally high input impedance, it is solely the 500kΩ resistor that establishes the meter's input impedance, and also its sensitivity of 100kΩ/V. One hundred per cent negative feedback is introduced by connecting the inverting input directly to the output (pins 2 and 6 respectively). The op-amp therefore functions as a unity gain buffer of high linearity, and whatever voltage is presented to pin 3, an identical voltage appears at pin 6. The circuit operates as follows.

The meter's "5V" terminal is connected to a source of voltage so that, for example, a potential difference of 3V appears across the 500kΩ resistor. As the op-amp has been made to function with unity gain, its output is also exactly 3V. The 5kΩ resistor acts as a multiplier, thus enabling the meter movement to measure voltage in the range 0–5V.

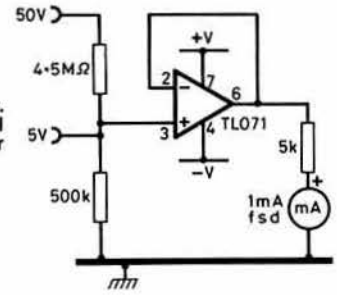


Fig 2. Operational amplifier voltmeter. The 4·5MΩ resistor forms a potential divider with the 500kΩ resistor in order to provide a 50V range

It is important to realize that the current which energizes the meter movement is derived entirely from the op-amp power supply. Therefore, assuming a positive supply rail of 9V, the maximum voltage that can possibly appear across the series combination of the 5kΩ resistor and the meter movement will be 8V. The differential of 1V is due to a voltage drop introduced by the op-amp output stage. This corresponds to a quite tolerable overload of 160 per cent full scale deflection (fsd) and the meter movement is safe from damage. Also, by introducing the op-amp we have made it possible to achieve a sensitivity of 100kΩ/V, which is equivalent to using a meter movement of 10μA fsd!

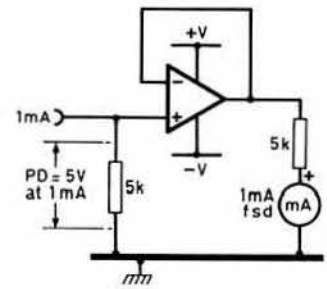


Fig 3. Op-amp ammeter in simple form

Exploring the possibilities further, Fig 3 illustrates the simplest method of measuring current with an op-amp buffer. A 5kΩ resistor acts as shunt, its purpose being to convert current flow into a potential difference. At full-scale deflection the voltage drop across the shunt will be 5V. Such a large drop cannot be tolerated in practice as it would almost certainly effect the behaviour of the circuit under test, thus making any readings obtained meaningless.

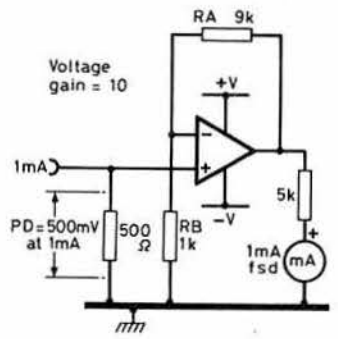


Fig 4. A practical op-amp ammeter

A simple solution to this problem involves the application of voltage gain. In Fig 4 the direct connection between the inverting input and output of the op-amp has been replaced by a network of two fixed resistors. The potential divider formed by RA and RB serves to present a predetermined fraction of the output voltage to the op-amp's inverting input. The resultant negative feedback produces a voltage gain equal to:

$$\frac{RA + RB}{RB} = \frac{9 \times 10^3 + 1 \times 10^3}{1 \times 10^3} = \frac{9 + 1}{1} = 10$$

The shunt value (500Ω) has been chosen so that a current of 1mA, the desired fsd, generates a potential difference (pd) across the op-amps non-inverting input of precisely 500mV. The amplifiers output is now 5V, this being the voltage required to fully deflect the meter pointer.

The principles discussed above form the basis of the G4BWE multimeter. In the practical design, the current shunt and voltage multiplier elements have been integrated into a common network. This measure reduces the

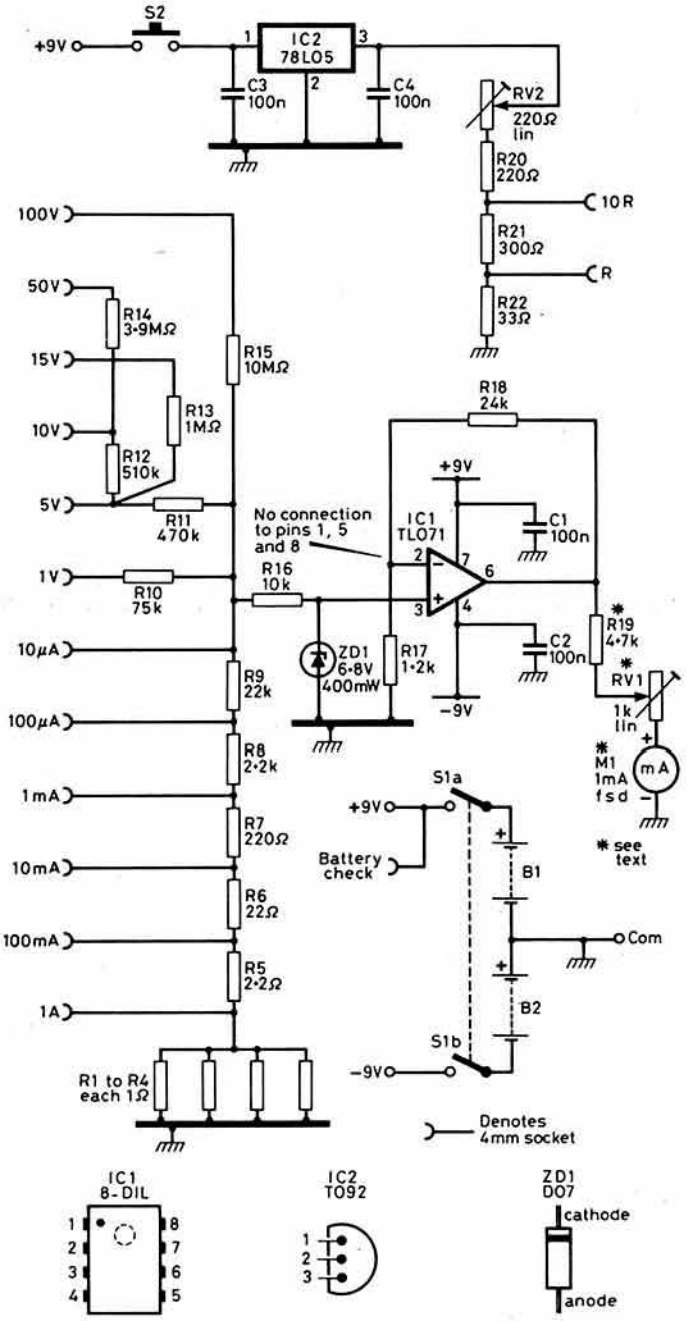


Fig 5. Complete circuit of the G4BWE multimeter

component count and also obviates the need for a function switch. Overload protection is provided for the op-amp, which delivers a voltage gain of 21. Choosing a higher gain figure means that the maximum voltage drop on current ranges is only 245mV.

After much thought, the author decided against the incorporation of ac ranges in the basic multimeter. The problems associated with the accurate measurement of the true rms value of alternating waveforms lead, inevitably, to compromises in the design of inexpensive multimeters, and performance suffers as a consequence. However, for those constructors who insist on such a facility, a simple ac adapter for voltage measurements has been developed and this is described later.

The practical design

A complete circuit diagram of the multimeter is shown in Fig 5. Power is derived from two 9V batteries of type PP3 or equivalents (B1 and B2). S1 is the on/off switch. When the meter is operational, around 2mA will be drawn from each battery.

Resistors R1 to R9 comprise the current shunt chain and allow measurement in decades from 10μA to 1A fsd. Operation of this arrangement is best understood by studying an example. For instance, 5mA is measured on the 10mA range as follows. The current under measurement flows through the combination of R1 to R4 (constituting a single 0·25Ω resistance) and the two other series elements R5 (2·2Ω) and R6 (22Ω). A total resistance of 24·45Ω therefore appears between the test probes. Ohm's Law enables us to calculate the resultant voltage drop for 5mA:

$$5\times10^{-3}(I) \times 24{\cdot}45(R) = 0{\cdot}122(V)$$

The potential of 122mV thus generated is transferred to the non-inverting input of IC1 via R7, R8, R9 and R16. Because the TLO71 has such a tremendously high input impedance, there is no voltage drop between the top of R6 and the op-amp's input pin. R17 and R18 form the negative feedback divider, which sets the voltage gain at 21. The output voltage appearing at pin 6 of IC1 is therefore 2·56V (0·122 × 21) and RV1 will have been so adjusted during calibration that this voltage produces a meter deflection of exactly 50 per cent fsd.

Resistors R10 to R15 form the voltage multiplier network. It is important to remember, however, that the current shunt chain remains in circuit. The chain has a total resistance of approximately 24·44kΩ, and it serves to form the lower arm of a potential divider that works in conjunction with the voltage multipliers. The amplifier's gain, as discussed above, dictates that an input of around 244mV is required for fsd. It is easy to see, therefore, how the value of R10 (75kΩ) has been chosen to provide a 1V range.

The 1V, 5V and 100V ranges utilize single resistors, while the 10V, 15V and 50V ranges rely on series combinations of two or even three separate values, some borrowed from other ranges. Although this arrangement may appear awkward at first glance, the net result is that six voltage ranges are obtained by using only the same number of preferred-value resistors. The choice of decade ranges (1V, 10V and 100V) is predictable and allows off-the-shelf meter movements having 0–1, 0–10 or 0–100 scales to be used without modification. Furthermore, readings taken on the 5V and 50V ranges are very easily converted. The 15V range is most definitely the odd-man-out, but was included in order to facilitate measurements on mains psus and batteries which produce outputs of 12–14V. It is suggested that a small red dot, or similar marking, be made on the meter scale at the point corresponding to 13·8V, thus making the 15V scale much easier to use.

Resistors R1 to R15 should ideally be of two per cent tolerance, and some constructors may wish to employ one per cent types. Difficulty is often experienced, however, in obtaining even two per cent components having values which fall at the range extremes, ie near 1Ω and 10MΩ. Should such a problem arise it is recommended that five per cent types be used for R5, R14 and R15 etc. Following initial calibration on the 5V or 10V range, the performance of ranges relying on five per cent resistors should be carefully checked. In all probability it will be found that an acceptable degree of accuracy is obtained on these ranges. If significant errors are detected, it is quite in order to "pad" the offending component(s) with an additional series, or parallel resistor of appropriate value. Suitable resistors for this design are metal film (eg Mullard MR25) or metal oxide (Electrosil TR5 etc) types with power ratings of between 0·25 and 0·5W. The exceptions are R1 to R4, which ideally should be small wirewound types.

It is advisable to ensure that the input voltage presented to an op-amp does not exceed that of the supply rail. To this end R16 and ZD1 have been incorporated as protection components for IC1. The values of R19 and RV1 have been calculated for a 1mA meter, but these components may be changed in order to facilitate the use of other movements. Table 1 shows the values appropriate to a range of meter sensitivities.

One apparent omission from the design is the absence of a zero-set potentiometer. In practice, however, it was found that offset irregularities do not present a problem. Errors due to the spread in characteristics of typical op-amps are only likely to move the meter pointer, in worst cases, by about three per cent of fsd away from zero. It is therefore entirely reasonable to remove such errors by adjusting the zero-set screw on the meter movement accordingly. This adjustment should, of course, be made with the multimeter switched on, and only after waiting a few seconds for the op-amp to warm up. If the constructor is lucky, however, he may well find that the op-amp obtained for this project exhibits such a low offset error that no zero-setting is necessary. Needless to say, if a stock of TLO71s is available it will be worth selecting the best device on test.

Resistance measurement

Measurement of resistance is accomplished by inclusion of IC2, a miniature voltage regulator type 78LO5, and associated components. The 5V reference generated by IC2 feeds a resistive potential divider comprising RV2, R20, R21 and R22. A 245mV output is taken from the junction of R21, R22 and this supplies a panel socket labelled "R". Similarly a 2·45V reference obtained at the R20, R21 junction feeds another socket labelled "10R".

This facility is employed in conjunction with the 10μA, 100μA and 1 mA current ranges, and its use simply involves connecting the resistance under

Table 1. Values for R19 and RV1 to accommodate various meter sensitivities

M1	R19	RV1
50μA	91kΩ	22kΩ
100μA	47kΩ	10kΩ
200μA	22kΩ	4·7kΩ
250μA	18kΩ	4·7kΩ
500μA	9·1kΩ	2·2kΩ

test between either the "R" or "10R" socket and the appropriate current range. A meter deflection of approximately 50 per cent fsd results when a 25kΩ resistance is connected between the "R" socket and the 10μA range. The corresponding values for the 100μA and 1mA ranges are 2·5kΩ and 250Ω respectively. The "10R" socket, which is used only in conjunction with the 10μA range, enables a 50 per cent reading to be obtained at 475kΩ.

After calibration of the multimeter voltage sensitivity (described later), RV2 is adjusted as follows. The "R" socket is directly connected to the 10μA range and, with the multimeter switched on and S2 depressed, RV2 is set for a reading of 100 per cent fsd. Shorting the "R" socket to the 100μA range should now also produce a deflection of 100 per cent fsd. Unfortunately, the reading obtained on the 1mA range will be about 90 per cent fsd only. This error, which is due to loading of the 245mV reference by the lower value of shunt resistance employed for the 1mA range, is unavoidable and contributes an error of five per cent for readings made at around 50 per cent fsd (ie 250Ω). This error was thought to be acceptable in practice. The "10R" range will not give an on-scale reading unless a suitably-high resistance appears across the 10R socket and 10μA range (approximately 220kΩ for fsd.)

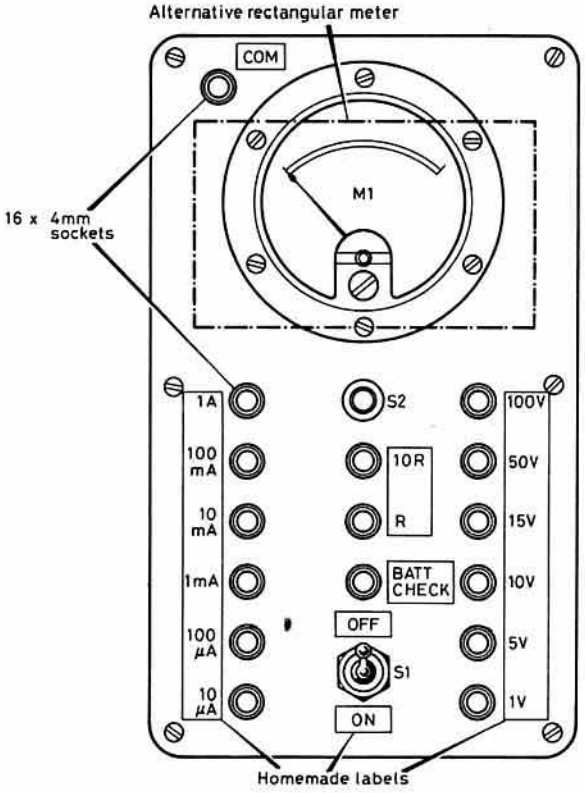


Fig 6. Multimeter panel layout

A scale may be marked on the meter by connecting known values of resistance between the "R" socket and 10μA range so as to produce calibration points. Readings then obtained using the 100μA range should correspond in the expected manner (ie the deflection for 15kΩ on 10μA is identical to that produced by 1·5kΩ connected to 100μA). The readings taken using the 1mA range will exhibit slight error, as explained above. The 10R range, if incorporated, requires a separate scale and will give useful results over the range 220kΩ to 4MΩ.

The current drawn by IC2 and its output potential divider is rather high, at around 12mA. S2 is therefore incorporated as a means of ensuring that the resistance facility does not present a continuous load to battery B1.

Components list

R1, 2, 3, 4	1Ω	R19	4·7kΩ*
R5	2·2Ω	R20	220Ω
R6	22Ω	R21	300Ω
R7	220Ω	R22	33Ω
R8	2·2kΩ	For resistor types, see text	
R9	22kΩ	RV1	1kΩ lin preset*
R10	75kΩ	RV2	220Ω lin preset
R11	470kΩ	C1, 2, 3, 4	100nF ceramic or polyester
R12	510kΩ	IC1	TLO71
R13	1MΩ	IC2	78LO5
R14	3·9MΩ	ZD1	6·8V 400mW zener
R15	10MΩ	M1	1mA fsd moving coil*
R16	10kΩ	S1	DPST toggle
R17	1·2kΩ	S2	SP push to make
R18	24kΩ	B1, 2	PP3 or PP7

Miscellaneous
Sixteen 4mm sockets. Two 4mm plugs and other items for probes. Battery connectors. Veroboard. Socket for IC1 (if required). Case.
*See text.

Construction

The multimeter electronics may conveniently be mounted on a small piece of 0·1in matrix Veroboard. The exact layout is not critical, and to some extent will be dictated by the size and shape of the particular components available. It is helpful, however, to map out the relative positions of all parts beforehand on a simple sketch plan.

Decoupling capacitors C1 to C4 should be soldered close to their respective ic pins, and it is important that the cathode of ZD1 (usually marked with a white ring) is connected to the junction of R16 and IC1, pin 3, as shown in Fig 5. The prototype multimeter is housed in a standard ABS plastics case of outside dimensions 7·5 by 4·5 by 2·37in approximately. A 1mA moving coil panel meter (a round type of considerable age which was purchased for the princely sum of £1 at a rally), S1 and 16 4mm sockets occupy the case lid, see Fig 6. Constructors should not feel bound by the panel layout presented, however, as there is great scope for innovation here. S1, M1 and the 4mm sockets are connected to the circuit board by flexible, pvc-covered flying leads.

Rather than utilize separate mounting brackets for the Veroboard, it should be possible to bolt the board to the back of the meter movement using the meter's own terminal screws. Test prods are easily fabricated from plastic tubing or, alternatively, may be purchased complete.

Calibration and refinements

Calibration is most easily achieved by comparing a voltage reading from the multimeter's 5V or 10V range with a simultaneous reading obtained from a meter of known accuracy. For instance, the battery check socket can be connected directly to the 10V range and also to the reference meter. RV1 is now adjusted until both meters give the same reading. Finally, the other voltage and also current ranges are given a quick check in order to confirm that everything is functioning properly.

In order to measure higher voltages, a 500V probe may be fabricated around four 10MΩ resistors (see Fig 7). This accessory works in conjunction with the 100V range. Care must be taken to ensure that the probe body is adequately insulated.

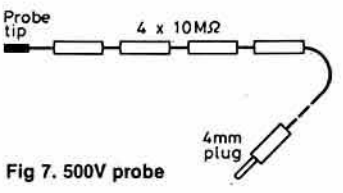


Fig 7. 500V probe

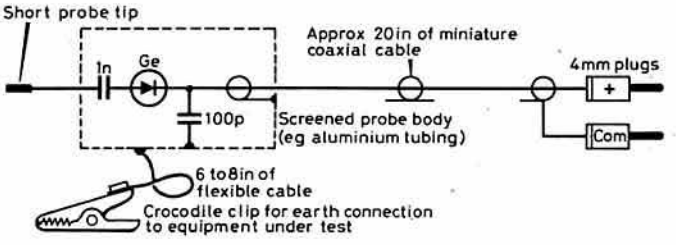


Fig 8. Peak reading rf probe. Ge is a germanium point contact diode; suitable types are OA47, OA95 etc

Fig 8 features a simple, peak measuring rf probe that will work in conjunction with the low voltage ranges. In this context, "low voltage"

(Continued on page 217)

THE HALTON OMNI

by Ted Cawkwell G8VEL*

A 144MHz switchable horizontal/vertical omnidirectional antenna

By trade a medical laboratory scientific officer, Ted Cawkwell developed an interest in electronics in self-defence in 1972. He served in the RAF from 1945 to 1981, and came in contact with amateur radio through the RAF Akrotiri ARC in Cyprus in 1978. He passed the RAE in 1979.

He is a founder member of the Aylesbury Vale ARS, of which he is a past committee member and newsletter editor, a founder member and committee member of RAF Halton AR&EC, and a member of the local Raynet group and the RAFARS.

Interests include 144 and 432MHz operating and swling, and he is very keen on "rolling his own". He has tried contest operating but is still undecided about it, is thinking about rtty and atv, and is trying to convince himself that he does not need a linear for the FT221R. Would like to retire and do homebrewing and writing fulltime.

ANYONE monitoring 144MHz will very soon realize that there are two classes of operator as regards the type of antenna used. One group uses beams almost exclusively, and these are the dx chasers usually to be found at the bottom end of the band. The second group is normally equipped with a single, simple, vertical, omnidirectional antenna, such as a Slim Jim or groundplane, just right for working local repeaters, mobiles or the friend on the other side of town. It is the latter group for whom the Halton Omni is intended, although a simple horizontal omnidirectional antenna is also a useful adjunct to a sharp beam. Switching to a turnstile must be quicker than swinging a large beam through 360° or even 180°.

When the author first started amateur radio with fm only and a Slim Jim, he was so often advised by the local "old-timers" to "Go horizontal young man—you'll get better signals and longer range", that he was persuaded to try a turnstile (or crossed dipole) antenna [1]. The old-timers are correct of course. The horizontally-polarized signals in my location, and there are many of them, certainly come from greater average distances, and there is little or no "flutter" on them. In fact, many fm and most ssb signals are propagated horizontally, and they are therefore received some 20dB down on a vertical antenna. Also, signals which start out vertically polarized tend to be rotated toward the horizontal by obstructions, particularly hills [2].

During tests of the Halton Omni it was noticed several times, when listening to medium-distance nets, that a few more members could be heard by switching to the horizontal mode—and even in quite local nets the signals of operators with horizontal antennas could be brought up, often from next to nothing, by switching to the turnstile.

Some time later, when it was desired to try out a groundplane antenna, it occurred to me that some work and materials could be saved by using the existing turnstile, grounding the two active elements, and adding the vertical element. The groundplane was a great success, and it was but a small step further to consider the possibility of switching from one to the other (Fig 1).

After some initial experiments the following construction was arrived at (Fig 2). The elements are assembled in a brown bakelite junction box about 3·5in in diameter; the lid of mine is held in place by a 6BA screw as indicated on the diagrams, but there are some imports with inferior threads—in any event you will need a nut to fit this screw. A block of five-ply wood was glued around the centre pillar to hold the radials, but the use of standoff pillars and through bolts would be an alternative and preferable method to give easier access to the relay solder tags. The terminals existing in the box are not useable and are ignored.

The method of fixing the antenna to the pole will need to be considered before assembling the parts, and this was done first by using a block of wood and the holes provided in the box.

Holes are drilled in the base of the box for the coaxial feeder, phasing line and relay terminals. The relay is bolted to the outside of the base with the solder tags poking through to the inside. A small slot is needed in the centre boss for the wire from the 6BA nut to the relay. Grommets were used on the radials to seal the holes in the box and provide a bit of "give" to the elements, since it was intended for use in the loft. All of the author's antennas are in the loft for ease of access, and tend to be nudged by the peripatetic experimenter. Unlike the beams, the Halton Omni has suffered no bent elements! If used outside, a waterproof sealer and several coats of protective lacquer will be necessary.

The relay should be of the type sealed into a metal case. A number of plastic-cased types gave poor results in the first experiments, and this was thought to be due to the relay contacts forming a one turn coil at the bottom of the vertical element. This will depend on the construction of the relay of course, and the metal case screens this area.

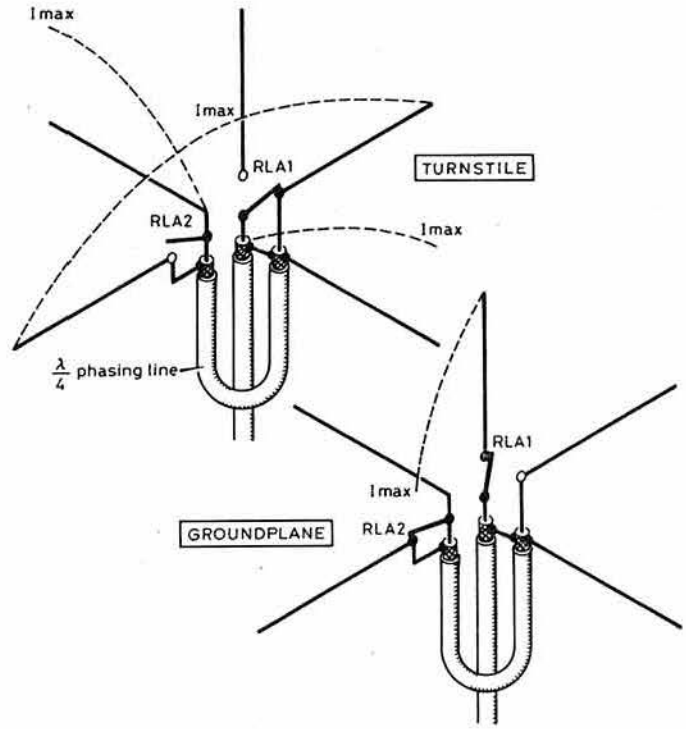


Fig 1. Turnstile and groundplane antennas

*1 Ladbroke Close, Elmhurst, Aylesbury, Bucks HP20 2EU.

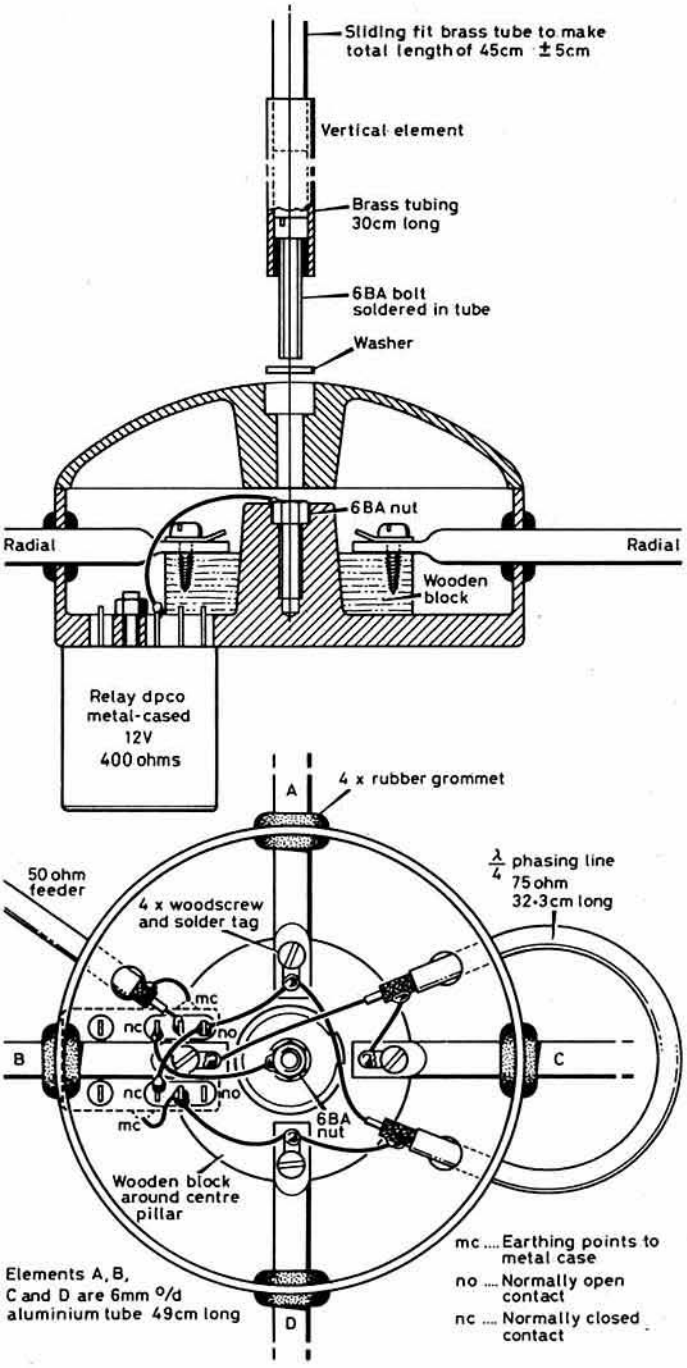


Fig 2. Details of the Halton Omni

Dimensions should be adhered to as closely as possible. In particular the length of the phasing line is important. The length given in Fig 2 is correct for solid dielectric 75Ω tv coaxial cable having a velocity factor of 0·66. The semi-airspaced variety in common use has a velocity factor of 0·85, and if this is used the length must be adjusted to 41·6cm. The groundplane is tuned by adjusting the length of the vertical element, which is made from two sliding-fit brass tubes 12in long, the fit being helped by a little solder. A good range of 12in brass tubes is obtainable from Taylor and McKenna toyshops.

Wired as shown, the antenna is a groundplane until the relay is energized, when it becomes a turnstile.

The elements were cut for 145·5MHz S20 using:

$$\frac{300 \times 0{\cdot}95}{\text{Freq in MHz} \times 4} \text{ metres}$$

giving the dimensions shown on Fig 2. When the turnstile was made, the author's interest was in horizontal fm and the antenna performs well for this mode. The vswr on a homemade swr meter is 1·5:1 in horizontal, and 1·7:1 in vertical propagation. At 144·5MHz the vswr is 2·2:1 showing that it is important to cut the turnstile accurately for the part of the band required.

The impedance of the antenna in either mode is about 36Ω and no attempt to improve this has been made as less than 10m of cable was used (RG58). A matching transformer would require a quarter wavelength of coaxial cable with an impedance of 42Ω (using $Z_t = \sqrt{36 \times 50} = 42$) which does not seem to be available. Using a transmitter of 75Ω impedance, however, a matching transformer of 50Ω cable would suit nicely, as the formula solves for 52Ω.

Experiments are currently being made with a 5λ/8 vertical element comprising a rod 1·27m long with an adjustable tip and a four turn coil of 16swg wire at the bottom. This has the advantage that the impedance is now close to 50Ω and the gain is theoretically greater than a simple quarterwave. It works, though the gain is hardly the expected 3dB, and the whole assembly is rather fragile, being held in place by a single 6BA bolt. A 3λ/4 element which might be the next step is too long to be accommodated in the loft. In the event of a second prototype being built, the possibility of making the turnstile resonant at 144·5MHz, and the groundplane resonant at 145·5MHz is being kept in mind.

Operators interested in satellites should note that, among its other properties, the turnstile propagates an excellent circularly-polarized signal at right angles to the dipoles, ie straight up. This is because, electrically, it is a dipole rotating at the frequency of operation—145·5 million rotations per second in the present case. Whether in fact it will work with satellites will depend on the propagation being matched for left or right hand "thread". Wired as shown, and looking upwards from below the antenna, the rotation is clockwise—which agrees with the convention for the northern hemisphere. However, some sort of tilting mechanism will be needed to use it for satellites in any but the overhead quadrant.

References

[1] *VHF/UHF Manual* G. R. Jessop, G6JP. Fourth edition, p8.45. RSGB.
[2] F. C. Judd, G2BCX. *Practical Wireless* July 1983. □

THE G4BWE MULTIMETER

(*Continued from page 215*)

includes the 10μA current range, which may also be thought of as a 250mV range.

It is possible to measure ac voltage by the use of the simple adapter shown in Fig 9. Three ranges are provided by this add-on unit, which can easily be built into a small plastics case. The adapter reduces the multimeter sensitivity to 11kΩ/V and, as only halfwave rectification is employed, the meter pointer may vibrate slightly in response to low frequencies such as 50Hz. The "form factor" correction employed enables true rms readings to be obtained for sinewave voltages only.

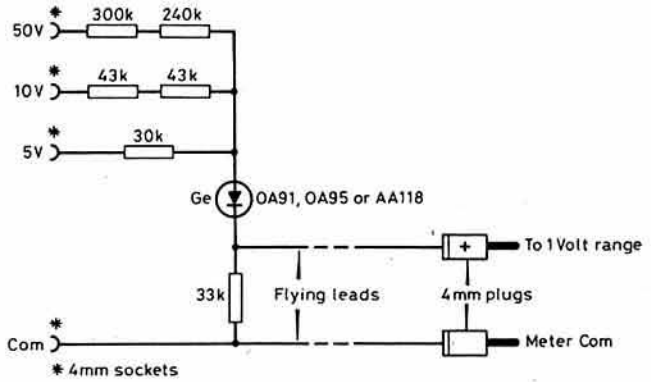


Fig 9. A simple ac adapter for rms voltage measurements (sinewave)

Many other refinements and additions to the multimeter are practicable. It should be possible, for instance, to employ the 7660 ic negative rail generator as a means of dispensing with B2, thus making it possible for the multimeter to operate with only one battery.

In conclusion, the author is confident that the G4BWE multimeter will reward the constructor with years of dependable service. □

Technical Topics

by Pat Hawker, G3VA

ONE OF THE PRIME AIMS of *TT* is to provide a forum for new ideas, whether or not they conflict with the pool of received wisdom or are likely to be blessed by those with specialist professional backgrounds. One knows of too many cases where important innovatory work in radio communications has initially been rejected by the "referees" acting for professional journals to have any great faith in the belief that the expert is always right —at least when it comes to assessing ideas that are not in accordance with established principles and practice. Clearly, one tries to weed out the perpetual motion machines, the water running uphill, and the many re-inventions of the wheel—or at least to insert a clear note of caution.

But it has always been my contention that in *TT* "everything is experimental, nothing is guaranteed". On the whole this policy seems to work. I can think of very few *TT* items that I have afterwards regretted using (except for one French April Fool af filter many years ago!) and conversely of a number of which, at first sight, I had doubts yet proved to be useful. Of course, not all ideas work out for others quite as well as they apparently did for their originators. The mathematics may not be perfect. The effect but not the cause may prove right.

To come from the general to the specific: G8SEQ's "absorbing element" as proposed to enhance the front-to-back ratio of a multi-element Yagi array. A number of people, whose opinions deserve the utmost respect, insist that G8SEQ's belief that a resistance-loaded element absorbs *all* the power that reaches it with *none* re-radiated is, from fundamental principles, incorrect. It just cannot happen. Further, without the use of a well-equipped test range, it would be extraordinarily difficult to measure or confirm a front-to-back ratio of anything like the 78dB originally claimed.

But that surely is not the crucial point. This is: will the absorbing element enhance the front-to-back ratio of a typical array to the extent where it represents a worthwhile technique—or not? After reading the letters, including several from G8SEQ, I for one remain uncertain about: (1) the actual degree of improvement likely to be achieved with an absorbing element; and (2) whether or not a similar or greater improvement could be achieved more easily using conventional methods.

On a rather different tack, I can sympathise fully with J. A. Ewen, G3HGM ("Members Mailbag" February, p117) who finds dealing with 40-pin lsi devices without having full data available an unnerving experience! There are still some of us, I can assure him, who prefer tackling large octal valveholders!

But if home-construction of high-performance receivers or transceivers is not to fade away entirely, the answer must surely tend towards the use of some complex ic devices, though not necessarily those with 40 pins. Recently it has been confidently forecast that by the turn of the century some integrated-circuits will contain 1,000,000,000 components on a single chip, while 230,000-bit memory devices are expected to appear quite soon in consumer electronics, including television sets, in the form of charge-coupled-device (ccd) shift registers.

Yet undoubtedly there is still a place for the discrete semiconductor and indeed for the discrete valve. Recently I profoundly surprised the technology correspondent of a national newspaper by telling him that even in this apparently all-solidstate era, the vast majority of all tv viewers and radio listeners receive their signals from transmitters containing one or more thermionic devices. He had thought that valves of all types were long dead and forgotten in broadcasting. How wrong can you be!

THIS MONTH

Using the TCA440

TT December 1983, pp1083-4, included some notes from ZL1BN on using the TCA440 integrated circuit as the heart of easy-to-build hf receivers. For some reason this particular Siemens device, introduced on the Continent in 1974, is seldom listed as available from British component distributors. I am assured, however, that the TCA440 is held as a stock item by Electrovalue, 28 St Judes Road, Englefield Green, Egham, Surrey, tel 0784 33603 or 01-873 3603. Current price of the TCA440 is only £1.82 plus VAT.

Hans-Joachim Brandt, DJ1ZB, whose low-power equipment designs are well known to members of the G-QRP Club, has in the past normally concentrated on direct-conversion receivers. A few years ago he decided to develop a superhet design based on the use of two TCA440 devices: Fig 1. His prototype comprises a series of modular pcbs, although he intends to rebuild the final model to a different mechanical design. His work on this receiver has given him a good insight into the use of complex, consumer-type ic devices in amateur-band receivers. He writes:

"The first TCA440 is operated in its intended manner as rf amplifier, doubly-balanced active mixer, free-running hf oscillator, i.f. amplifier and agc amplifier. The early stages of the second TCA440 provide the product detector and bfo, permitting the adjustment of the input level to the product by variation of a dc voltage applied to the rf amplifier agc input; in parallel with the product detector, the second part of the device is operated as an i.f. amplifier/a.m. detector/agc, again offering the capability of adjusting the agc threshold by adjustment of the dc voltage applied to the agc input of the i.f. amplifier."

DJ1ZB notes that a problem can arise with ic devices that have the bfo and i.f. amplifier on the same chip. However, in this design it is not too serious since the amount of post-i.f. amplification is quite low. By feeding part of the bfo voltage via an RC phase-shifting network into another input pin of the i.f. amplifier, the problem of bfo leakage into the i.f. amplifier on this chip can be cancelled out. He stresses, however, that having bfo and i.f. amplifier on the same chip does present a serious limitation to the dream of many designers to achieve a "receiver on a chip", especially when higher i.f. frequencies are involved.

In his design the agc voltage is processed by the four op-amps in an LM324 to generate a "hang agc" characteristic with two overlapping time constants; the principle is basically similar to that of the Plessey SL621c, but with control derived from the i.f. signal and not from af.

With some 40dB rf gain and 60dB i.f. gain, guidelines must be obeyed to maintain i.f. amplifier stability where the TCA440 is operated in the conventional manner. The layout of the ground path is very important so as to avoid coupling of i.f. input, or oscillator earthing currents, to the i.f. earthing current: Fig 2. Since the i.f. is quite low, short earth connections are not of prime importance, and a large earth-area on the pcb is not desirable. The most critical earth path is from the earth end of the i.f. output resonant circuit. This should be taken directly and as shortly as possible to pin 8 of the ic. Should it be intended to use alternative oscillator circuits, note that inductive feedback coupling should be employed so that the impedance between pins 4 and 5 is low at the intermediate frequency. Good shielding between mixer output and i.f. input pins must be maintained in order to retain the ic's good internal decoupling, which is better than 85dB.

The recommended limit of i.f. for this device is 2·5MHz, which affects some design concepts but does avoid the stability problems and additional

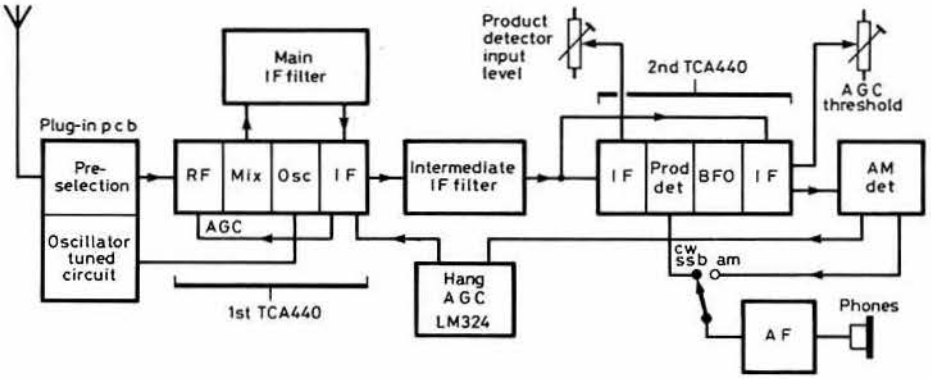


Fig 1. Block diagram of the hf receiver being developed by DJ1ZB based on the use of two Siemens TCA440 low-cost integrated circuits. These devices are available in the UK at around £2 each

i.f. current drain that would come from the use of a high i.f. The mixer transistors can handle oscillator frequencies up to 50MHz so that it is possible to have a much higher first i.f., subsequently converted to a low i.f. by using an external mixer/oscillator arrangement. This arrangement improves the isolation between mixer output and i.f. input on the chip, since two different frequencies will be involved.

Where the oscillator section of the TCA440 is used up to 30MHz, an extremely well-stabilized voltage source should be used for the entire ic, including the oscillator collector supply, in order to avoid change of chip capacitances with voltage variations. A low-cost three-pin regulator ic is not sufficient: either the 723 or the later improved versions are recommended; alternatively, use an Intelsil ICL 7663 or the ICL8069 reference diode in conjunction with an op-amp. With such a stable voltage source, capacitance-diode tuning can be employed for the oscillator, at least over a typical amateur band range of 100 to 500kHz.

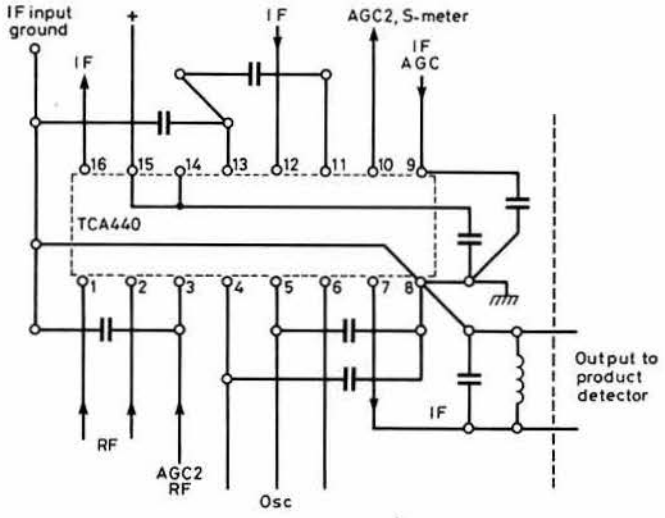


Fig 2. It is important to lay out the earthing paths around the high-gain TCA440 carefully. This diagram shows DJ1ZB's suggested layout

Since the total current consumption of the TCA440 is only about 12mA, the dynamic range of the mixer cannot be expected to compete with modern high-level mixers. With no agc applied, 3dB desensitizing occurs with an interfering signal of about 15 to 20mV (across 50Ω) when using a single input tuned circuit as preselection, with a noise figure of about 10dB at 30MHz. In practice the performance of this device can be made excellent by using good preselection, severely attenuating all signals outside of the band in use. For bands between 7 and 24MHz, the minimum requirement would appear to be a three-section input-filter such as described by Leonard Anderson (*Ham Radio* June 1977, p34). Particularly on the lower frequency bands, some insertion loss is permissible in the preselection since external noise level is so high. With a suitable preselection filter, even with a long antenna, tuning the European 7MHz band in the evening will show several spots where the S-meter goes to minimum (cw bandwidth) free of intermodulation products.

The use of a good three-section filter also means that image reception is no problem, even with a 455kHz i.f., except for 28MHz where there is no easy or practical solution to this problem. Oscillator frequency, however, should always be selected to avoid the image falling into a broadcast band.

For 3·5MHz (and planned for 1·8MHz) DJ1ZB uses two resonant circuits ahead of the ic. These are ganged with the oscillator, using a BB113 three-section capacitance diode. On 28MHz he has so far been concerned only with reception on the lower 500kHz, using two resonant circuits for preselection in conjunction with an image trap tuned to 28·9MHz, providing about 40dB image suppression. This is about sufficient for 28MHz but would not be satisfactory when a vhf converter is used ahead of the receiver. For band-changing he adopted the traditional HRO approach: for each band, the preselector and oscillator circuitry is arranged on a plug-in pcb having contact areas that fit into a receptacle on the receiver proper.

The agc range of the TCA440 was measured to 100–110dB, an excellent figure for a low-cost ic. At very high gain reduction, there is some tendency to oscillator pulling, noticeable above 25MHz. (DJ1ZB points out that Siemens have subsequently designed improved ic devices with more oscillator buffering but, since these have an internal a.m. detector, they are not suitable for ssb/cw. For optimum oscillator stability it is therefore advisable to use an external oscillator, or pll control etc.

His feeling about the TDA1083, mentioned by ZL1BN, is gathered only from a study of the data sheet. He considers it would prove inferior to the TCA440, with less agc range, no possibility of using a crystal oscillator, and many compromises resulting from the dual a.m. fm i.f. strip. Nevertheless it might well be suitable for simpler receivers.

Horizontally-elongated quad loop

The vertically-elongated quad loop antenna with an aspect ratio of 1:3 by GM6RI/GM3VNW (*TT* September, p800, with further note November, p998) caught the eye of Dave Gordon-Smith, G3UUR, as he had never come across a quad-loop extended in this way before. On the other hand, roughly 10 years ago, he used a horizontally-distended loop with an aspect ratio of about 2:1. He emphasizes that the crucial point to be observed if optimum performance is to be obtained it that, as in the Scottish version, the quad-loop is fed in the middle of one of the *short* sides. His loop (Fig 3(a)) had 48ft horizontal span and 24ft vertical sides conveniently fed from an upstairs shack. On 7MHz the feed impedance was approximately 50Ω. He feeds the antenna via the combined balun/atu shown in Fig 3(b)). The transformer-type balun has an impedance ratio of 1:4 on 7MHz switched to provide 1:1 on 1·8 and 3·5MHz. Such loops can also be used on harmonic frequencies, though G3UUR does not mention whether he used his on bands above 7MHz.

On 1·8MHz the radiation resistance of a loop with these dimensions is only about 1Ω, but despite this he found that with 14swg wire the radiation efficiency was reasonable. No deep broadside nulls exist on 1·8/3·5MHz since the vertical sections do not carry equal currents. On the other hand, on these bands, the two horizontal wires do carry equal and opposite currents, and this, in conjunction with the relatively close spacing, means that the antenna radiates less power directly upwards, tending to result in desirable low-angle radiation for long-distance working.

On 7MHz the loop behaves in much the same fashion as a conventional quad loop. When fed as shown it provides *vertical* polarization and slightly more gain, 2dB rather than 1·2dB (see below), with reference to a dipole. The maximum lobe produced by the "long" sides carrying the out-of-phase components can be expected to be over 20dB down and of opposite polarization to the main lobe from the "short" sides. Like all loops, the average height above ground is reduced from that of a single wire type of antenna, but with vertical polarization this is less important than the effects of the conductivity of the ground.

G3UUR has recently calculated the gain and feed impedance of the conventional quad loop using what he feels is a rigorous approach. He finds that this gives a theoretical gain (ref dipole) of 1·2dB and an input impedance of 110·7Ω. An interesting point is that the gain is slightly higher

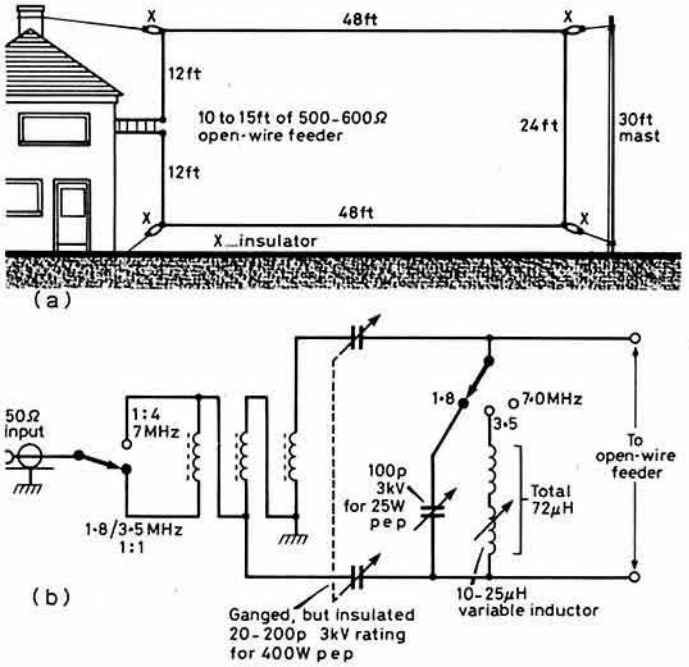


Fig 3. Horizontally-elongated vertically-polarized quad-loop antenna used by G3UUR on 7, 3·5 and 1·8MHz: (a) antenna with open-wire balanced feeders; (b) atu with switched-ratio balun used to convert the unbalanced 50Ω transmitter output

than usually suggested. On the other hand the impedance is significantly lower than the figure of 120 to 140Ω usually quoted in amateur radio publications. While the actual impedance will be affected to some degree by ground proximity, this will tend to *decrease* the figure to below rather than above 110Ω. G3UUR has reasonable confidence that his calculations are correct, so that it may well be that the handbooks have got it wrong.

Another long loop

By coincidence, G. E. Cripps, G3DWW, has recently sent in a note on an antenna of roughly similar shape and size to that described by G3UUR above, although his version does not tie up with the guidelines given above, and he incorporates a switch to open the loop on 3·5MHz: Fig 4.

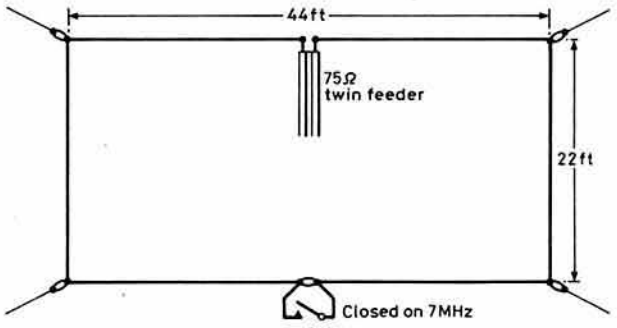


Fig 4. G3DWW's switched loop/dipole multiband antenna (horizontally polarized)

G3DWW writes: "The span available for wire antennas at this location is limited to 45ft in a straight line. A simple antenna for 3·5MHz and 7MHz was constructed in the form of an elongated quad loop with two horizontal sides of 44ft and two vertical 22ft sections. This is fed at top centre with 80Ω balanced twin feeder. On 7MHz the loop is continuous, but on 3·5MHz the lower horizontal limb is opened at the centre to form a folded form of "bent dipole". Since the antenna is of balanced form it discriminates well against the high level of tv timebase radiation at this location. As is normal with quad loops, the closed loop also radiates on harmonically-related frequencies."

The G3DWW antenna, of course, provides *horizontally*-polarized signals on 3·5/7MHz.

Multiband trapped dipoles

Although, today, many amateurs recognize that the use of traps to form multiband antennas is far from an ideal system, and that there are better techniques, the trap has become firmly established. The simplified form of multiband dipole, using just two 7MHz traps, as originally proposed by W3DZZ, is undoubtedly one of the most widely used of all "wire" hf antennas, though now tending to give way in the popularity stakes to such alternatives as the trapless G5RV and the multiband loop (quad or delta).

The way in which many trapped dipoles work is less simple than it may appear at first glance, yet relatively few of the usual handbooks other than the *ARRL Antenna Book* explain the principles in any detail. It is easy to see that on 7MHz the traps inserted in the wire at 33ft either side of centre act virtually as insulators, isolating the 66ft span from the outer section, and so forming an λ/2 dipole. Further it can be appreciated that both these traps need to be of high-Q construction and well protected against the effects of weather and ageing if performance on 7MHz is to remain good.

But just what do the traps do on the other bands, and why is it necessary to specify carefully the LC ratio of the traps in a W3DZZ-type antenna? Would not any trap tuned to 7,050kHz work just as well? The answer to this second question is that it would on 7MHz but not necessarily on the other bands. Remember that the W3DZZ with a 102ft span and two 7MHz traps is intended to work on all five of the pre-WARC hf bands from 3·5 to 28MHz without necessarily requiring an atu.

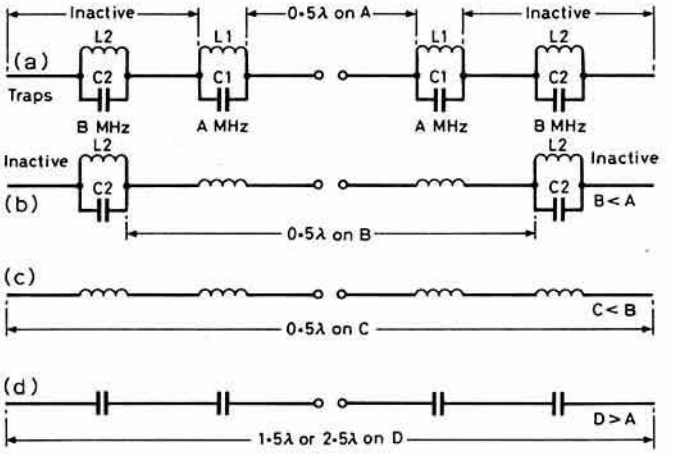


Fig 5. Showing the basic principles of the multi-band trap dipole antenna indicating the mode of operation on different frequency bands. The traps provide a very high isolating impedance on the band to which they are tuned; provide inductive (loading) reactance on lower frequency bands; and capacitive (stretching) reactance on bands of higher frequency

Fig 5 shows the principles of operation of a four-trap antenna on different bands. At lower frequencies than that to which it is tuned, the trap looks like an inductive reactance and so provides inductive loading thereby decreasing the span required for λ/2 resonance on the lower-frequency bands. At higher frequencies than that to which the trap is tuned, it acts as a capacitive reactance tending to "stretch" the element, although clearly, because of the length of the initial span, it cannot do this to the extent that the antenna forms a "stretched" λ/2 dipole; however, if the design figures are correct the whole span forms a resonant 3λ/2 or 5λ/2 centre-fed dipole, though the radiation pattern will not be the same as for the bands on which the antenna forms a λ/2 system. This is not necessarily a disadvantage, since there will be some power gain in the lobes of a 3λ/2 or 5λ/2 antenna.

It needs to be appreciated also that on the higher frequency bands, resonance for a given overall span will depend on such factors as the LC ratio of the trap, so that for a W3DZZ trap the capacitors should be within the span 50-60pF as well as being high-voltage, high-current types. The design of an antenna such as the W3DZZ, which depends on both inductive loading and capacitive stretching, is quite tricky unless, as most people do, you simply follow the original W3DZZ dimensions and values: Fig 6. Though it should be noted that these were intended for the wider American 3·5 to 4MHz and 7 to 7·2MHz bands.

Trapped-beam arrays tend not to use the capacitive/inductive reactance feature of the W3DZZ design, using "insulator-type" resonant traps for each band to maintain the λ/2 feature on each band: a three element array for 14/21/28MHz may thus use 12 traps.

The two-trap W3DZZ antenna at a reasonable height above ground, free of unbalancing features such as a slope over the entire span or proximity to other structures, should be capable of providing an swr ratio (without an

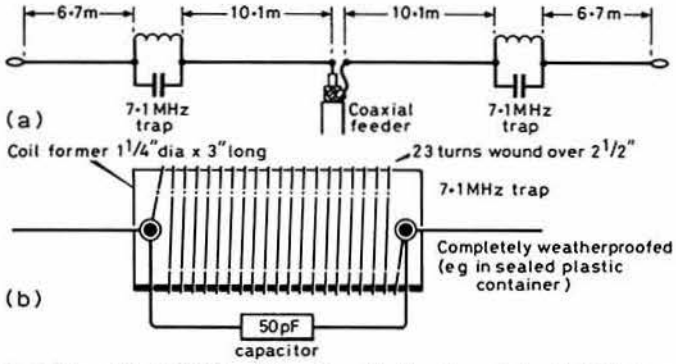


Fig 6. The original W3DZZ multiband trap dipole using only two 7·1MHz traps but designed to provide low-impedance centre feedpoint on 3·5/7/14/21/28MHz with an swr not greater than about 2·5:1. The whole system should be symmetrical about the feedpoint, with the top span either horizontal or in inverted-V form but not as a continuously-sloping wire. The new G3OSS modification consists of connecting the traps some feet into the central span, letting a few feet of wire hang down, and adjusting the outer span as necessary

atu) at the transmitter of less than about 2·5:1 on all five bands. Even this figure may require the use of an atu with some all-solidstate transmitters that automatically begin to reduce output with an swr above about 1·8:1, though it should be appreciated that the use of an atu in this way does not alter the swr of the coaxial feeder (in practice unless there is a *very* long feeder there will be virtually no loss of efficiency with an swr of around 2·5:1).

Traps have the disadvantage of introducing extra weight into a wire antenna, requiring additional strength in the supports to reduce sagging of the centre part of the element; they are also very frequency-conscious. On the band in which they are used as isolating "insulators", since they are inserted at high-impedance voltage maxima, any leakage or misalignment will affect the system significantly.

Angus McKenzie, G3OSS, in "Trapped dipoles—back to the drawing board?" (*Amateur Radio* (UK) December 1983, pp56-8) argues persuasively that a simple modification in design can result in better and more consistent performance, reflected in an swr that is much less frequency-dependent. His idea is stunningly simple. Why, he argues, connect traps at the most critical points, ie at the high-impedance end-point of the antenna when it is used on the "trap band"? We have all known for many years that the outer few feet of a dipole can hang downwards without significantly affecting its performance; a technique generally used when faced with a site that will not support a full-length dipole span. So why not connect the trap a few feet into the central span, letting the last few feet hang down? The trap is then connected at a point of lower impedance. Hence less leakage, and less change over a band.

G3OSS tested this idea on a four-trap dipole used on 1·8MHz as well as on the higher-frequency bands; he found the swr flattened out significantly. Results, particularly on 1·8 and 3·5MHz "improved dramatically". He is convinced that this simple modification, if carried out correctly and the outer span dimensions optimized, represents a significant advance on the conventional W3DZZ approach; it also means that a 1·8MHz antenna can be fitted into a little less space. Trapped dipoles to this modified design are likely to be marketed by G2DYM, but it should not be difficult to adapt an existing W3DZZ antenna. It might well be worth trying!

Wide-range crystal oscillator

A series-resonant form of crystal oscillator having no LC tuned circuits but claimed to cover the extremely wide frequency range of 1kHz to 10MHz has been described by Fred Brown, W6HPH, in *Electronic Design* (22 December 1983, p190): Fig 7. It uses a three-stage amplifier, rather than the more usual two-stage form of series resonant oscillator with RC networks (C1.R1) to compensate for the lower series resistance of very low-frequency crystals; it also reduces feedback arising from the shunt capacitance of the crystal. High-frequency peaking is achieved with C2, C3 and C4. He notes that although the frequency range could be extended still further with more peaking, to do so would invite spurious oscillations when low-frequency crystals, having high shunt capacitance, are used.

The arrangement is intended to provide some 7V peak-to-peak output, in the form of square waves at low frequencies. The use of components having tolerances of five per cent or better is recommended.

The approaching era of 12GHz television receivers designed to receive direct broadcast satellites is concentrating a good deal of industrial research on mass production of components and devices that may prove of interest to microwave enthusiasts. For example, new low-loss dielectric resonator material for stabilization of microwave local oscillators is being reported, including better barium titanate material with much reduced temperature drift. Experimental results include GaAs fet oscillators with a temperature drift of only 150 to 200kHz at 10·9GHz over the wide temperature range of −30 to +80°C, representing better than ±0·1ppm/K.

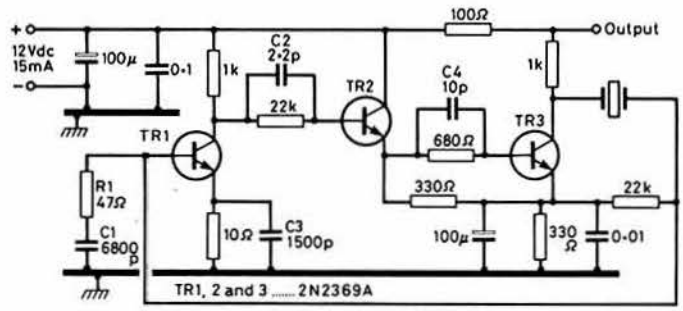


Fig 7. Fred Brown's three-transistor "universal" crystal oscillator claimed to work on the series-resonance frequency of any crystal between 1kHz and 10MHz without adjustment

The sort of performance now being achieved with precision crystal standards is illustrated in a current American commercial package offered by Piezo Systems using a "doubly rotated AT" stress-compensated crystal with output on 10MHz: ageing rate less than 5 parts in 10^{10}/day; phase noise better than 160dBc at 10kHz offset; warm-up to within 5 parts in 10^9 of final frequency in 10min; a stability better than 5 parts in 10^{12} if averaged over 1s; and power consumption 2W after warm-up.

Extinguishing fires

From time to time *TT* has drawn attention to the traumatic, but fortunately rare, experience of having your radio or electronic equipment catch fire; or to the potentially more dangerous (because you may not be there when it happens) possibility of causing a fire by leaving a soldering iron on and unguarded.

Fortunately, modern transceivers are built in such a way that there is little that can feed a sustained fire when ignition has occurred due to a component breakdown. Nevertheless, as reported in *TT* March 1983, p233, problems can arise, for example, due to gradual deterioration of multicore pvc-insulated cable harnesses leading to short-circuits, fire and toxic smoke.

Kjell Strom, SM6CPI, endorses the views expressed by Jack Maling, G5JL, on what to do should smoke start coming out of your equipment. He stresses the importance of realizing immediately that there is no reason to panic, particularly if you have had the foresight to think out in advance what you should do, and what you should not do, to put out an electrical fire. There will be adequate time to cope with the situation:

(1) Switch off the ac power at the master switch (*Every* shack should have one of these!) or, alternatively, pull out the ac plug from the socket. In most cases the smoke should cease to come out almost immediately.

(2) If smoke continues, throw a blanket (or similar covering) over the equipment; then wrap it around the equipment to prevent air from entering so that the fire is smothered.

Where the fire is of a more general nature, usually arising from domestic or cooking accidents, faulty electrical and other appliances, it is useful to have at least some knowledge of how to go about extinguishing them. As pointed out in the December 1983 *TT*, mobile operation, with the possibility of a petrol-type fire, calls for the use of an effective fire extinguisher. In general, fires are most likely to occur in kitchens or garages.

The Safety Group of the organization for which I labour issues copious notes on many safety topics. On fire precautions it stresses that it is better to *prevent* a fire than to put it out, and that *saving of human life has priority over all else*.

Fire-fighting equipment needs to be conveniently placed, but not so close to the apparatus it is designed to protect as to make it difficult to reach it should a fire break out; it needs to be regularly inspected and maintained in good condition. Remember that some types of fire extinguisher have a relatively short life unless refilled or otherwise maintained. A badly-maintained extinguisher can be a handicap, not a help.

Water should *not* be used to put out a fire in electrical equipment. The most useful way of tackling equipment fires, or those caused by oil or fat

fires etc during cooking, is unquestionably the fire blanket. The IBA safety notes recommend blankets made of woven glass cloth rather than the formerly popular asbestos blankets, now in disfavour. In an emergency a domestic blanket is usually effective. A fire blanket that is about 6ft by 4ft is also large enough to envelop a person in the event of their clothing catching fire.

Except for burning petrol and for some frying-pan fires (which are best smothered), dry-powder fire extinguishers are generally less effective than water and other improvized methods. To quote Eric Clark's *Everybody's Guide to Survival*: "There is a very real danger that a fire extinguisher can give a false sense of security. And it is useless owning one unless it contains enough powder, foam or water, and unless you have had practice in using it. If you do buy one, learn how to use it, and remember that it needs to be maintained or renewed regularly or it will deteriorate. Fighting petrol fires is the one case where an extinguisher is essential."

Remember also that fighting fires in "live" electrical equipment demands the use of an electrically non-conductive extinguishing agent. It may also be worth remembering, as SM6CPI points out, that some chemical agents are extremely aggressive and can result in more damage than the fire.

The area in which a fire has taken place should be thoroughly ventilated as soon as possible afterwards, since even if the substance used in the extinguisher does not itself produce toxic gases, the products of combustion, especially in electrical fires, are likely to contain harmful gasses. It is widely recognized that toxic smoke from plastics is the major hazard in most domestic fires.

The *Industrial Safety Handbook* (2nd edition, edited by William Handley) lists seven classifications of manual fire-fighting equipment of which the first two are the most applicable to the domestic scene:

(1) Hand appliances such as buckets for water and sand; shovels for sand; implements for beating out fires; and fire-resisting blankets for smothering fires.

(2) Portable fire extinguishers, with various agents for a range of risks; portable pumps, for example stirrup pumps, for water.

Fire-fighting agents include: water, dry powders (further classified according to their usage); halons and inerting gases; and medium and high expansion foams.

To sum up: it does seem worth while to have a fire blanket available, and this should cope with virtually any likely equipment fire in an amateur shack. Fire extinguishers, it would seem, are best reserved for garages and for mobile operation.

Antennas in the wind

These notes are being prepared in the immediate wake of several gales that swept most parts of the UK in mid-January. One can be pretty certain that a significant number of British amateurs will have lost antennas that, when put up in the balmy breezes of summer, must have seemed strong enough to defeat the worst winds of winter. On a fine day the possibility of wind gusts of well over 100mph seem so remote as not to be worth worrying about.

The British Standards Institution has finally got round to publishing BS6330:1983 "Reception of sound and television broadcasting". This replaces the old CP1020 Code of Practice and includes a good deal of information about recommended methods of installing vhf and uhf antennas, much of it along the general lines of earlier recommendations by such bodies as the Confederation of Aerial Industries (see *TT* July 1982 or *A Guide to Amateur Radio* 19th edn). Much of this information applies to 144MHz and uhf amateur arrays, although of course some of these are likely to be much bigger and heavier than receiving antennas for broadcast reception.

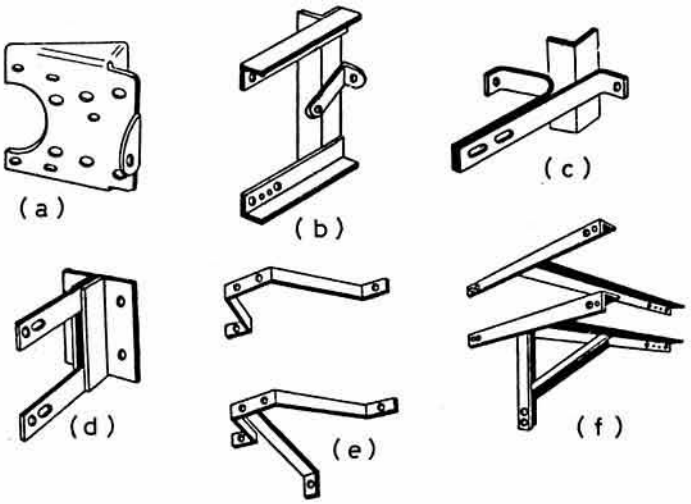


Fig 8. Examples of commercially-available chimney- and wall-mounting brackets used for broadcast receiving antennas as noted in BS6330:1983. (a) Pressed steel chimney bracket; (b) welded chimney bracket; (c) double chimney lashing bracket (used in pairs); (d) welded wall bracket; (e) two-piece welded wall bracket; (f) T and K welded wall brackets. Note that such brackets are not intended to support the weight and strain of very large rotating 70MHz or 144MHz arrays. Guidance as to what the brackets will support is given in BS6330

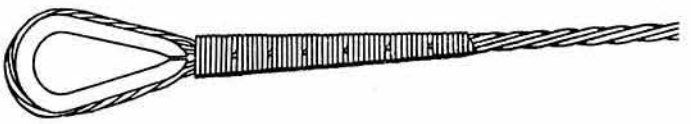


Fig 9. Method of terminating a lashing wire as shown in BS6330

The BSI publication does, however, include additional information on accessories such as chimney-mounting and wall-mounting brackets (Fig 8), noting that wall-mounted masts are to be preferred as these eliminate the need for lashing wires. It notes that: "For brackets of a welded construction, it is essential that the welds are of a good quality, and preferably the welding process should be such that it produces a clean surface for finishing. Guy and lashing wires where used should be properly terminated (Fig 9) with provision for adjustment of the tension. When fitting the mast to the bracket, all nuts should be spanner tightened. When the mast is secured by U or V bolts, care should be taken to avoid undue distortion of the mast. Severe distortion can result in metal fatigue and fracture after a lapse of time." It is also noted that to avoid contamination by smoke and flue gasses, or damage by chimney sweeps, an antenna should not be erected over the top of a chimney. On the use of roof spaces it warns that these should not be used where metal foil roof linings are present; in other cases care should be taken to position uhf or vhf antennas as far as possible from pipes, cisterns and other metalwork.

BS6330 also reminds installers that any outdoor system that is erected in a situation where it is fully exposed to the rigours of the climate "will experience wide ranges of temperature (from well below freezing to over 55°C), rain, snow, ice formation and high-velocity winds, and will be subject to metal fatigue, as are all stressed metal structures". The degree of exposure of the site needs to be considered very carefully. Coastal sites, sites on hills or very tall buildings need special care. It is worth remembering that most weather data are based on *statistics* and are not absolute values. An assurance that wind gusts are likely to exceed 100mph only, say, once in 20 years means, by Murphy's Law, that the wind gusts will certainly exceed 100mph the following winter!

Section 8 of BS6330 is concerned specifically with "safety", recognizing that the installation of antennas, feeders etc almost always involves some degree of hazard, not only to the installers but to other people. Ladder work, electrical hazards—including proximity to overhead electricity transmission lines or the use of common ducts for signal and power cables etc—all pose safety problems which need to be recognized and minimized.

The production of BS6330, as I can personally testify, took a good deal of effort by working parties over several years. Even so it does not cover the looming question of 12GHz satellite "dishes" that can give rise to great problems in high winds. Similarly, amateur radio hf arrays and towers in exposed sites need a climate-proof installation that requires mechanical engineering expertise of no mean order. Perhaps the best guidance is to remember that wind forces, corrosion etc are always more severe than one imagines—and that even digging a hole in the garden for an earth is liable to damage buried pipes, etc.

Analogue and digital

Last year I attended a colloquium organized by the Royal Society that brought together academics and engineers (including several radio amateurs) concerned with both pure and applied research in telecommunications and radio. As I subsequently noted in *Wireless World* (October 1983) one of the points that emerged from this meeting was that the impact of digital techniques is tending to change, and to some extent distort, the pattern of formal electronic engineering training at universities, polytechnics and in industry etc. There is apparently already a marked

(Continued on page 228)

DYNAMIC RANGE INTERMODULATION AND PHASE NOISE

by P. E. Chadwick, G3RZP*

THE CONCEPT of intermodulation as a limiting parameter in receiver performance has become more common over the last few years, possibly because of the introduction of wideband solidstate receivers in which the performance in this respect was worse than that of the valved receivers they replaced. More recently, the term "dynamic range" has been introduced as a catch phrase to encompass the inadequacies (or otherwise) of receivers and radio systems in what is frequently a non-quantifiable manner. As a result of this fashion, the term "dynamic range" now means all things to all men, and almost any meaning desired can be attributed to it!

However, by specifying the system in which we are working, some of the confusion can be removed. For example, the "dynamic range" of an fm i.f. strip is generally considered to be the range of on-tune signals which can be handled without excessive distortion or damage. In a radar receiver with a logarithmic i.f. amplifier, the concept of dynamic range as that range of signals over which the logarithmic law holds is valid. But in a communications receiver the situation is clouded by the very environment in which the receiver must work, ie in the presence of a large number of unwanted signals. At first glance, it may well appear that the problem of handling strong signals is easy, for an effective agc loop will reduce the gain of the receiver as desired to remove the overload. This is, of course, perfectly valid—for signals within the detector passband of the receiver. But for signals that are off-tune, a completely different situation occurs, because a signal which is outside the detector passband of the receiver will not produce any agc, and so the overload still occurs. Therefore the agc dynamic range is a different parameter to the dynamic range, which is that of the ratio of unwanted signal on an adjacent channel to wanted signal for a given degradation in received signal quality—while this is unlikely to bear much resemblance to the "spurious free dynamic range" used in discussing intermodulation. It is therefore possible to consider the term dynamic range as also covering a composite measurement of receiver performance, although this has not yet been produced.

In the conventional, non-synthesized receiver, especially if solidstate, the major limitation in performance is produced by intermodulation, and it is therefore reasonable that this should be considered first. (For a discussion of receiver parameters and their meanings, readers are referred to [1]).

Peter Chadwick was born in 1947, the son of G8ON. He attended his first NFD in 1948, and has missed only four since then. Since 1964 he has worked for several companies, including Marconi, KW, Decca and Racal, and is currently principal applications engineer at Plessey Semiconductors for rf and professional applications. He has presented a number of professional papers, both in UK and abroad, holds five patents, and has written some 15 articles for electronic magazines. Peter operates on hf bands, mainly on cw, and on 144MHz, all modes, but with a cw preference.

In September 1983 he married G4FNC, daughter of G3ZCV and sister of G4MZM, thus keeping amateur radio firmly in the family! His other interests include railways, canals, cooking and home-brewing (beer as well as equipment).

* 50 Ravenglass Road, Westlea, Swindon, Wilts.

As a phenomenon observable by the amateur, intermodulation has been observed in transmitters since ssb was first introduced. In its simplest form as it occurs in an ssb transmitter under two-tone modulation, it is fairly easy to understand, and reference to Fig 1 will make the picture clear. Here we have an amplifier in which the input consists of two frequencies, which for the sake of convenience are between a few hundreds of hertz and a few tens of kilohertz in separation. The effect of non-linearity in the amplifier is to produce at the output of the stage a series of harmonics of the input frequencies—so, for example, if the input frequencies were 7,000 and 7,001kHz, the output would have components at 14,000, 14,002, 21,000, 21,003, 28,000, 28,004 and so on. Were these all the output components, the problem would be simple, for the unwanted components would be removed by simple filtering. Unfortunately, however, this is not the case, because devices which will produce harmonics will also act as mixers.

The result of this is that the various harmonics mix with each other to produce a number of spurious outputs, which are known as intermodulation products. For example, the second harmonic of 7,001kHz is 14,002kHz, and this mixes with the fundamental of 7,000kHz to produce an output component of 7,003kHz. Similarly, the second harmonic of 7,000kHz is 14,000kHz, and this mixes with the 7,001kHz to produce 6,999kHz. Note that these spurious outputs are very close to the wanted output frequency, and therefore cannot be removed by filtering. In a similar manner, combinations of $3 \times 7{,}001$ minus 2×7000 produce an output on 7,003kHz. Generalizing, then, if we have two signals on frequencies f_1 and f_2, the output intermodulation products will be on frequencies given by the equations mf_1-nf_2 and mf_2-nf_1, where m and n are integers; for example, products of $2f_1-f_2$ and $2f_2-f_1$ are typical examples. Where the sum of m and n is even, the resulting products are considerably removed in frequency from the fundamental input frequency, and are thus fairly easily filtered. These products are referred to as even-order products, and may generally be ignored in practice.

However, where the sum of m and n is odd, inspection shows that a series of outputs is produced which is closely grouped around the wanted output frequency. The spacing between the signals (often referred to as imps, intermodulation products, or just as ips) is the same as the spacing of the two fundamental signals, and the lower the sum of the values of m and n, or order of the ip, the closer those products are to the fundamental. It is ips of this sort which are so objectionable to other spectrum users, and lead to complaints of splatter or broad transmissions. Interestingly, the level at which ips begin to become audible in terms of distortion of the received signal is considerably higher than that at which severe annoyance is caused to the occupants of the adjacent channel. While with speech transmission, statistical effects allow a much worse ip level to be used than would at first be expected from a study of adjacent channel power.

It is at this stage that the reader may well be wondering about the significance of this parameter, normally associated with transmitters, in the context of receivers. Also, the purist may well be complaining that the above explanation of intermodulation is incorrect—after all, if the ips are caused by the mixing of harmonics, why can they not be trapped out? The answer to the latter question is, of course, that a simplified explanation of the mechanism has been given, which fits the observed phenomena reasonably well; but without a rigorous mathematical analysis, the distinction in mechanisms is neither easily explicable nor particularly useful. Nevertheless, it should be noted that the mixing of harmonic components actually appears within the device, and the individual currents involved at the various frequencies are not available to allow filtering to take place.

If we now consider the simple case of a receiver tuned to a weak signal on 7,010kHz, with strong signals being present at the input of the receiver on

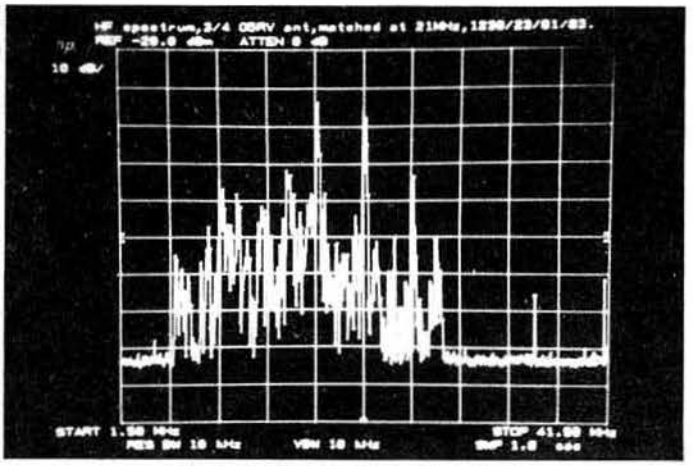


Fig 1. The hf spectrum, 1·5 to 40MHz

7,020 and 7,030kHz, the effects of third-order intermodulation will produce an ip on 7,010kHz—which is the frequency of the weak signal which the receiver is trying to receive. It is at this point that the applicability of intermodulation to the receiver is apparent. However, the simplistic approach of considering two signals, while conveying very well the basis of the problem, does not begin to address the real world in which the hapless hf receiver has to operate.

White light is made up of all the frequencies in the optical spectrum, and the radio frequency spectrum—if looked at over a wide enough bandwidth —similarly appears to be full of noise. If we were to include random amplitude and phase enough discrete frequencies, we would produce a signal indistinguishable from white noise, and even the addition of the signals in part of the hf band produces an approximation to noise. The receiver, by virtue of its selectivity, is able to sort out the desired signal from the noise, in the same way that red glass in the traffic light filters the red light out from the white light generated in the bulb.

However, if the linearity of the front-end of the receiver is such that intermodulation can occur, then the vast numbers of intermodulation products which can be produced from a number of signals produces an output closely akin to noise. The more mathematically inclined may wish to list the output ips from three input signals up to the seventh order as an exercise in the possible problems. So the front end of a completely wideband receiver is quite likely to be heavily overloaded by the output from even a modest antenna, while the connection of, say, a rhombic may well lead to few signals being receivable. The use of an antenna attenuator to cure this problem has been suggested, and although this can be of assistance, the author considers this approach to be an admission of defeat; insofar as in a properly-designed receiver, such an attenuator is unnecessary unless high-power transmitters in the immediate vicinity of the receiver are a problem. Even so, it is necessary to achieve some understanding of the levels of intermodulation products and their relationship to the power being handled in order to appreciate this relationship. For cw, the requirements are much more severe; eg −94dBc/Hz at 600Hz.

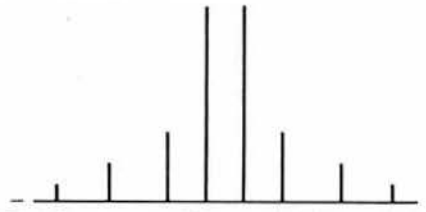


Fig 2. Two tones and intermodulation products

In a perfectly linear system, the relationship between input and output is linear; if the input power is doubled then the output power is also doubled. Obviously, some limit must exist, or we would have BC108s producing 500W, which is patently absurd. Fig 3 shows this relationship in graphical form, and it can be seen that, in practice, as the limit of output occurs, the gain of the system decreases. Where the gain has decreased by 1dB, the point reached is the "1dB gain compression point", and the system generally has reached gain compression. The actual and theoretical curves in Fig 3 show this change in performance. Note particularly that the gain compression point can be specified in terms of either input or output power at the compression point, and which is used is often a matter of "specmanship".

The level of intermodulation products in a system operating below the gain

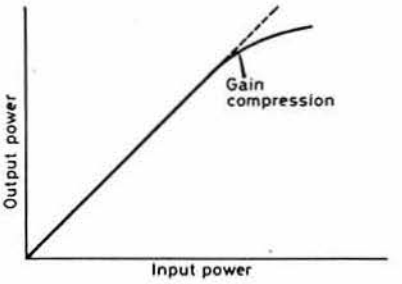


Fig 3. Gain compression and input/output characteristics

compression point is dependent upon the input power to the system, and the order of the intermodulation product. For every 1dB change in input power, the third-order ip will change by 3dB, the fifth-order by 5dB, and so on. So we can establish a family of curves as in Fig 4, where the various lines show the rate of rise in the ips with signal. Usually, for the sake of clarity, only the third-order products are shown, for these are the most troublesome.

So we can see that in the case of the 7MHz receiver discussed earlier, the addition of 1dB of attenuation in the signal path will attenuate the wanted signal by 1dB, but will attenuate the ips by 3dB, which is a net gain of 2dB when the noise floor of the receiver has been artificially raised by intermodulation effects. It is for this reason that antenna attenuators have become popular, but it is of course quite obvious that in the ideal case the attenuator would not be necessary because of the adequate intermodulation distortion capabilities of the receiver. So it is a fair argument to suggest that the inclusion of an attenuator is either an admission of defeat in design capability, or a pandering to a somewhat ill-informed whim.

A popular term used in intermodulation discussion is that of intercept point. Fig 4 shows this better than any description can; but, briefly, intercept point is the purely theoretical result obtained by extending both the input against output line and the intermodulation against output line to the point where they intercept or cross. This point is necessarily theoretical because the component under discussion would be well into gain compression long before the power of the ip was equal to the power of the fundamental: nevertheless it provides a very convenient method of determining performance. As in the case of compression point, there are two intermodulation intercept points, the input and the output intercept points, and they differ by the gain below the compression point. The usual intercept point quoted for components such as amplifiers and mixers is third intercept point, although in wideband systems, the second-order intercept point is very important. Nevertheless the adoption of a push-pull configuration is very effective in minimizing second-order intermodulation problems.

It is the second-order products which lead to the inclusion of "sub-octave" filters in hf receivers. Second-order intermodulation is of the form $f_1 + f_2$ or $f_1 - f_2$ producing the wanted signal: eg 11MHz − 4MHz = 7MHz. It can be shown by a simple arithmetical exercise that if the bandwidth of a system is less than one octave, second-order intermodulation cannot occur. The approach of using a high i.f. and upconverting, and using a lowpass filter to provide image rejection has proved particularly prone to suffer in this respect, as has the use of very wideband antenna amplifiers.

Obviously, intermodulation products will only be a problem if they are above the noise floor of the system, and it is comparatively easy to show that signals which exceed the noise floor by less than two-thirds of the amount that the intercept point exceeds the noise floor will not cause trouble. It is this range of signals that is usually understood as being concerned in the meaning of dynamic range. Here an example may usefully be used.

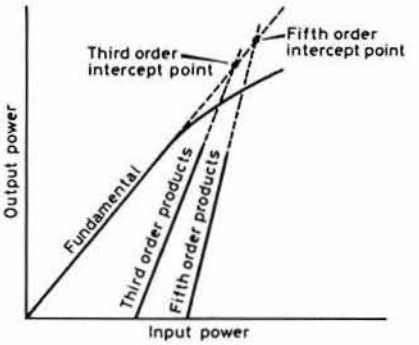


Fig 4. Intercept point

A receiver has a 20dB signal-to-noise ratio for a 1μV input. Two signals each at 1mV produce a 1μV intermodulation product. It is usual to express intercept points in "dBm" (decibels relative to 1mW in 50Ω). This nomenclature has some advantages insofar as for those not accustomed to working in decibels, the conversions can prove somewhat easier: in addition, certain system calculations are eased. 1μV in 50Ω is −107dBm, so the receiver in our example has a noise floor 20dB below the signal, or at −127dBm. We also know that two signals at 1mV (−47dBm) produce a 60dB intermodulation ratio. Extending this figure, bearing in mind the rules outlined above, leads us to say that at −37dBm the intermodulation ratio (imr) will be 40dB: at −27dBm input it will be 20dB, and at −17dBm input the imr will be 0dB. However, the point at which the imr is 0dB is the intercept point, and we can thus say that this receiver has a third-order input intercept point of −17dBm and a noise floor of −127dBm. With this intercept point, any signals lower than −60dBm (220μV) will not produce signals above the noise floor of the receiver—see Fig 5. From this, we therefore have a dynamic range of 2/3 (−127−(−17)), or, neglecting the minus sign, 73·66dB. In other words, where signals can exist at the receiver input at a level greater than that given by noise floor (dBm) + dynamic range, intermodulation troubles can be expected to occur. This dynamic range, which recently started appearing in the specifications of amateur receivers, is correctly known as the "spurious free dynamic range", and is complicated by the fact that it is nowhere near as easy to measure as might at first be thought [2]. Note that the use of an antenna attenuator does not increase the dynamic range, but only moves the effective noise floor of the receiver.

The topic of intermodulation has been extensively covered in the literature, and [3] and [4] may well be of interest to the reader.

In summary: intermodulation can limit the effectiveness of a receiver by providing not only discrete spurious signals, but by raising the noise floor because of the products of the vast number of signals present at the input. Dynamic range in this sense is the amount by which signals must exceed the noise floor for intermodulation to be a problem.

Phase noise, reciprocal mixing and dynamic range

If dynamic range is alternatively defined as the ability of a receiver to respond to a small wanted signal in the presence of a number of large unwanted signals, other effect becomes apparent. The effect is known as reciprocal mixing, and is caused by phase noise in the local oscillator of the receiver. It has only become of much importance in the last 10 or so years, merely because the techniques used previously performed very well, and again it was the advent of the solidstate synthesized receiver with its drop in performance that has led to the importance of reciprocal mixing being recognized in professional circles.

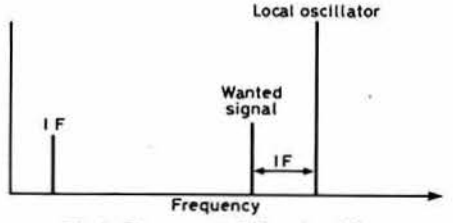


Fig 5. Clear spectral lines in mixing

Fig 5 shows the relationship in the usual superhet between the input, oscillator and intermediate frequencies, and shows how the effective "window" of the i.f. passband is tuned across the input frequency range by varying the local oscillator frequency. A large signal, offset in frequency by some amount, is rejected by the i.f. filters, and causes no problems with the weak wanted signal. In Fig 6 we see the effect of deliberately frequency-modulating the oscillator with noise, so that instead of being a spectral line, it becomes a broad "block", and is thus able to mix any signal within the block to the i.f. Obviously this is a case of *reductio ad absurdum*, for no-one would deliberately modulate the oscillator in such a way. However, the practical case is such that the oscillator is modulated with noise at some level, and in practice the situation is much more akin to that shown in Fig 7, where there is some noise modulation of the local oscillator. It is this broadening of the signal at low levels which gives rise to the problem, while the effect produced, that of noise mixing with the unwanted signal, gives rise to the name reciprocal mixing. In terms of the selectivity of the receiver, it means that the ultimate rejection of the i.f. filters can well be impaired, while the performance required to give reasonable overall receiver performance is quite high and difficult to achieve. The noise modulation produced is not a.m. noise, which, theoretically at least, is fairly readily removed, but is phase noise, or phase modulation produced by noise. There are various techniques for reducing phase noise, some of which will be mentioned later. However, some degree of quantitative measurement is required, and this will now be discussed.

The textbook introduction to noise shows us that the power produced in a resistor by the random movement of electrons is given by

$$P = kTB$$

where P is in watts, k is Boltzmann's Constant ($1{\cdot}37 \times 10^{-23}$ J/K), T is the absolute temperature, and B is measurement bandwidth in hertz.

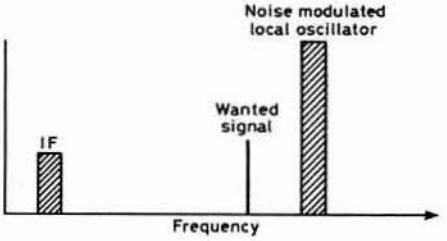


Fig 6. Noise modulation of the lo

By "plugging-in" the figures for a 1Hz bandwidth at room temperature, we obtain a figure of −174dBm as the absolute minimum limit that a noise floor can be at in a 1Hz bandwidth. In a 10Hz bandwidth this will be −164dBm, and so on *pro rata*. A perfect oscillator running at an output of 1mW (0dBm) can therefore never have a better signal-to-noise floor ratio than 174dB, and so the advantages of an oscillator running at high power become obvious. In an AR88, for example, the input to the oscillator is about 1W, and the signal-to-noise ratio with a 10 per cent efficiency is then limited to some 194dB maximum—a figure which is reduced in the practical case by the noise figure of the valve and the finite Q of the tuned circuits and other components. Nevertheless it is quite obvious that the restriction of input power to an oscillator in the interests of stability is at variance with the best phase noise performance.

The noise in an ssb bandwidth of 3kHz is some 34dB above noise in a 1Hz bandwidth, which is a convenient figure to use for comparison purposes. If the response of the i.f. filters is specified down to 60dB, then obviously the phase noise of the oscillator must be better than 60dB in the particular bandwidth if the filter is not to be effectively degraded. Translating this back to the reference 1Hz bandwidth, the oscillator phase noise limit is 94dBc, which means −94dB relative to the carrier power of the oscillator, when measured in a 1Hz bandwidth.

It is at this point that the question may well be raised "If the noise is phase noise, why is it detected in a linear detector such as the product detector in an ssb signal?" The answer to this is that the ssb signal contains phase and amplitude information; variation of the frequency of an ssb signal obviously affects the output of the receiver, and the phase noise introduced by the local oscillator chain may well be considered as fm.

To recap: the noise at a given spacing from the local oscillator (lo) signal will be at some level X decibels down on the lo signal in a given bandwidth. An unwanted signal X decibels above the wanted on-tune signal will mix the noise of the local oscillator into the i.f. bandwidth, the unwanted signal being distant in frequency by the offset from the lo frequency.

So in a receiver where some £30 has been spent on a KVG XF9B filter with a stopband of 90dB, the lo noise has got to be −90dBc in a 2·1kHz bandwidth (−123dBc in 1Hz) if the stopband is actually to be realized in practice. For this reason the claims of 120dB ultimate rejection used in the advertising for the Atlas transceivers some years ago was meaningless when viewed in terms of receiver performance. References [5] and [6] show the results of reciprocal mixing on two modern hf transceivers in a very effective manner.

It has now been shown that the capability of a receiver to do its job is likely to be limited, especially at hf, by either intermodulation or reciprocal mixing, or both. Furthermore there would not appear to be any particular virtue in producing a receiver with outstanding performance in one respect without taking necessary precautions to obtain good performance in the other.

It now remains to decide what levels of performance are required in a receiver, and under what conditions. For this exercise the receiver considered will be for the hf bands only, but exactly the same considerations can be made for a vhf receiver—and at this point the writer is prepared to stir up some controversy by saying that the vhf receiver is no more demanding in dynamic range terms in general than is the hf one.

References [6] and [7] give a very complete picture of the hf band for general coverage receivers, but some modification of these figures may well be desirable for amateur use, insofar as the antennas used are either inherently narrowband (such as quads, Yagis or dipoles) or else are used with narrowband matching networks (atus) which provide a useful limitation of the input power. Unfortunately the losses in mismatching from an off-tune dipole to the average receiver are not as high as could be hoped, so the adoption of levels of the above references are probably only excessive by about 10dB.

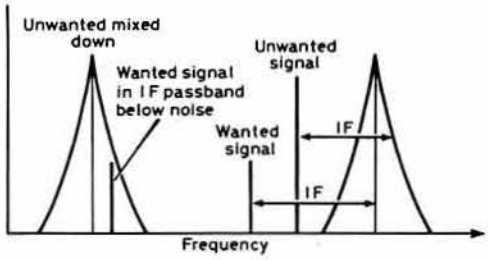


Fig 7. The practical reciprocal mixing case

Barrs [7] deals with the case in which the front-end of the receiver is restricted to a bandwidth of ±2·5 per cent, representing some 700kHz at 14MHz. Using the case of a receiver with a +24dBm input intercept point, it is shown that there will be only one or two signals as high as 100mV emf within the ±2·5 per cent band. If we assume two 100mV emf signals, there will be the following intermodulation products:

6 up to third order at 30μV emf
14 up to seventh order at 3μV emf
30 up to fifteenth order at 0·3μV emf

This is using a traffic density pattern which gives the following band occupancy:

Input level (mV)	Frequency (MHz) 12	14	16
100			
30	4	3	
10	5	5	
3	10	9	
1	20	18	
0·3	40	36	
0·1	60	60	

In this table the vertical scale represents the signal strength in millivolts emf, while the horizontal axis is scaled in frequency. The numbers in the columns represent the number of stations in the input range.

It is probably a fair assumption that the average amateur station using, say, a three-element beam at 40ft will receive fewer strong signals throughout this band. If we assume that the signals are reduced by 10dB because of the narrowband antenna arrays used by amateurs, reference to the figures published by Hart [5, 6] show that, with typical intercept points of amateur receivers being some 10dB worse than those used by Barrs [7], the numbers of intermodulation products will be approximately equal, as will the levels. In this respect, reference to Barrs again will show that the noise floor of the FT-1 will, from Hart's figures [5] be degraded, probably to about the extent that a 1μV signal will be inaudible.

A valid question at this stage is that of how do these equipments work as well as they do. The answer, as already indicated, is that the amateur receiver has the advantage of having a relatively narrowband antenna, and of being used by many operators who are incapable of deciding whether or not a failure to receive is caused by a receiver fault, QRM or a noise floor increase. In addition, many amateur operators are able to accept very marginal copy—after all, with callsign, name, QTH and report repeated three times, a fair degree of communications redundancy exists! In general it is probably fair to say that the average amateur receiver suffers quite badly from reception failure due to these causes, while the shortcomings in this respect are neither recognized nor understood.

If we assume that Barrs' results—diminished by 10dB to allow for the "amateur" factor—are used, the addition of 10dB to the intercept point will obviously cause a vast improvement in the amount of problems caused by intermodulation. In fact, the 50 signals caused by intermodulation will drop to about 20 if an intercept point of +24dBm can be achieved, and with these products spread out through a 2MHz band, the probability of interference is obviously very much reduced.

From Barrs we can also see that the noise level in a 300Hz bandwidth caused by galactic and man-made noise is about 0·25μV at 14MHz. Experience suggests that to apply a 10dB correction to this is hardly fair, as even a low antenna can easily produce a 2dB increase of receiver noise output, compared with that due to a dummy load, when it is connected. From this it is probably fair to suggest that a sensitivity of about 20 to 25dB signal-plus-noise-to-noise ratio for a 1μV input is the most that can reasonably be used—corresponding to a noise factor of about 9–12dB. Curiously enough, this noise factor seems to have been adopted commercially by receiver manufacturers: it has been stated, however, that noise figures as low as 8dB can be used where short whip antennas are in use.

Reciprocal mixing has not yet been considered. If we modify Barrs' figures by the same amount, and use Hart's figures for the FT1, we can see that the noise floor will be degraded by some 3dB because of reciprocal mixing. However, this degradation should be insufficient to cause problems purely because of the level of man-made and galactic noise, if we assume that the strong signals are separated by 300kHz or more from the tune frequency. If that does not apply, for example with spacings of only 100kHz being used, then the situation is much worse, while at 20kHz off tune, a 2mV signal would cause appreciable interference to an otherwise readable signal of 10dB signal-to-noise ratio. The increasing use of solidstate pa stages with their appreciably higher order intermodulation products, does suggest that for ssb these parameters are not so important. In the case of the FT1, the high-order products are some 20dB worse than those of the FT102 with its valve pa. Under these conditions, a station causing sufficient interference to a receiver because of reciprocal mixing would, in the event of the removal of the reciprocal mixing problem, suffer another layer of interference a few decibels down caused by the transmitter imps. In fact, the FT1 would suffer QRM because of reciprocal mixing, while the FT102 would suffer QRM from an FT1 because of transmitter intermodulation. This perhaps makes the maxim that "if I interfere with you, it's your lousy receiver, but if you interfere with me, it's your lousy transmitter" seem not quite so far fetched.

Any queries at this stage as to why the Yaesu FT1 and FT102 have been chosen for these examples may easily be answered by the fact that these transceivers have been reviewed recently, and have had the reciprocal mixing measured.

So have we decided upon the level of reciprocal mixing performance required for an advanced amateur receiver? If we assume a filter stopband of 90dB on ssb, then a noise floor of at least −125dBc is required on the local oscillator at 10kHz offset, and this will hopefully fall to about −140dBc at 100kHz (all in a 1Hz bandwidth). Another 20dB on top of this would be desirable, but would be used relatively infrequently on ssb because of transmitter deficiencies.

A valid argument may well be that the extreme skirt selectivities used in amateur receivers are not in fact particularly necessary, because the adjacent channel is unlikely to be occupied with a signal clean enough for the skirt selectivity to be used.

As an example of this, consider the case of a transmitter such as the FT102 running without speech processing at 100W output. The imps on a two-tone test in the adjacent channel 3kHz away will be around −40dB, and speech will be somewhat better because of the high-peak-to-average-power ratio leading to the average power, and thus the average imd power being less—probably about 25dB less. Under these conditions the average intermodulation power in the adjacent channel will be about −65dB relative to the transmitted channel, and thus selectivity of this order in the receiver is usable. Consider now the case of a filter offering 80dB of adjacent-channel selectivity, and it is obvious that it cannot be used to full advantage. Where the offending transmitter uses speech processing, the averaging effects no longer apply, which may well explain the apparent broadness of stations using speech processors under some conditions.

In order to obtain data on the spectral density at the input of an amateur receiver, some measurements were made. The antenna system is probably best described as a "three-quarter 5RV", at a height of 25ft at one end, falling to 16ft at the other. An atu of the W1FB "ultimate transmatch" type was used to provide matching, and the system was tuned for minimum swr on 7,050kHz on a winter's night. Twenty-two signals exceeding 250μV were noted in a by-no-means-extensive search from 7 to 7·45MHz, of which five were between 3 and 10mV, eight between 1 and 3mV and eight between 300μV and 1mV. In a receiver with an intercept point of 0dBm, these would give 20 imps of 50μV or over, 56 of 5μV or over, and another 56 of 0·5μV or over—a total of 132 spurious signals. This takes no account of the higher order (fifth and seventh) products, or the strong signals on the lf side

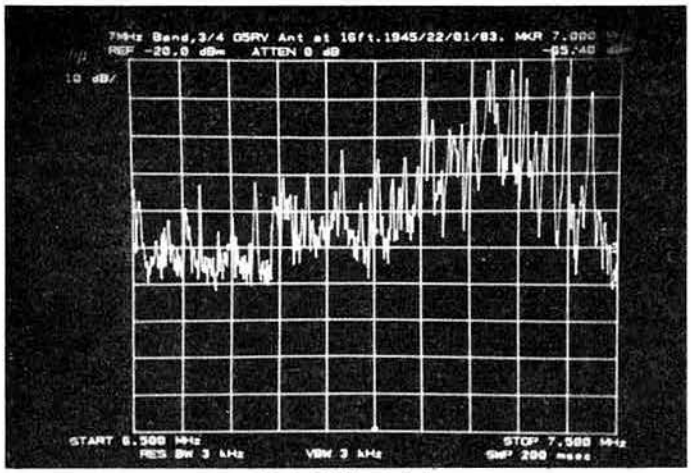


Fig 8. 7MHz at night

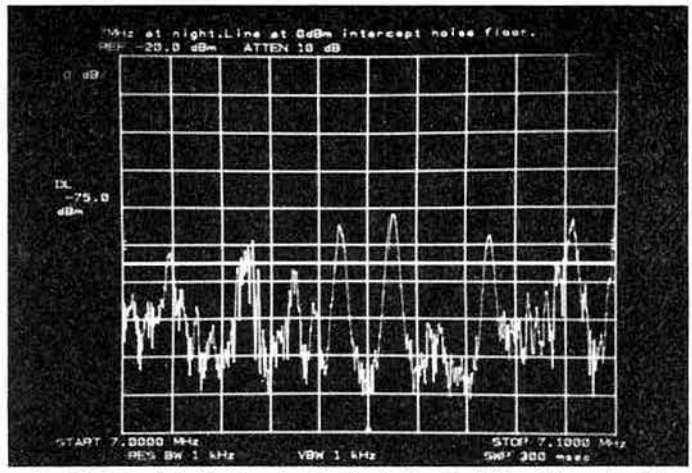


Fig 9. 7MHz at night. Line at noise level given by 0dBm intercept point

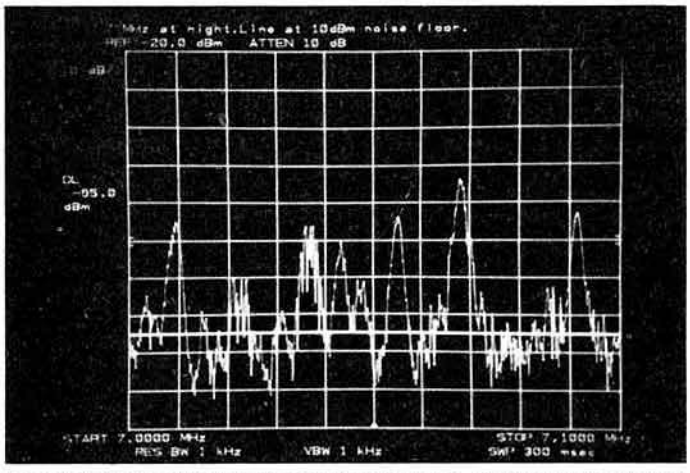


Fig 10. 7MHz at night. Line at noise level given by +10dBm intercept point

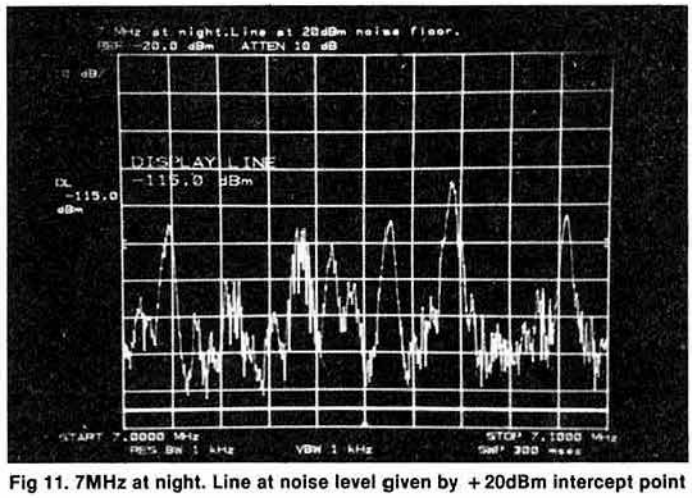


Fig 11. 7MHz at night. Line at noise level given by +20dBm intercept point

of the 7MHz band, which would get into the front-end. Improving the intercept point by 20dBm would reduce the worst-case imd by 40dB, and the resulting signals would probably be equal to the atmospheric noise level, provided that the reciprocal mixing performance was such that the lo had noise sidebands at about −110dBc in a 1Hz bandwidth as close in as possible (see Figs 8-11). In [7], Barrs refers to a paper by Gardiner and Yousif entitled "Distortion effects in switching diode modulators arising from local oscillator interference", and the conclusion is drawn that there is in fact 6dB less noise than would be expected—at least in commutative diode mixers.

Techniques for reducing the effects of intermodulation have been examined in great detail in the literature, both professional and amateur, over the last few years, but only recently has the problem of imd in crystal filters been examined openly. Claims have been made for filters having +40dBm intercept points, but the method used for evaluation is considered very dubious by a number of authorities, and figures of +25 to +30dBm for carefully-chosen filters are more common. Average filters appear to run at about +13 to +20dBm for filters such as KVG XF9B types, and similarly for the majority of the 10·7MHz radiotelephone ones. Collins mechanical filters are much worse than this according to the data sheet, although this does not specifically state the levels for signals at 5 and 10, or 10 and 20kHz removed from the centre of the passband, which is where the measurements need to be made. It has also been claimed that the removal of ferrite-cored transformers from the filter input circuitry removes the imd problem, but this suggests not only bad design, insofar as the flux density is too high, but fails to explain why ladder filters without any transformers at all are just as bad! The most convincing explanation that the author has heard is that the effect is caused by the stressing of the crystal so that Hooke's Law of deformation no longer applies, but cleanliness of crystal manufacture has a lot to do with the results. Indeed, one prominent professional manufacturer who selects filters includes the direction of signal flow, as some filters are often much better one way round than the other.

For some time, mixers have been under scrutiny, but there are a number of mixers of various types now available in a large number of varieties—diode, transistor, fet and ic—capable of giving intercept points of +20dBm or more. Here again it should be noted that gain and intercept points can be interdependent insofar as output intercepts can be quoted for mixers with gain, and input intercepts for those with loss, in order to play specmanship. In this respect: *caveat emptor*—"let the buyer beware!" Generally speaking, commutative diode mixers require an accurate wideband termination if they are to provide the best performance, and the calculations need to be done with great care if overall system performance is to be obtained. See [8, 9 and 10].

The advent of the synthesized receiver has led to the problems of reciprocal mixing becoming apparent, and this is likely to increase. Frequency synthesizers are popular for their ease of use, with the capabilities of programming, memories and so on, but pay the price in terms of reciprocal mixing. Single-loop synthesizers providing small steps by the use of a low reference frequency tend to be very poor in this respect, unless the tuning range of the vco is very restricted, because of the low loop bandwidth which is necessary. It is fair to say that single-loop phase-locked-loop synthesizers with low reference frequencies are best avoided in high-performance receivers—with the notable exception of the Racal Digiphase variety, which is not likely to be generally used in amateur equipment, and in any case has a high reference frequency.

In general the home constructor almost certainly produces a much better receiver by avoiding synthesizers completely at hf. The designs published in various magazines around the world have not yet shown phase noise performances which are good enough for an advanced amateur receiver, and considering the time and trouble involved in home-constructing a receiver, it may as well be spent in getting good performance as bad. In addition, the necessity for a synthesizer in terms of frequency accuracy, resettability, long-term stability or remote control does not exist in the vast majority of amateur stations in such a degree that two vfos will not suffice. Finally, even at today's prices, the cost of 12 quartz crystals plus a vfo and filters is likely to be cheaper than a synthesized injection system.

Summary

The importance of not only intermodulation but reciprocal mixing has been studied, with its relationship to the dynamic range of the receiver. Dynamic range has not been defined in quantitive terms except for intermodulation, and the requirements of modern amateur receivers in respect of intermodulation and reciprocal mixing have been evaluated, with reference to their likely rf environment. It is hoped that some idea of the importance of these parameters and their effects in terms of signals "not heard" has been given, and that more understanding of the parameters so carefully measured by reviewers will be gained.

References

[1] "Receiver parameters, parts 1 and 2", Peter Chadwick, G3RZP. *Practical Wireless* February and March 1981.

[2] "Intermodulation measurement techniques in mixers and amplifiers". Application Note AN1007, Plessey Semiconductors Ltd, Swindon.

[3] "Receiver dynamic range", Cornell Drentea, WB3JZO. *Ham Radio* December 1982, pp77-9.

[4] "The effects of preamplifiers on receiver performance, and a review of some currently available 144MHz preamplifiers", J. N. Gannaway, DPhil, G3YGF. *Rad Com* November 1981, pp1026-31 and December 1981, pp1120-3.

[5] "The Yaesu Musen FT ONE hf transceiver", P. J. Hart, BSc, G3SJX. *Rad Com* October 1982, pp854-8.

[6] "The Yaesu Musen FT102 hf transceiver", P. J. Hart, BSc, G3SJX. *Rad Com* January 1983, pp32-6.

[7] "A reappraisal of hf receiver selectivity", R. A. Barrs. Clerk Maxwell Commemorative Conference on Radio Receivers and Associated Systems, Leeds 1981. Published by the IERE, Gower Street, London. Conference publication No 50, ISBN 0 903748 45 2, pp213-25.

[8] "Mixers for high performance radio". Session 24 of Wescon 1981, published by Electronic Conventions Inc, 999 North Sepulveda Boulevard, El Segundo, California 90245.

[9] "Modern receiver mixers for high dynamic range", by DeMaw and Collins. Session 15 Southcon 1981. Published by Electronic Conventions Inc, California. Also in *QST* January 1981.

[10] "High performance integrated circuit mixers", P. E. Chadwick. Clerk Maxwell Commemorative Conference on Radio Receivers and Associated Systems, Leeds 1981. Published by the IERE, conference publication No 50. ISBN 0 903748 45 2. □

TECHNICAL TOPICS

(Continued from page 222)

shortage of young engineers with specialist training in analogue rf design and rf propagation. This results from students and teachers preferring the mathematical certainties of digital electronics to the more vague, but often more challenging, analogue systems—a tendency that has probably been encouraged by the higher initial salaries associated with the digital and computing side of the electronics industry.

A further problem is that fundamental rf propagation and research projects often involve time scales appreciably longer than can be fitted into normal courses. One sees very little evidence these days of much professional research in the UK into *hf* propagation, most of the work is on vhf, uhf and shf propagation. Yet, despite the increasing amount of digital technology now to be found in amateur radio stations (nineteenth-century telegraphy was essentially an early form of digital systems), the hobby is still largely dependent on analogue circuit design and the vagaries of hf and vhf propagation. Perhaps one of the contributions that the hobby can continue to make to the science and craft of radio communication is to keep alive interest in these areas.

Andrew Churchley, G4EAQ, described in *Radio Communication* February 1984 an interesting digital technique permitting the use of a home computer to work out the beam patterns from phased vertical antennas. It is perhaps worth recalling that almost 40 years ago the RCA antenna engineering team led by Dr George Brown developed an ingenious instrument they called an "antennalyzer" which, simply by setting 16 knobs with amplitude and phase information, displayed the radiation pattern of a complex vertical array on a large-screen oscilloscope. The "antennalyzer" needed a large enclosed rack several feet high, but nevertheless it formed an extremely flexible "analogue computer" that permitted rapid design of complex directional arrays with accurately-placed deep nulls as required in mf broadcast practice.

That analogue circuit design is in something of a decline at the moment is suggested by the disappearance from recent issues of the fortnightly *Electronics* magazine, one of the leading journals of the industry, of such features as "Designers' Casebook", the source of a considerable number of innovatory circuits that have appeared over past decades in *TT*. Similarly *Electronic Design* has become increasingly orientated towards data processing and computer electronics.

Radio frequency design

More and more the publishing world reflects this concentration on data and digits. "Numerous books are available at all levels for the student of digital methods, especially those methods concerned with microprocessors. There is less information available for the beginner rf engineer other than sophisticated graduate-level treatments."

The above is a quotation from the preface to *Introduction to Radio Frequency Design*, a 1982 book which George May, G4RZF, feels should be drawn to the attention of *TT* readers. There is another excellent reason for following his advice: the author is Wes Hayward, W7ZOI, of Tektronix who, apart from innumerable *QST* articles on simple hf receivers etc, is co-author (with Doug DeMaw, W1FB) of that bible for experimenters: *Solid State Basics*.

His latest book, it must be emphasized, is not intended primarily for the radio amateur, other than those with a moderate formal background in electronic engineering, but rather for students and those working professionally in the industry. Nevertheless, as he points out, "there are many serious experimenters with an interest in the subject matter". He stresses that "a central theme employed throughout the book is simplicity. I have observed that a thorough and complete analysis of a circuit using the simplest of circuit models is a pre-requisite to the level of understanding that leads to innovation."

G4RZF was much impressed by the book, and has reviewed it for his local club (Swindon and District 'Microcircuit') noting particularly four of the eight chapters: two-port networks; practical amplifiers and mixers; oscillators and frequency synthesizers; and the receiver as an rf system. I would add that the earlier chapters also include some valuable material on the design of crystal filters (including ladder filters), large signal operation of bipolar transistors, and a chapter on transmission lines including the use of the Smith Chart. His explanation of distortion in amplifiers includes the concept of intercept points; he also rightly stresses the importance of oscillator noise, often disregarded in the traditional textbooks.

So, this is *not* a book for those who enjoy and are content with building their own equipment from published designs, or who seek entirely non-mathematical explanations. But, since it escaped the net of the *Rad Com* "book review" column in 1982, I take this opportunity of endorsing G4RZF's view that it well worth the attention of the more "professional amateurs", even if it is a question of borrowing rather than buying a copy. (*Introduction to Radio Frequency Design*, W. H. Hayward. Published in the UK by Prentice/Hall International, first edition 1982, 384 + xiv pages, ISBN: 13-494021-0, £20.95).

Tips and topics

A novel form of probe for identifying faulty, in-operative components is being marketed in the USA by Metrifast. It operates by sensing very small temperature changes when held above semiconductor components, resistors etc. The "Thermoprobe" is claimed to be able to detect a temperature change of only one-fortyfifth of a degree Centigrade when the probe is held about one-sixteenth of an inch above a component. The meter on the handunit is first set to a null position representing ambient temperature. It uses a thermistor probe in a modified Wheatstone-bridge circuit.

Mike White, G4IPY, had a go at G3UUR's point about reflected "power" in transmission lines (October), but I believe he has missed the point that G3UUR was making. By definition, power represents energy actually consumed in a load; until then it is strictly speaking *energy*, but it is *real* energy sure enough! In effect, G3UUR was quibbling over the semantics and not with W2DU's basic premise. Very few of us bother to distinguish between power and energy as it does not affect matters in a practical sense. □

EPHEMERIS
Satellite news and views

*by R. O. Phillips, G4IQQ**

Satellite status reports

Oscar 10

The latitude of the satellite at apogee continues to increase (around 23°N in March) resulting in very high elevation angles for long periods of time. This has resulted in a number of operators designing and constructing simple but efficient antennas that can easily be adjusted in elevation. One example, by G4HUV, was described in the December issue of *Oscar News*. This system, which has proved to be highly successful, is based on two six-turn helical antennas spaced at 5λ/8 using 2mm copper wire and a lightweight timber frame. On QRP days G4HUV reports successful contacts with only 1W of rf to the antenna.

The AMSAT newsletter, *ASR*, reports that Mode L activity continues to increase, with over 60 stations known to be operating, including G4KGC, G3WDG and GW3XYW. Uplink capabilities range from 2W into a single Yagi to 400W into an array of 16×23-el Yagis.

The operating schedule for the satellite is as follows:

Mode B From mean anomaly 40–220 except when Mode L is operational;

Mode L Saturday and Wednesday from one hour before to one hour after apogee.

Monday is QRP day when uplink eirp should be limited to 100W.

RS

There were very good reasons for the unexplained switching sequences of RS5–RS8 referred to last month. The object was to minimize the drain on the satellite power systems during the periods of extended eclipse. To achieve this each satellite was switched on for only one or two days each week. In fact all four satellites should have resumed normal operation by the end of January, though further periods of "optimization" are expected around the end of March, end of July and mid-November when similar solar illumination conditions will exist.

UOSAT-1

The spacecraft continues to operate successfully in accordance with the schedule published in *Rad Com* November 1983, p999.

Satellite proposals

UOSAT-B

A great deal of effort continues to be devoted to the construction of the spacecraft at the University of Surrey. The nominal launch date remains 1 March 1984, riding piggy-back with the Landsat-D spacecraft. The actual launch date may change depending on a number of factors, and the latest information can be obtained from the GB2RS news bulletins or from the AMSAT-UK satellite nets. There has been some criticism about the lack of detailed information concerning the project, but the problem is that there are limited resources at the university and the first priority must be the fabrication and testing of the spacecraft. There is no question of holding up the launch to allow more time for UOSAT-B—if the spacecraft is not delivered to the launch agency for integration and test at the agreed time then it will not fly. Instead, its place will be taken by a corresponding mass of ballast. It is likely that the information will start to flow quite soon after launch and will be given rapid and wide dissemination.

Another somewhat negative series of comments has been heard recently concerning the objectives of the project and its relation to amateur radio. Indeed, similar comments were raised around the time of the launch of UOSAT-1. It is argued that the use of radio frequencies allocated to the amateur satellite service should be limited to the usual communication aspects of amateur radio; ie the use of active transponders or the necessary telemetry and command to support such satellites. No one would disagree that the payloads on both UOSAT-1 and to a lesser extent UOSAT-2 are heavily biased towards space science, and therefore may be of marginal interest to radio amateurs. The argument continues that if this is the case then why should these spacecraft not use frequencies specifically set aside for the purpose. Clearly, from the point of view of the project organizers one good reason for using amateur frequencies is the availability of suitable receiving equipment at reasonable prices.

My personal view is that it would be a great pity if projects such as UOSAT were driven to other frequencies. The potential benefit in terms of obtaining a better understanding of some of the non-communication aspects of satellites surely outweighs the periodic use of a few kilohertz of the amateur frequency allocations. In the unlikely event of a flood of these satellites turning up in the future, the subject might need to be considered in more detail.

Returning to the subject of UOSAT-B, there is some information on the payload additional to that given in *Ephemeris* November 1983. An additional experiment to investigate the occurrence of micrometeorites and space dust will be carried: a piezo-electric type of sensor will be used to measure the density of the particles. In addition to the science and education experiments, UOSAT-B will also be used to evaluate the performance of a number of projects related to navigation, attitude control and stabilization. Particular attention will be paid to ensuring that the problems encountered on UOSAT-1 with the stabilizing boom do not recur. Improved sensors to detect the position of the sun and earth horizon, as well as a new navigation magnetometer, should enable the position and attitude of the satellite to be maintained to a much higher degree of accuracy.

A 2·4GHz beacon will again be carried and be used for telemetry and experiment data transmissions. The satellite group at the university have amassed a very considerable amount of experience in spacecraft operations during the past two-and-a-half years, and assuming there are no malfunctions on UOSAT-B the commissioning phase for the new satellite should be quite short. With some luck and a lot more hard work the summer months should see the latest of a growing list of impressive achievements in amateur satellite technology.

Japanese amateur satellite JAS-1

Activity on this project is proceeding well, and the schedule leading to a February 1986 launch appears to be a viable one. The satellite, which will have a three-year design life, will be placed into a 1,500km, 50° inclined circular orbit. The proposed characteristics of the two transponders are:

A		B	
Input frequency	145MHz	Input frequency	145MHz
Output frequency	435MHz	Number of channels	4
Bandwidth	100kHz	Output frequency	435MHz
Type	Linear, inverted	Number of channels	1
Uplink eirp	100W	Type	Digital, store and forward
Transponder eirp	2W p.e.p.	Uplink eirp	100W
Beacon eirp	100mW	Transponder eirp	1W rms

Transponder A will be similar to the Mode J transponder flown on OSCAR-8, indeed that transponder was also constructed by JAMSAT. The digital transponder B will present a further opportunity to experiment with packet radio transmission techniques. Using signalling protocols based on the amateur version of the X25 system adopted by telecommunications authorities, it will be possible to load messages into the spacecraft memory, which would be relayed upon receipt of the appropriate access code. In this way it will be possible to pass messages between amateurs anywhere in the world, though in a non-real-time mode. In common with UOSAT-B, the satellite will use a cmos NSC-800 microprocessor running at 1·3MHz, to control the digital packages and to look after all housekeeping functions.

Other news

Requests have been received to provide orbital data for the operational satellites, particularly in the form of Keplerian elements. One of the problems with trying to give this information is the large amount of space required; however, I will endeavour to include the data in future issues.

An analysis has been made of the tape recordings of the 4h operation by W5LFL during the recent flight of the *STS Columbia*. A total of 290 callsigns have been positively identified, and a further 46 with incomplete information. The successful UK stations were G4UYL, G6DEF, G6EGY, GM8NXC and GW6OJK. □

*170 Shirehall Road, Hawley, Dartford, Kent DA2 7SN.

4-2-70

*by Ken Willis, G8VR**

WINTER CAME IN with a vengeance during January, and the more northerly parts of the British Isles suffered hurricane winds and snowfalls, worse, apparently, than at any other time in living memory. While this was at its height, much of the south enjoyed mild weather. With such large variations in weather over an area as small as the UK, it is not surprising that for some time conditions have not been stable enough to support good tropospheric propagation.

Not so many years ago, this would have meant a fallow winter period for the vhf/uhf bands, with amateurs tending to work on projects rather than operate on the bands, but today the introduction of so much new technology into the hobby has meant that even when tropo, auroras and Es are not there for the taking, there is still much to be accomplished. Satellites and microcomputers have already had a major effect, though one suspects that we have so far barely scratched the surface of the implications of these innovations.

As I write this, snow is falling outside, and a wind howls out of a dark grey sky, rocking the antennas. Yet, thanks to Oscar 10 and a microcomputer program which told me where to find it, I am listening to 2m ssb transmissions between Japanese and British stations using entirely vhf/uhf equipment; some of the stations are using only 10W to access the satellite. If there are problems arising from the rapid growth of the hobby in the UK, there is also a great deal which should give cause for satisfaction, not least the fact that British amateurs have pioneered so many innovations in the past on the vhf/uhf bands. There seems to be no reason why this happy state of affairs should not continue. And when this is being read, the summer "goodies" are not too far off!

Apologies

It seems that I misquoted what Keith Fisher, the Society's vhf manager, said at the agm in December on the possibility of the 50MHz band becoming available to UK operators. I quoted him as saying that the band would be open to both Class A and Class B operators since it is not a shared band like 70MHz. The licensing authority has since pointed out that no-one can make such a statement since no such understanding or agreement exists at present. What G3WSN **did** say was that it would be the **intention** of the Society to press for the band to be available to both classes of operator once it was released.

This was not the only slip-up in a gremlin-filled month.

I quoted BARTG officers from a list which almost immediately became out-of-date through new elections, and the following are current officers: the membership secretary is John Beedie, G6MOK, 161 Tudor Road, Hayes, Middx UB3 2QG; the chairman is Stuart Dodson, G3PPD, QTHR; and the editor of the *Newsletter* is Ian Wade, G3NRW, QTHR.

Apologies to all concerned, both those who were embarrassed by the slips and to readers who were misinformed.

Repeater news

The Central Scotland & Borders Group was waiting, at the time of writing, for authorization from the licensing authority for their proposed new uhf repeater GB3CA on RB13. When it goes on the air it should be the first repeater in this group to be equipped with microprocessor control. This unit, based on the 6502, will handle all functions, such as timeout, callsign, "T" generation etc. The transmitter and receiver will be Wood & Douglas units, mounted in separate die-cast boxes to reduce receiver desensitizing, with an output power of around 5W to a common antenna via a six-section cavity diplexer.

The logic for GB3CA includes a 1,750Hz tone for initial access (0·5s), followed by 4s of audio to cause the unit to latch and relay the received audio. When carrier drops, a "T" will be sent after 1s and the timer is then reset. If toneburst is not followed by audio, the repeater will close down after the input carrier drops, and the callsign will then not be transmitted. This is intended to prevent the repeater being repeatedly "blipped up". If the repeater is accessed before a "T", audio will be relayed but the timer will not be reset. If re-accessed after a "T", the timer is reset and full talk-through for 5min will be available. If this time is exceeded, the repeater will send its callsign and close down. Re-access will then not be possible until the timed-out carrier drops from the input. At its meeting in October, the Repeater Management Group reported no reaction from DTI in respect of any uhf proposals, such as this one, currently with them for decision. We are indebted to the *Central Scotland & Borders FM Group Newsletter* for the above information.

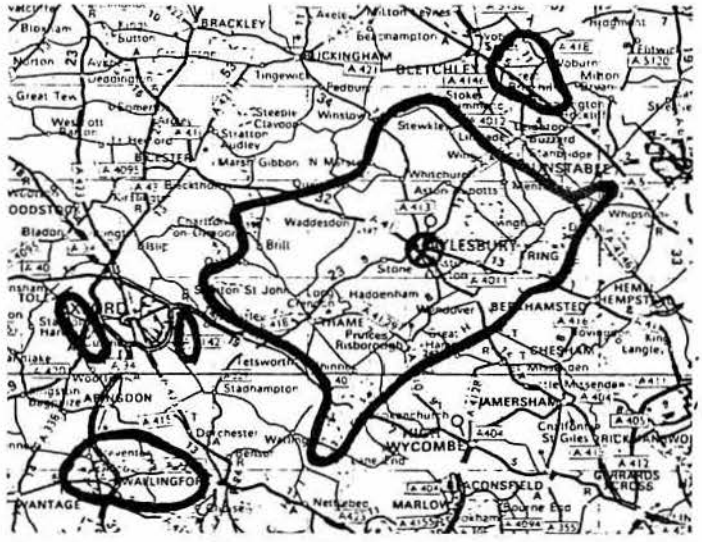


Fig. 1. Service area available to mobiles from Aylesbury uhf repeater GB3AV. Areas within heavy lines should be accessible to the repeater from a mobile transceiver at all times when it is open

David Roberts, secretary of the Aylesbury Vale Repeater Group, responded to the request for repeater coverage maps *(4-2-70* January) by sending such a map for GB3AV, the group's 70cm repeater. It is likely that many amateurs, especially those new to the hobby, may never before have seen a service-area map of a repeater, so the Aylesbury map is shown in Fig 1. With high buildings and local topography providing screening, coverage maps very much reflect local conditions. Sometimes repeaters are sited in a way to use such conditions to enhance or mask propagation in certain directions in order to achieve good coverage for mobiles in a preferred area. GB3AV is to be re-equipped shortly, when a significant improvement in coverage is expected. Another comment, aimed at the beginner, is that when abnormal tropospheric propagation exists during a "lift", the coverage map no longer provides a true indication of the range of the repeater, which may then be accessed by very distant stations. Equally, if you are on a mountain-top somewhere outside normal range, you may well be able to call up the repeater. These maps are intended to show solid 24h/day coverage, wet or fine, come hail or high-water!

The Repeater Management Group plans to hold an open meeting in the Bournemouth area in the spring. About 40 attended their open meeting at Brunel University on 21 January, where the main topic was the misuse of the London repeaters. On a show of hands, the meeting unanimously voted not to close down GB3SL since this might only invite problems on the other repeaters and on simplex channels in the London area. There were other discussions on 70 and 23cm, tv repeaters, and the re-allocation of the GB3HN (Hitchin) franchise.

Regarding the fourth London repeater GB3EL, a new group is currently looking at sites, the original group having now relinquished the franchise.

Some repeater dx of a novel kind was reported by G4RKP/G4KDL (Lowestoft). On 29/30 December several good pictures were exchanged on 70cm atv with stations in Belgium, Holland and Germany using 50W to a

*11 Old Downs, Hartley, Kent DA3 7AA.

19-element Tonna antenna. On 30 December they got into the 70/1,296 repeater DB0KO, and believe that this was the first time a G-station had accessed that repeater. The channel was not reported, and I do not have DB0KO listed; perhaps someone can throw some light on the location of this repeater.

The 70MHz auroral record

The record for an auroral contact on 70MHz has recently been the subject of controversy. In a recent letter, GM3WOJ mentioned some contacts he had on this band during an aurora on 11 August 1982 when he was in the Orkneys (YT75j). Stations worked far to the south on that occasion were G3SHK (ZK02a), G3DAH (AL56b), G8VR (AL42e) and G3TCT (ZL56d). Chris was of the opinion that this gave the record to G3SHK, and quoted a QRB of 896km. Previously, G3TCT had laid claim to the record, stating a distance of 878km (*4-2-70* November 1983).

I fed the relevant QTH locators into a micro and this produced the following results: GM3WOJ - G3SHK, 906km; GM3WOJ - G3DAH, 900km; GM3WOJ - G8VR, 881km; GM3WOJ - G3TCT, 880km.

Unless my program is incorrect, this clearly gives the record to G3SHK, and this would be expected from the positions of the QTH locators relative to YT75j.

Beacons

Chris Tran, GM3WOJ, reports that the 70MHz beacon GB3ANG (YQ35c) is still off the air due to QRM problems. It may be necessary to change the system of keying, and omit the high-speed ms portion of the message in future. GM3WOJ is very keen to have readers' views on this—does anyone make significant use of the ms speed transmission? GM8BJF is currently working on this beacon.

Following the statement in *4-2-70* January 1984, GW2HIY (Anglesey) has made a plea that GB3SUT on 70cm be left as nearly as possible in its present state when the change of mast takes place. He says that it is the only consistent signal on 432MHz in his area, and if GB3SUT ceased operating there would be times when he would not know whether his receiver was working. In his location GB3MLY is received only very sporadically, whereas a few years ago it was quite consistent. Has anything deteriorated at that site?

Further comments in January related to co-ordination of beacon activities by the VHF Committee, brought forth a very detailed and reasoned paper from John Branegan, GM4IHJ (Fife). It is too long to be reproduced here, but will be circulated to VHF Committee members. To select a few points from the paper, however, John does not favour mixing up propagation warning devices with pure beacons. He agrees that local beacons are virtually useless. For him, GB3ANG is useful only for minor equipment checks, whereas beacons such as DL0PR and GB3CTC, while equally useless to *their* locals, are of enormous interest to GM4IHJ. He also comments on warning beacons such as one from the USA which transmits such a long message—including a full postal address and request for confirmation of reception—that by the time the text reaches the "real" information, QSB has claimed it for the day. His point is, do not over-complicate vital beacons. John hopes that much other correspondence on this subject will reach either *4-2-70* or the VHF Committee, or both, and I certainly echo these sentiments.

Meteor scatter

Having read the comments in *4-2-70* October and December 1983, which stressed the difficulties in working meteor scatter on the 432MHz band, Mats Espling, SM6EAN, felt it necessary to write in order to put the record straight. His letter, incidentally, shows how important it is to refer to such topics regularly, lest they get lost in the archives.

Mats says that, as far as he is aware, the first 432MHz ms contact was established in the USA. This was in the late 'sixties, and while it may not have conformed with current ms procedures, signals were copied both ways. The next contact which Mats is aware of took place on 12 August 1977 during the Perseids, when SM2AID worked club station SK6AB (operated by SM6ETO) using speeds 1,000/550lpm. The sked took almost six hours to complete, and SK6AB copied one ping and 12 bursts. Mats comments: "Imagine going more than two hours without a single ping!" The SK6AB equipment was 1kW rf into eight 48-element antennas.

Following this, several tests were carried out without much success until, on 12 August 1980 (Perseids again), EI2VAH, operated by ON5FF, completed with SK6AB (operator this time SM6EAN) in about 4h 10min. Speeds of around 1,000lpm were used, and SK6AB received one ping and four bursts, the longest being 12s at S7. Mats has kept a tape recording of this burst. At EI2VAH, the best burst was 1s at S9. This time SK6AB used 1kW output to eight 21-element Yagis. Mats says that after details of this contact had been published in *Dubus*, an swl card from a station in UA3 was received which claimed to have heard the QSO; the team felt unable to confirm this report!

So, here is firm evidence of ms contacts on 432MHz. It is clearly not a pastime for the average 432MHz operator unless he is endowed with much patience, spare time and a high erp. SM6EAN is a regular reader of *4-2-70*, and, of course, a frequently-heard signal on 2m in the UK by tropo and aurora, as well as on ms. He is always ready to help out with skeds.

Many stations arranged skeds on 2m for the Quadrantids meteor shower, which was expected to peak on 3/4 January. During daylight hours throughout 3 January there was quite a lot of activity on both ssb and cw random channels, and by sked operators. Although the occasional contact was made, it was hard work, and there is little doubt that only sporadic meteors were around at the time. By sunset on 3 January, many operators must have thought that the shower was going to "fizzle out", but things began to improve around midnight, and the shower seemed to peak between 0001 and 0300gmt on 4 January. Reports are mixed. Some thought it very good while it lasted, others had to struggle to complete a contact. Again the random channels were busy at this time, and although reflections were sometimes quite strong, very long bursts were few and far between, though some good contacts were made. Several of the "regulars" were to be heard on 2m, including HG8CE, HG1YA, UQ2GCG, YU3FM, YU3TS, OK1SM, OK2KZR, and many others. Some contacts heard over the air serve to indicate the general spread of the event, for example: G3LTF working OH5IY; G4IJJ working SP9DSD; G4NQC working YU7PXO; and G4RGK working OK1SM.

One thing which was again proved conclusively; skeds are much more likely to produce completed contacts than calls on the random channels —where much time can be wasted only to discover after several periods of calling that the station at the other end has either given up or was not replying to you in the first place!

One station with no complaints about the shower was G4DHF (Lincs). Dave completed with EA6FB (AY), SM3COL (IW), YU7MAU (JF) and YU3PXO (JF), all through schedules. On random he worked OK3TJI (JI) receiving a 38 report.

SM6EAN thought the shower quite good, probably because he operated late on 3 January and into the early hours of next day, at the peak. He completed three 1h skeds and had two random contacts. The best were with UA3DHC (TQ) and UB5BAE (MJ). The last one ought to be workable from the UK under very good ms conditions; he has already worked several UK stations via Es, so his station appears to be good.

Gerald Peck, G4OIG (Northampton) is an ms enthusiast who appreciated the shower information published in *4-2-70* but wishes it had been available earlier. This point is certainly noted for the future. Using quite simple equipment, delivering a bare 100W to a nine-element Tonna, Gerald worked OK2SGY (IJ), I0XPS (GB), YU3TS (HF) and YU2JL (HD). During December he also operated in the Geminids, his best being I1ANP (EE) and LA1K (FX).

Since the shower the sporadic meteor rate has been low, as is to be expected at this time of year. However, cw contacts are still possible if one has the patience, and both G4IJJ and G8VR recently had complete contacts with EA6FB (AY), each taking about 90min to go through. Jose, EA6FB, has a fine station with two 16-element Yagis and, of course, represents a separate country as well as a nice rare square.

Sporadic-E

March is a little early for the onset of the Es season, but by this most of us mean the appearance of Es on the 2m band. Sporadic-E propagation can in fact be observed all the year round, as GM4IHJ has reminded us from time to time. He maintains a watch using various techniques, and reports that up to 21 January the month has been the poorest for Es that he had experienced in seven years of record-keeping. Incidentally Es reports from Ron Ham, BRS15744, who maintains a radio observatory in Storrington, Sussex, are published annually in *Radio Communication*, mainly for the months of May to August. Reference to back issues, usually around the end of each year, will provide useful references of Es events by date.

If you possess a tv set which will tune down to 49MHz, it is worth putting up a dipole and keeping watch on the eastern Europe tv channels, since good pictures often appear through Es propagation. In any case this might be a good time to dust off any particular equipment used for Es monitoring, be it a tv receiver, general coverage vhf receiver or a simple fm broadcast receiver.

I am in contact with Bill Tynan, W3XO, who writes the vhf column (*The World Above 50MHz*) for *QST*, and have suggested to him that this year

we exchange information on the dates and precise times of Es openings in Europe and the USA to see if there is any correlation between events in the two continents. There is still no adequate theory to explain the nature of sporadic-E propagation, so anything which adds to the general fund of knowledge on the subject can only be useful. In reporting Es openings this year, please try to give details of when the event started and finished at your location, together with any information on apparent movement of the active area.

Meanwhile let us hope that GM4IHJ's results for January do not mean that 1984 will be a poor year for Es on the higher frequencies.

Aurora

For those who like to keep the charts up to date, the following dates supplied by GM4IHJ may be useful. They represent days on which auroral activity was evident in Fife, with a few comments on the extent of the openings.

28 November. GM & SM heard around 1807gmt.
10 December. LA, SM and G heard at 1615gmt, followed by auroral Es at 2010gmt to TF and Arctic LA regions.
11 December. LA, SM, GM, G, GI, and PA heard at 1440gmt.
12 December. 1452gmt: Scandinavian tv on 48MHz with Au tone.
14 December. 1550gmt: Scandinavian tv followed by 2m GM signals; and auroral Es tv at 1816gmt.
30 December. 1620gmt: GB3LER plus GM and G on 2m. 2115; Auroral Es tv from Norway.
3 January. 2110gmt: auroral Es tv Norway. 2150gmt: auroral tv from Iceland.
4 January. 1854gmt: auroral tv on 48MHz.
10 January. 1758gmt: SM, DJ and OH heard on 2m.

Once again this illustrates the many days on which auroral activity occurs, albeit too weakly to penetrate too far to the south, but more activity on 70MHz might well show the band to be open on some of these occasions. It is well worth monitoring.

Awards and the "squares game"

Jack Hum, G5UM, the RSGB vhf awards manager, has provided details of some recent awards. John Matthews, G3WZT, who is no stranger to readers of this feature, has been awarded a sticker to upgrade his squares award to the 200/30 category. John submitted some exotic cards, as would be expected from someone who has reached this total of squares, but pride of place in his collection will probably be a card for a contact with CN8BA (WT-South). Among the 25 cards sent to "top-up" his claim, he included eight ms cw confirmations and six cw auroral contacts. G5UM, from his position as adjudicator of these and many other claims, repeatedly observes the part played by cw in aiding operators to get the more exotic prefixes and squares. Did you know, incidentally, that Monday night is activity night for cw on the 2m band? If you are working on the code, listening there will provide an opportunity for practice.

Another award which must not go unrecognized is that which went to G8ULU (N Kent), who gained a coveted Supreme (No 53), issued on 1 January this year. This is no mean feat for any operator, let alone one who in this case has had to do it all without the use of cw.

G8BMJ (Stoke) went straight for the 100/20 award on 144MHz, but it took him more than three years to collect the necessary cards to support his claim. G6DOX (Carlisle) who was awarded a 40/10 certificate, also on 2m, has actually worked nearly 70 squares, and he bemoans the slow return-rate of QSL cards. G3PBV (South Devon) claimed a 70/15 sticker for his 432MHz operation, while on 70MHz, G3JEQ collected a 20/4 certificate by submitting cards which included 16 cw contacts, nine of them via the auroral mode. GM8DPV, who was previously in Cornwall, was able to collect enough cards from that location to claim a 30/6 certificate on 432MHz. He finds the Cairngorm Mountains a barrier from his GM location, and has not yet worked his own square on 70cm! On 2m, auroras and Oscar 10 make life bearable. Sometimes I wish that AL square was half as peaceful!

On this subject of squares, we shall probably be changing over from "squares" to "grids" within the next 12 months or so, if the system obtains the blessing of the IARU at the forthcoming conference. The Americans have already adopted this so-called "Maidenhead" system, and it is apparently working wonders for vhf activity there. We, of course, have played the "squares game" for years, and this, coupled with the particular nature of the UK Class B licence, has meant that we have never suffered a lack of activity on our vhf/uhf bands. I hope to mention the USA "grids" award next month, following some correspondence with John Lindholm, W1XX, the ARRL communications manager.

Meanwhile, have you ever given a thought to our particular geography in the British Isles, and what it means in terms of available squares? With the North Sea to the east and the Atlantic Ocean to the west, plus seas around our northern shores, this expanse of water takes away from us a large number of potentially workable squares. Compare a location in ZL with one in, say, LL. Although the terrain in some parts of Europe may be against all-round vhf working, to be totally surrounded by land-based squares must be a substantial help in increasing personal totals. Anyone who has worked 70 squares in the UK would, with the same equipment, probably be up to a 100+ total if located in mid-Europe, and obviously the further west one goes in these islands, the greater the problem.

For those who like parchments to adorn the shack walls, here is news of a Dutch award, communicated via G5UM by PA0BN, who is the awards manager for the Dutch national society. The PACC-VHF parchment is available to all who can show proof of contacts with 100 different Netherlands stations on 2m. The 70cm version is known as the PACC-UHF, and stickers are available to upgrade the award to 900 different Dutch stations worked, after which there is a sort of "Supreme" award for those who have worked 1,000 or more different Dutch stations on a given vhf/uhf band. The VHF-6 is awarded to stations who have worked six countries on 144MHz, together with a UHF-6 for the 432MHz band. Stickers for these go to 50 countries on 144 and 30 countries on 432MHz. There are currently 13,000 licensed amateurs in Holland. Claims should go to PA0BN, Keerweer 13, 6862 CD Oosterbeek, Holland. When cards are sent, ircs for their return should be included.

Expedition plans

The Derbyshire Hills Contest Group have dropped their plans for an expedition this year, but the good news is that instead they are to combine with a group of operators from all over the country to go to WL square where they are certain to be in great demand. Tentative plans are for them to go between 4 and 18 August, and operation is likely to be on 70, 144, 432, 1,296 and 2,320MHz, with the possibility also of some 10GHz wideband fm. The team is receiving much help in their arrangements from our good friend EI2CA. More news will be published nearer the date of departure, but European readers needing a sked on ms with WL square would do well to note a few callsigns. So far G8TFI, G6CHL, G6ABU, G8NPM and G8ROU have "signed up", though being all Class B calls they will need to be represented on the vhf net by someone tough enough to stand up to an onslaught of S9 plus signals when WL square is mentioned! A glance at the squares map will show how very little land exists in that square, so this is a chance not to be missed. The expedition coincides with the Perseids, which will please the ms addicts.

VHF Convention

The RSGB VHF convention will be held at Sandown Park on Saturday 24 March 1984; details were published in last month's *Radio Communication*. It promises to be a good event, and I hope to meet as many readers as possible on this occasion.

From here and there

More suggestions have been received for a new name for the column. One is simply to call it *VHF-UHF* which certainly has the merit of brevity, and is not a bad distinction between its coverage and that of *Microwaves*. Another suggestion is *The Middle Ground* with a sub-title "A review of affairs on 6-4-2-70". Andre Marcay, F2MA, writing from Athis Mons (which according to my atlas lies south of Paris), suggests *Mini Waves* since we already use the terms "Long, medium, short and micro". Andre always reads *4-2-70*, and with his friend F8SQ frequently goes portable or /A from a site in BK square where he is on the look-out for British stations.

Another case of a pirated callsign, this time that of G3DCC, whose call is being used illegally by someone on 2m calling himself "G3 Double Cotton Chips"! He appears on the London repeaters, whereas the real G3DCC (Sidcup, Kent) never uses these "machines" and is seldom QRV on fm. Write to G3DCC, QTHR, if you can be of any assistance.

Good quality black-and-white photographs of vhf/uhf operators and their equipment or other subjects of general information are always welcome for publication in *4-2-70*. Unless contrast is particularly marked, colour prints do no reproduce too well. Why not show us your face and station?

SM6EAN, who has a superb vhf location near the sea, suffered the penalty of an exposed site when his antennas were damaged in the worst storm recorded there since 1969. It will be spring before necessary repairs can be effected. □

SWL News

*by Bob Treacher, BRS 32525**

VHF contests

With the vhf contest season getting under way early in March it is time to try and tempt a greater number of listeners than usual away from the hf bands to take advantage of these contests. In the past vhf contests have for me been that much more difficult due to the larger amount of information which is required in order to claim points. On hf all that is needed in most cases is callsign, report and serial number, and callsign of station worked. On vhf all these are needed, plus a QTH locator and QTH. This year the requirement to send the QTH is to be dropped in some contests, which should make bigger scores easier to come by for transmitter and listener alike. The "1 in 20" rule has been amended to "1 in 10", meaning that G1XYZ should not appear in the station worked column more than once in every 10 QSOs logged. This should encourage greater participation from listeners outside of the London area, which is heavily populated by fixed and portable stations in any major contest. Scoring will still be by the radial ring system on 144MHz. Certificates are now to be awarded in all contests where swl sections exist. The number to be awarded will depend on the number of entrants. Listeners therefore now have a much better package to encourage their greater participation in the vhf contests run by the Society. Added to these new measures the swl who scores most points in all contests during the vhf contest year will win the Hanson Trophy.

As the vhf table proved to be quite popular in 1983 it will be run again in 1984. Contests are a surefire way of adding the rarer QTH squares to your totals. Yet another reason for participating this year.

Tips for vhf contests? The main thing is to be aware of the barometric pressure before and during the contest. If it is "high" there is more chance of some good European dx being heard, in which case quickly beam to the Continent. During June and July, be aware of the likelihood of a sporadic-E opening. If facilities for monitoring Band 1 tv or Band 2 vhf broadcast stations exist you will quickly know whether an Es opening is likely. Being aware of band conditions can certainly make a tremendous difference to a score. A few good tropo loggings from northern Spain, or several Italians via Es, can make all the difference to an otherwise mediocre score. Another tip is not to keep the Yagi in the same direction for long periods, as good dx to the north might be possible even if the band is open to DL. Remember from the London area loggings into Yorkshire can count 13 points. It is also handy to keep a QTH locator map by your side. This will help you position the Yagi to get maximum signal strength. For example a French station in YI square will not be particularly good copy if you are beaming at another Frenchman in BI square. The following are the contests with swl sections for 1984. Make sure your logs are despatched within two weeks of the contest:

3-4 March — 144/432MHz
19-20 May — 144MHz
3 June — 70MHz
10 June — 432MHz
7-8 July — VHF NFD
4 August — 432MHz Low Power
5 August — 144MHz Low Power
1-2 September — 144MHz
16 September — 70MHz

If any readers have any queries as a result of this brief piece on vhf contests G3XDY (QTHR) or myself will be happy to provide further information on receipt of an sae.

An ear to the bands

Plenty of reports coincide with the Christmas holiday. The second VU7WCY expedition certainly made amends for the poor signal of the first expedition, being exceptionally good copy on both 7 and 3·5MHz. BRSs 25429, 48909, 62088, 50134 and 45992/7Q7 all mentioned logging their signals on at least one band. 1·8MHz had livened up to produce VP2VI, KV4FZ, UK6VAF, CT1AOZ, TF3JX, numerous Ws and VEs, together with ZB2EO, a rarity on phone. On cw Brad, BRS1066, copied VK6HD(2125) for a new country, together with JX5DW and TF3XUU. The VK provided Brad with a VK on all nine bands. LZ1KDP managed a string of Ws at around 0100 on 12 January, with Brad copying all of them. 3·8MHz "grey-line" propagation had not been too good. A couple of W6s had been heard in the noise, VE3BVD/DU6(1605) and a few ZLs and JAs provided only run-of-the-mill dx. Conditions on 14/15 January were favourable on the lower frequency bands, with JAs heard at good strength around 2100 on both evenings on 3·5MHz. YB0WR and YC0VM had also been on 3·5MHz regularly at virtually any time between 1750 and 2330. FB8WK, KC6IN, ZK1CG and 9Q5JE had also been copied. On 7MHz, the ZL2AAG net continued to provide good Pacific dx. ZL8AFH (Kermadec Is), FW8AF, ZK2RS, KX6OI, JD1BBG (Ogasawara Is), C21RK, KD7P/KH2 and 3D2DM were all reported between 0715 to 0815 during early January. Later in the day signals were still copied from FB8WJ, while 3X4EX was also active.

On the hf bands, KE4UX/KH9 became AH9AB. 28MHz was very poor, while 14 and 21MHz were closing remarkably early, which benefited only those who were able to grace the shack during the day. Little of real note was reported—however, Andy Smith, BRS50134, caught TJ1AF and A22ME on 21MHz, and F6GUK/FB8W and KG6JHH on 14MHz. Ian le Page, BRS40292, reported again after a long absence due to renovation of a new QTH. He fared quite well on the higher bands in view of his temporary antenna system—a 6ft vertical car antenna! He heard 7P8CL on 28MHz, P29NSF, ZD7BW and 9L1JW on 21MHz, while VP8AEN (Antarctica) was heard on 14MHz. John Goodrick, BRS44395, did copy cw from FR7AI/T on 21MHz for a new one. An interesting letter from Robert Small, BRS8841, which just beat the deadline, enthuses over lower frequency conditions which have been mentioned above. He too felt that 100 countries were possible on 3·5MHz, having heard 70 by 14 January. On 7MHz Robert copied signals from AZ5ZA on South Orkneys, although nothing exotic was reported on the hf bands except HC1SK/8 and TZ6FIC on 21MHz, and KA4JRY/DV9 and FG0MV/FS7 on 14MHz.

HF challenge results

It seems that the idea of a challenge that coincided with a major hf contest was a pretty good one. Comments received certainly gave that impression, so much so that it will be repeated for the CQ WW Contests this year. The

1983 HF Countries List
Final table
(Band leaders in bold type)

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS8841	149	221	231	155	134	44	934	ssb/cw
BRS52543	149	203	206	145	143	51	897	ssb
BRS48909	151	206	217	147	127	48	896	ssb
BRS25429	153	198	189	143	147	61	881	ssb
BRS50134	146	192	180	130	119	48	815	ssb
BRS44703	113	164	178	113	120	43	731	ssb
BRS25901	112	171	189	110	101	36	719	ssb/cw
BRS44395	124	184	165	125	77	40	715	cw
ARS53844	127	180	164	108	93	39	711	ssb
ORS45992/7Q7	134	189	201	73	63	10	670	ssb
RS49327	117	147	180	83	72	22	621	ssb/cw
BRS1066	89	148	139	109	72	54	611	cw
RS49875	101	145	175	72	62	14	569	ssb/cw
ORS46084/7Q7	103	161	147	62	20	0	493	ssb
BRS18529	21	65	85	75	106	19	431	ssb
BRS42979	45	66	87	48	65	23	334	ssb,rtty,sstv
EI835	22	53	100	25	23	3	226	ssb
BRS62088	16	29	47	52	53	10	207	ssb
BRS40292	22	50	49	41	34	5	201	ssb
Average score for 1983	100	146	154	96	86	30	612	

All-Time Countries List
Entry score 750

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS25429	278	311	334	250	229	82	1484	ssb
BRS32525	267	304	317	253	253	72	1466	ssb
BRS25901	256	291	325	201	227	31	1331	ssb
BRS8841	253	289	313	215	197	49	1316	ssb/cw
BRS48909	213	249	260	181	144	52	1099	ssb
BRS1066	192	208	264	164	106	69	1003	ssb/cw
BRS44703	191	211	216	152	145	48	963	ssb
BRS18529	155	203	263	173	121	45	960	ssb
BRS50134	174	209	229	138	134	50	934	ssb
BRS52543	149	203	206	145	143	51	897	ssb
ORS45992/7Q7	205	245	254	99	79	10	897	ssb
BRS44395	154	212	223	134	77	52	852	cw
ORS46084/7Q7	188	228	234	104	43	1	798	ssb
Average	206	227	264	170	146	47	1060	

1983 UHF/VHF Squares/Countries Table
FINAL PLACINGS

Station	QTH Loc	70MHz Square	70MHz Countries	144MHz Square	144MHz Countries	432MHz Square	432MHz Countries	Total	Via*
BRS32525	AL	—	—	107	26	27	10	170	abd
BRS52543	YN	21	6	73	20	14	5	139	abcd
BRS25429	ZN	—	—	112	25	—	—	137	ab
RS49875	YN	—	—	51	17	20	11	99	ad
BRS50134	YJ	—	—	83	16	—	—	99	ab
RS49327	YN	—	—	49	17	20	10	96	ad
BRS62088	AL	—	—	49	15	11	5	80	ab
ARS53844	YN		—	29	11	11	4	55	a

a = tropo, b = Es, c = AR, d = MS

*79 Granby Road, Eltham, London SE9 1EH.

HF CHALLENGE

SSB MULTI-BAND

Posn	Station	28 Pts	28 DXCC	21 Pts	21 DXCC	14 Pts	14 DXCC	7 Pts	7 DXCC	3·5 Pts	3·5 DXCC	1·8 Pts	1·8 DXCC	Total points
1	ONL383	242	105	264	116	256	112	252	76	148	53	233	45	707,265
2	BRS52543	191	85	178	84	179	87	195	63	159	57	210	42	464,816
3	G-10173	161	73	149	73	167	79	136	47	118	44	160	37	314,523
4	ARS53844	136	64	139	67	99	55	129	48	122	49	164	36	251,691
5	ONL6966	114	56	129	67	102	51	174	54	106	41	148	33	233,446
6	BRS8841	109	47	156	70	79	41	104	31	107	38	139	30	178,358
7	ONL620	99	47	140	72	97	53	91	32	80	34	—	—	120,666
8	BRS44395	109	49	140	69	76	44	45	21	36	18	70	21	105,672
9	NL4483	69	38	51	45	54	51	53	23	98	39	85	19	88,560
10	BRS84908	83	43	50	26	131	65	28	14	61	29	—	—	62,481
11	ZL1-287	31	15	49	23	164	64	52	22	41	19	—	—	48,191
12	OE1-109976	63	35	57	35	69	43	40	16	34	14	—	—	37,609
13	BRS20249	3	1	20	10	5	3	38	16	32	16	61	18	10,176

SSB SINGLE-BAND

Posn	Station	28 Pts	28 DXCC	21 Pts	21 DXCC	14 Pts	14 DXCC	7 Pts	7 DXCC	3·5 Pts	3·5 DXCC	1·8 Pts	1·8 DXCC	Total points
1	E. Carling	295	127	—		—		—		—		—		37,465
2	ONL6945	—		151	71	—		—		—		—		10,721
3	LA-M-8507	—		—		162	82	—		—		—		13,284
4	BRS52422	—		—		—		149	54	—		—		8,046
5	BRS25429	—		—		—		—		—		249	48	11,952
6	BRS32525	—		—		—		—		—		203	42	8,526
	Countries heard during challenge	137		140		149		98		81		56		

CW MULTI-BAND

Posn	Station	28 Pts	28 DXCC	21 Pts	21 DXCC	14 Pts	14 DXCC	7 Pts	7 DXCC	3·5 Pts	3·5 DXCC	1·8 Pts	1·8 DXCC	Total points
1	BRS44395	95	43	115	57	90	46	144	48	70	29	48	16	134,318
2	BRS8841	17	7	93	44	50	26	210	54	91	35	90	23	104,139
3	NL-4483	13	7	45	21	28	20	52	22	57	24	30	10	23,400

CW SINGLE-BAND

Posn	Station	28 Pts	28 DXCC	21 Pts	21 DXCC	14 Pts	14 DXCC	7 Pts	7 DXCC	3·5 Pts	3·5 DXCC	1·8 Pts	1·8 DXCC	Total points
1	ONL383	—		—		129	63	—		—		—		8,127

ssb leg produced 13 multi-band and six single-band entries. Some very good scores were gained, in particular by the winner, Jean-Jacques Yerganian, ONL-383, whose score of 707,265 represented nearly 48h of determined effort.

Conditions were quite favourable, and most participants found a few new countries to add to their 1983 and all-time scores. Saturday provided the best openings, as conditions on the Sunday were variable, with the Europeans being particularly strong. 1·8MHz offered some particularly tasty morsels such as JY8RF, VK6HD, HZ1AB, PJ7A, and 5N8ARY, together with 9Y4W and rarer European countries OH0BH, 4U1ITU, DL6EAZ/HB0 and Y22TO. The dx log from Colin Thomson, ZL1-287, a Society member in New Zealand, showed what Pacific dx was active during the event—in particular VK9NS, C21RK, VK2LHI (Lord Howe Is) and DU1CPL on 7MHz. YJ8RG, KL7IRT, VK9NS, C21RK, T2YKC, ZK1CG and VK2LHI were on 3·5MHz.

Dave Shapiro, ARS53844, remarked that the challenge represented 14 new countries on 28MHz and 13 on 1·8MHz. John Goodrick, BRS44395, proclaimed that "it was a madhouse, but I'm glad I took part, and enjoyed it". Robin Kirkhus, LA-M-8507, was actually LA9PCA in disguise. His reason for entering was to gain experience on 14MHz in readiness for the CQ WW cw leg which he was to enter as a QRP station. He found the challenge most rewarding, and hoped that the exercise would benefit him in the contest.

The cw leg produced four entries, and the entrants were grateful for the opportunity to practise their cw reception competitively. It seems that conditions were not as good as for the ssb weekend, reception being hard work on 28MHz. Robert Small, BRS8841, found some interesting dx on 7MHz—KG4CD, TI2CF, VP2KAA, VP2EEW, HZ1AB, 9Y4VU, HH2VP and PJ7A during the first 3h, A4XJP, TO7GAS(FG7), VU83AJ, 5H3WCY and V3A at other times. 5N8ARY and 4X4NJ were the only dx stations logged on 1·8MHz. John Goodrick, BRS44395, added eight countries to his 1983 table score on his way to overall victory.

All in all the number of entries received, the favourable comments and the effort put in by all entrants has resulted in another hf challenge for 1984 being organized to again coincide with the CQ WW Contests. Finally, prizes have been awarded to ONL-383 (first place and leading overseas ssb entrant), BRS52543 (second place, top British entrant, and best entry from a newcomer on ssb). Special mention must also be made of the first class single-band ssb entries submitted by Eric Carling (28MHz) and David Whitaker (1·8MHz). On cw BRS44395 gets a prize for first place.

QSL competition results

SWL reports of all shapes and sizes were received for judging in the "best swl report" competition—a satisfying response. The judges were two well-known dx operators—G3XTT and G3ZAY—who both had sufficient knowledge and expertise in handling QSL cards to easily qualify for the job. Both have QSL manager responsibilities and have received their share of swl reports from around the world, giving them their own independent views on what constitutes a good swl report. Their winner was Kevin Cooke, BRS45466, whose report was considered to be clear, concise and easy to read, with interesting observations contained on the back of the card away from the basic essential details such as time, frequency and signal strength. The entry sent by Robert Small, BRS8841, was commended. Although a QSL of standard format, his report was considered of value because it reported a QSO between JA1BWA and DF3NZ/ST2 on 40m ssb. It was felt that the recipient would have found it of use to know that his signals were also being received well in western Europe.

In view of the number of amateurs who have sent me copies of Nick Bainbridge, BRS32388's, graph report form with comments to suggest that it was the best swl report seen, it is worth noting our judges' view. While commending Nick on the time and effort spent on preparing the report, they felt that the graph itself did not convey any additional information to that which could be conveyed on any standard QSL card. The judges commented that a presentation in graph form would be more appropriate for several reports spaced over a longer period of time in order to show daily or seasonal variations. It was also felt that reports to fellow G stations on the lower bands reporting 59 signals were of little value. The size of the report form (on foolscap graph paper) would not be the easiest to handle, especially by QSL managers who are anxious to see at a glance the information needed in order to confirm a report, or by managers of the many worldwide QSL bureaux. However, Nick certainly boasts a very high QSL return rate and it is clear that those stations who have received reports from him have been very impressed with them. Our judges certainly enjoyed their task and by way of constructive comment G3XTT offers the following guidelines.

Think about who you are sending the card to. If it is to a QRP amateur in darkest Africa your report may well be the first swl report he has received from G and he will be happy to reply almost regardless of the information your report contains. If it is to a well-known station with a reputation for having a big signal, then the report is likely to be of little or no interest to him. So do something which encourages him to reply rather than consign it to the waste paper basket. A note expressing an interest in knowing more about himself and his station perhaps. If the report is to a dxpedition, forget the long messages, etc. The expedition's manager probably has a pile of several thousand cards to deal with and will not have time to read the messages. In principle he will not object to sending you a card. After all, the whole point of the expedition was to put a rare country on the air for enthusiasts everywhere, whether licensed or not. Far more important in this case is to make it easy (and therefore fast) for him to deal with your card. Make sure the date, time, waveband, and station worked are all clearly and accurately marked on the card, and enclose not only ircs but a self-addressed envelope of sensible size.

If the report is to a non-expedition multi-operator contest station, your report is unlikely to be of any interest. The group probably went their separate ways when the contest was over and there is no money in the kitty to get cards printed.

If you want a direct reply, include not only a self-addressed envelope, but also sufficient return postage. An active dx station may receive several thousand cards a year, and even replying via the bureau, the cost could run into hundreds of pounds a year for cards and postage.

There is a view that swl cards should be "useful". But put yourself in the mind of the recipient and ask why and how? If he is an active operator he should know how well he gets out on any given band without your assistance. Telling W that you heard him working JA is all very well, but he is probably well aware of that unwanted sidelobe on his home-made beam. If you heard him trying out a new rig or antenna, then that might justify a report. Generally though, you will have sent the card not for his benefit but for yours, because you want one in reply. So make it easy for him to reply, and perhaps encourage him by showing some interest in him or his station etc. This is a different ploy to making the report "useful" and it can bring results.

There seems to be a view among the more "experienced" swls that the more information that appears on a report the better. Thus they produce elaborate graphs of "signal strength" (how many swls have the facilities to measure signal strength in absolute terms, ie V/m at the antenna. Any S-meter reading is meaningless, except perhaps as a relative signal strength compared with someone else heard from the same area of the world on the same band at the same time), or they give weather information which, at vhf, shows a meaningful correlation with propagation, but at hf is totally irrelevant. There may be scope for doing something above and beyond the obvious but beware of offering the superfluous. One thought that comes to mind is that the availability of personal computers makes the calculation of propagation data a practicable proposition. Why not wait for a few days until you can find out what the sunspot number was at the time you heard the station in question, and then calculate the muf and luf for the path between your QTH at the time you heard him. If you heard him on 40 or 80 on a grey line path, then tell him so. Learn a little about propagation as you determine why you heard him when you did, and maybe you can teach him a thing or two in the process.

144MHz topics

A first-time welcome to E. S. Smith, RS50718, who likes listening to the vhf and uhf amateur bands. Dave Whitaker, BRS25429, had plans for adding 432MHz gear to his already crowded shack, and hoped to find room on his mast for yet another beam. Even in the depths of winter we had some decent openings—YU3ZV gave Martin Parry, BRS52543, his first ms logging on 14 December, while good tropo produced stations on the near Continent. Andy Smith, from his Guernsey QTH, added OZ1AFF (FP60c) and SM7WW (GP26h) on 4 December, while on 28 and 29 December EB1AW (YD42f), DK7UY(EJ53f), several DL and LX stations in DJ square and F6HVA(DI55b) were logged. An opening on 1 January provided HB9AEN/P in DG square—a good start for the new table.

Overseas news

Stan Porter, ORS45992, updated the situation in 7Q7 after a long break back home. He came back to 12in of rain in December and poor radio conditions. QRN on 3·5MHz was "appalling" in early January and this had meant disappointment for Stan who was convinced the dx was there. Perhaps a Beverage beaming at Europe would help? On the WCY front, Stan had sufficient stations to claim the award. AZ5ZA had been heard on 1·8MHz and RW9A (QSL via UK9AAN) on 3·5MHz.

Here and there

Nick Bainbridge, BRS32388, sent a copy of a very rare QSL card from A7XD, now A71AD. Nick's report was so comprehensive that he now joins the elite few swls who actually have a QSL card from that station.

Colin Watson wrote from GM-land to report his 144MHz activities from XQ square during November "lift" conditions. Many repeaters could be copied in the fm portion of the band, including GB3WT and GB3MP.

Finale

Congratulations to Robert Small on his first place in the 1983 listings. There was a tremendous tussle for the first few places, but it is interesting, although to be expected, that the winning score is decreasing year by year. Perhaps 850 will win the table in 1984?

News, comments, and 1984 table scores for the May issue should reach your scribe no later than Saturday, **17 March**, with late copy by Monday **26 March**. □

RAYNET

*by G. Cluer, G4AVV**

It is my sad duty to start this column by referring to the recent death of Eric Yeomanson, G3IIR. Eric served amateur radio in many ways for a large number of years, and Raynet has a particular debt to him. He served the organization since its beginnings in 1953, both as a Raynet member and a Raynet committee member. He was chairman of the committee during a difficult period, and he was zonal representative and county controller for London until a few months before his death.

As these notes are being written, winter has come with a vengeance, and I expect that we will soon be receiving many reports of the activities of Raynet groups during the blizzards which have created havoc in the north. Among a number of reports already received was one from Humberside South Group, which was active when an oil-carrying supertanker collided with the Immingham Oil Terminal jetty.

Members are reminded that there is a net on 3,790kHz ssb from 8.30am on Sundays, and it is particularly popular on the first Sunday of each month. This net is primarily for controllers, but there is no objection to a nominated member of a group deputising for the controller if he is unable to take part. Not only is the net a means of passing up-to-the-minute information, but it also enables controllers to get to know each other, and sets the scene for a national net should one be needed in an emergency.

In the January *Raynet* column, Geoff Griffiths, the chairman of the Raynet Committee, mentioned the new scheme to keep records of Raynet members on the Society's data processor. This scheme starts on 1 May, and from that date membership applications and renewals should not be sent to Mrs Taff Crane but to RSGB headquarters via your controller.

Few groups achieve the national recognition that the South Anglia Group has through its efforts in promoting teleprinters for Raynet use, and in making some available to Raynet members. A report has been received of an exercise in which the group compared the times for relaying Radiac information to and from county to district levels by both speech and teleprinter. The results show clearly that teleprinter links provide both a more reliable and quicker service, while other advantages include printed records of the messages as sent. Teleprinters provide a service some three to eight times faster than speech—and with zero errors. Full details can be obtained from the group controller, Mike Watson, G8CPH. Buckinghamshire Raynet also reports on the advantages of rtty for large quantities of raw scientific data. Groups interested in rtty might also like to talk to G8VWN, group controller of West Kent/Medway Group, which recently held an exercise using portable teleprinters powered by petrol-powered generators.

At times one Raynet group may need to move into the area covered by another group. It would be silly to make rules saying that a group was not allowed to operate outside its own territorial limits, but the Raynet Committee suggests that it would be courteous, should this happen, for the group controller to inform the controller of the "resident" group at an early stage.

I have in front of me a large number of reports of sophisticated exercises which have been run by dozens of groups; many involve county-wide operation and multiple group liaison, and a number are out of the ordinary. A total of 229 were reported in 1983: one group took maximum advantage of "one exercise per month", two groups had seven exercises, but 52 groups had none: 12·5 per cent of exercise slots were taken. Please continue to report anything of interest to the RSGB on the Raynet report forms, and remember that user service exercises and live emergencies must be reported. □

*12 Bingham Road, Addiscombe, Croydon CR0 7EB.

Microwaves

*by Charles Suckling, G3WDG**

2·3GHz eme news

Peter Riml, OE9PMJ, reports further success on 2·3GHz eme by the OE9XXI group. On 28 December they made their second eme QSO on this band, with LX0WCY (LX1DB). LX1WCY was running only 25W at the feed of his 30ft dish, and what is even more remarkable is that there was a 3dB polarization mismatch loss, as LX0WCY was using circular polarization (OE9XXI use linear). Both stations could copy their own echoes, and OE9XXI measured theirs' at 13dB above noise in 200Hz bandwidth. The QSO was the first-ever by any mode on 2·3GHz between Austria and Luxembourg.

Another DF0EME test was organized for 14 January. G3LTF spent the previous week building a 2·3GHz feed for his 19ft dish and a new preamp. Unfortunately he reports nil results, and it appears that bad weather on the Continent prevented operation by DF0EME.

Operating news

The series of excellent lifts towards the end of 1983 was finished off in style by a fine opening on 29 December. G4BYV spent most of his time on the "middle" bands. On 2·3GHz he increased his squares worked total to 30 by working EK, while on 3·4GHz a QSO with DL9LU (DK) brought his total to 11 squares. He was also active on 5·7GHz where he worked PA2DOL in CL square. G8PSF reports that the opening for him did not extend much further than 250–300 miles. On 1·3GHz he worked F6DZK (AI), PE1JSE (CL), ON6OO (CL), ON5PX (BK) and DL4EBB (DL). Adrian notes that F6DZK with his 8 × 23-el Tonna array and 200W was very loud! G3LTF was active on 2·3GHz during the lift, having just put his equipment back on the tower. A test signal from G3LQR was 59 + +, and GB3LES was audible in most directions (S9 at best). The DL0QQ beacon on 2,320·025 was S9, somewhat stronger than it was on 1·3GHz. Peter also heard the PA0QHN beacon, as well as G3AUS and G4BYV. He worked G4NQC for square 11 (ZL).

Microwave contests

At its January meeting, the Microwave Committee discussed the 10GHz and Microwave cumulative contests. It was felt that interest in these events was waning a little, and ways of improving interest and activity were discussed. It was decided to reduce the number of events from six to five, starting the events in May. The 10GHz contest would have effectively three sections: wideband, narrowband and both together. One of the main reasons for doing this was to remove the feelings of some wideband operators that competition with narrowband stations is unfair, but also to encourage narrowband, since this mode was used very little during the 1983 event. Awards would be made to the winner and runner-up in each section. If interest in the contest from other IARU countries increases (the RSGB is trying to sponsor this contest in Region 1), an overall table (all-mode) containing both UK and foreign stations would be prepared.

The committee was particularly disappointed that there had been no entries for 24GHz for the last two years. It was felt that since it is rather more difficult to make contacts on this band compared to the lower bands, it is not a good idea to run the 24GHz section of the Microwave Cumulative Contest on a 10GHz day, as had been the previous practice. This year, the 24GHz section will have a day to itself (in July), and it is hoped that this will result in more interest: 2·3, 3·4 and 5·7GHz will run concurrently with 10GHz as before.

Rules for both events will be published in April. Any feedback on these ideas would be much appreciated (send to G3WDG).

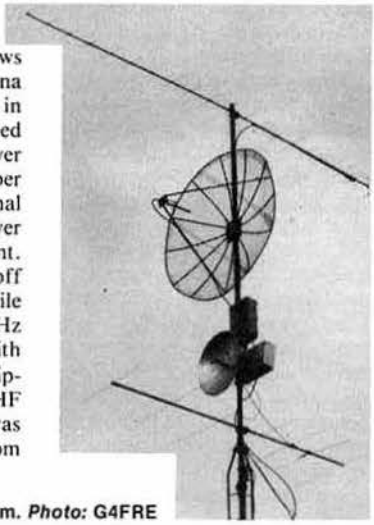
In other journals

In *Radio ZS* a "new record" for 3·4GHz was reported recently. Two teams from the Wellington VHF Group broke the G4BYV-DB5KS 464km record on 6 March 1983 with a QSO over a distance of 545km. The New Zealanders used crystal-controlled transmitters with 1W output and interdigital converters with GaAs fet preamps on receive.

In the September 1983 issue of *Break-in* some details of microwave operation in the USSR were given by ZL2PU. UK5EFL and UK5ECZ hold the Russian dx record on 10GHz. Their best QSO so far is 110km, made using 45mW transmitters and 36dB gain dish antennas. The same path was also worked on 5·7GHz, which is also the dx record on this band. On 1·3GHz their dx record is 878km (UP2BJB to DF3XU).

Photo feature

This month's photo feature shows (right) G3LQR's microwave antenna system. The upper dish is 5ft in diameter and has a log periodic feed for 1·3, 2·3 and 3·4GHz. The lower dish is used for 10GHz. The upper box contains the 3·4GHz final multiplier and receiver, and the lower one houses the 10GHz equipment. The photograph below shows Geoff Grayer, G3NAQ, looking on while the power output of his 10GHz transverter was being measured with the impressive array of test equipment at the 1983 Midlands VHF Convention. The equipment was kindly loaned by the British Telecom Training College.



G3LQR's microwave antenna system. ***Photo:*** **G4FRE**

Microwave test equipment at the 1983 Midlands VHF Convention. ***Photo:*** **G8DJC**

Microwave component supply

The RSGB Microwave Committee is now operating a component supply service. The aim is to make available some of the much-needed but hard-to-get microwave components. The first items in the stock list are MGF1402 GaAs fets (a good low-cost device which can be used in preamps for all bands up to and including 10GHz) at £13 each, MD4901 snap varactor diodes for the G3JVL 10GHz transverter at £7.50 each, and 94·6667MHz crystals for 10GHz transverters at £3.50 each. The prices are post paid. Steve Davies, G4KNZ, is handling the mail order "business", and cheques should be made payable to "RSGB Microwave Committee" and sent to him at 2 Beaconsfield Road, Aylesbury, Bucks. Please do not send orders to RSGB HQ.

Future stock items will include pcbs for the Microwave Committee local oscillator source, and mixer diodes for the G3JVL 10GHz transverter. Please do not order the latter items yet: prices and availability will be

*46 Windsor Close, Towcester, Northants.

announced in due course in this column, and the *Microwave Newsletter*. In addition to the mail order service, the components will also be available at conventions and "round tables" whenever possible.

Awards corner

The second-ever batch of microwave awards to be issued to a station in the USA went to Joe Reisert, W1JR. Joe was able to claim the 10 Squares Award and Distance Award on 1·3GHz from his present Massachusetts QTH, as well as the 2·3GHz Distance Award for past operation under his previous callsign, W6FZJ. The USA is now very square conscious following their adoption of the "Maidenhead" locator system. It is worth reminding overseas RSGB members that they are fully eligible to claim all the microwave awards available. Full details of these, and how to claim, are available from the RSGB microwave awards manager, Jack Hum, G5UM, 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester.

On this side of the Atlantic, G4BYV moves into the lead on 2·3GHz, with 25 squares now confirmed following the arrival of some exotic cards from the Continent. G6DER and G8ULU recently received the Supreme Award; both completed the requirement for this certificate by gaining the 1·3GHz Standard Counties + Countries Award.

G5UM has passed on details of microwave operating awards available from Holland. These are: PACC-SHF for working 100 different Dutch stations on 1·3GHz or above, with stickers available up to 900; SHF-6 for working six countries on 1·3GHz (including one's own country); 23 × 23 for working 23 Dutch stations on 1·3GHz; 13 × 13 for working 13 Dutch stations on 2·3GHz in four different QTH squares; 9 × 9 for working any nine stations on 3·4GHz. Claims should be sent direct to J. Lourens, Keeweer 13, 6862 CD Oosterbeek, Holland.

Finale

This is my last column, and I would like to express my thanks to all those people who have contributed news and technical items over the years. I am glad to say that the column will continue, and I would like to take this opportunity to introduce your next columnist, Mike Dixon, G3PFR. I am sure that he is well known to many of you for his regular 10GHz activity, his excellent article on microwave operating (*Practical Wireless* May 1983), and as secretary of the Microwave Committee. Mike's interest in microwaves is broadly based, and he has equipment for most of the bands. He also has a strong interest in introducing microwaves to newcomers.

I hope that you will give Mike the same degree of support which I have been given, as the success of a column of this sort depends so much on what comes in through the columnist's letter box. Thus please send your operating news, technical items, photographs etc now to Mike Dixon, G3PFR, "Wood Stock", Gaze Bank, Norley, Cheshire WA6 8LL. □

A VANGUARD STORY

by Stan Crabtree, GM3OXC* (ex-VQ4SGC)

THE WORD "VANGUARD" will probably bring back different memories to a lot of us. The battleship! The family car made by Standard in the post-war years. Or perhaps the Pye vhf transceiver for mobile use. For me it has to be the sturdy little transmitter produced in kit form in the late 'fifties.

I collected the bits and pieces from G8KW himself, then operating from a garden shed at his house at Wilmington, Dartford, while on leave from Kenya. I had until then been using a battered home-brew rig that had seen many owners, and was fascinated by the gleaming new chassis, hammer-finished cabinet built like a tank, and all the new components in little plastic bags.

For the uninformed, the Vanguard transmitter was built around a Geloso three-valve vfo-6J5 oscillator, 6AU6 buffer and 6V6 output to drive a very conservatively-rated 6146 power amplifier. The audio was supplied from a 6BR7 and 12AT7 driving a pair of 6L6Gs. All the power supplies and the modulation transformer were contained in a single cabinet of "table-top" design. Although large by today's standards, it was fairly compact for its time.

Because of its weight the kit had to go by sea to Kenya, and it was therefore some months before the packing cases containing it arrived. We had not been able to find a house and were thus confined to a hotel on the outskirts of Nairobi. However, I set to work immediately with screwdriver and soldering iron, and the transmitter was constructed over a two-week period. It was a joy to build. Good instructions and ample space beneath the chassis resulted in quite a professional appearance.

Once finished I was anxious to try it out. I got permission from the hotel manager, who I'm sure regretted it when he next saw me scrambling around on the roof. A 7MHz dipole was soon erected between a chimney pot and a convenient nearby tree, and I was able to join in the Sunday morning local net. Reports of "broadcast quality" on the audio made me feel very contented in my purchase. In the evenings I was pleased to get back on cw. The model originally had cathode keying of the power amplifier, and even with some conventional key filter components the make and break became fairly obvious on our broadcast radio. However, I continued operation for the next week, oblivious to all and sundry.

On the eighth day I was summoned to the manager's office. Here I was politely asked to take down my antenna and cease operation. The manager had been inundated with complaints from other residents, who strangely enough did not know where the QRM was coming from. But the manager did. He said a retired major-general in a suite next to ours had become very heated when he described a "damned north-country accent absolutely surging over my hi-fi".

We left shortly afterwards and were established in a pleasant cottage on the outskirts of the city. No nuisance to anyone. In just over a year I had worked 150 countries and earned many awards, the most notable perhaps being the RSGB Empire DX Certificate. These were individually handpainted for each successful applicant, and truly a work of art.

In the autumn of 1960 VQ4HT (now G3FBN) and I decided to mount an expedition to Zanzibar—then VQ1. We had sounded out a few friends in the UK and the USA, and it seemed our efforts would be appreciated. There was no resident amateur on the island, and no one had visited the location for a number of years. We discussed equipment and decided to take an HRO and the Vanguard.

By this time the transmitter had been modified to key the vfo. A small neon was used for differential keying in the oscillator stage. Negative bias for the 6146 was obtained by the "economy" method; a resistor in the earth return of the centre tap of the power transformer. Thus the continuously running oscillator was no longer a nuisance, key clicks had been eliminated and the note was without any discernible chirp.

With the gear cushioned on the back seat of a Ford Consul we set off south via Arusha into what was then Tanganyika. Night-stopping at Dodoma just as darkness fell, we arrived at Dar-es-Salaam the following afternoon. The following morning we boarded the DC3 service flight to Zanzibar.

The "Pigalle" was an unpretentious hotel on the outskirts of the town. There were few residents but the local European community used the bar as their "local". We had only vaguely been able to describe our requirements by letter. Now, with our equipment stacked in a heap beside the reception desk, the charming French proprietress realized what was needed. Two hours later we were on the air from a small store room on the roof of the hotel. The 24in-thick walls provided some protection from the heat during the day, while in the evening the temperature was just about right.

We had brought inter-connecting antenna rods to provide a groundplane for 14MHz which was to be our main operating band. We would also use it on 21 and 28MHz. We had no atu—no one seemed to bother about refinements such as swr—certainly not in East Africa at that time. We later improvised a rotating dipole for 28MHz, which served us well when the band was open.

The Vanguard performed very well throughout. During the first few hours the heat was such that we decided to operate the transmitter without its cabinet. As we were committed to cw operation exclusively, we also removed the 6L6 modulator valves. These were only replaced for the occasional short sked with VQ3 stations. Working round the clock we managed 3,200 QSOs between us in seven days. This earned us some complimentary comments in *QST* and the Niagara Frontier DX Association DX Signal of the Month Award for October 1960.

The robust little transmitter served for the rest of my time in Kenya, and for a further three years in Tripoli, Libya. We eventually parted company in Cyprus. I finally finished a home-brew project—a transmitter sporting the then routine line up of two 6146s. This provided more than three times the power out on cw. Thus my "old faithful" eventually found its way to the shack of a 5B4 friend in Nicosia. As he was predominantly active on cw, I wouldn't be at all surprised to hear that it's still there. □

*50 Victoria Street, Aberdeen AB1 1XA.

The Month on The Air

*by John Allaway, G3FKM**

THE WRITER was amused recently when listening on the 21MHz band. Both VU7WCY and FB8WK were transmitting on almost the same frequency and listening for callers off-frequency but in the same place—it would be interesting to know how many worked the wrong station! This kind of thing is by no means unusual, and one wonders why the widely accepted "dxpedition frequencies" have to be adhered to so strictly—it shouldn't take too long to tune across a band and find out what is going on. This might have the added advantage of giving potential callers an idea of where to call.

G3SOX reports receipt of QSLs for "3X3WCY". He has never visited Guinea and knows nothing about such a station.

Well known dxer Rudi Hammer, DL7AA, is still trying to find the latest whereabouts of PK5AA (operator Leo, late 1951), PK4VD (James, October 1950), and FI8ZZ (1948). Any information to G3FKM please.

RS53718 reports that G3MD's callsign is being pirated by an operator calling himself Ian and saying that he is in Weston-super-Mare. the real G3MD is Dick and he lives at Wickford and operates almost exclusively on low power cw.

Expeditions

Seven members of the East Anglian Contest Club are going to Madeira for 10 days at the time of the WPX Telephony Contest at the end of this month. They will operate on all hf bands.

Karl, K4YT, began a 10-week tour of the Middle East in late January. He expected to visit ST, 4W, A4, A6, A7, A9, HZ, SU, JY, 9K, and YK and was hoping to come on the air from as many as possible.

Just after the closing date for the February issue a news-sheet arrived from the Heard Is DX Association. In it Jim Smith (VK9NS) gives the good news that on Christmas Eve he received a permit from the New Zealand authorities for Dr Craig (a scientist) and he to lead an expedition to Kermadec Is. Jim also says that there is no reason why four well-known dx operators should not activate the islands. He suggests that the callsign may well be ZL8K1 and reminds everyone that it will be an expensive venture—contributions would be welcome to HIDXA, PO Box 90, Norfolk Is, S Pacific 2899. No dates were mentioned in the news release.

The Aves Is expedition, YV0AA, was scheduled for the end of February and beginning of March. DL2GG/YV5 is quoted as saying that it will begin on 1 March.

The *DX Bulletin* reports a meeting with one of the organizers of the proposed expedition to Clipperton Is on the day that papers for a 5 to 23 March operation had been signed. WB6GFJ is quoted by *DX News Sheet* as having written that the expedition will sail from Acapulco on 5 March and reach the island about four days later for an operation which should last at least five days.

Very much in the rumour category is a report that there will be some activity from Bouvet Is (as 3Y0ZA) for 12 days starting 8 March.

Iris and Lloyd Colvin made 6,000 QSOs from W6KG/HC8 with amateurs in 120 countries during their 11-day stay. They were very sad because Bud, HC8GI, died a few days after their arrival. He had been the most active amateur on the islands for many years and his station was only a few hundred feet from W6KG/HC8. From Galapagos the Colvins moved to Peru where they used the callsign 4T4WCY, and their next stop was to be Bolivia. QSL cards for all operations should be sent to the Yasme Foundation.

At the time of writing two different expeditions had already visited the Laccadive Islands, each using the callsign VU7WCY. The licence is said to be valid until the end of March and a third group was expected to be on the islands before that time. There are also reports that VU2GDG will be on the air as VU5GDG from the Andaman Is during March.

It is very important when applying for QSLs from any of the VU7WCY operators to include the suffix letters of the station worked—it is rumoured that if this information is not given the QSO may be invalid. Cards for QSOs before 5 January go to VU2APE, and those after 9 January to VU2GDG.

CT4NH and CT4UW will visit Berlenga Is (39°20'N 9°30'W) from 16 to 18 March, and will be on all hf bands 3·5–28MHz as CT0BI; the first time that CT0 has been issued. The island does not count separately for DXCC, but it does for the IOTA Award. QSL cards should be sent to the operators' home calls.

A group of members of the Dordate Electronics Club (from the Netherlands) will be on the air using their own callsigns/LX (or should this be LX/ own callsigns?) from Luxembourg between 1800 5 April and 2400 8 April. Operators will include PA0s BOE, TUK, VDO, PA2FAS, and PA3s ATA, AWW, CLS, CQR, CQU, CZW, and six newly-licensed amateurs. QSLs go to the address given for PA0BOE/LX in "QTH Corner".

DX news

DX'press reports that HA5DW left Hungary on 5 January for a six month stay in Iraq. He took 3·5 and 7MHz antennas and cw filters for use by YI1BGD but it is not known whether he will actually be on the air himself.

FB8WH, FB8WJ, and FB8WK are often to be found after 1800 on 7,002, 7,047, or 3,795kHz.

AT0A is the callsign of VU2IF, who is in Antarctica and will be there until the end of the month. He operates on 14 and 21MHz on cw and ssb.

KE4UX/KH9 now has the callsign AH9AB and has been worked on 14MHz ssb after 0700 when he looks for Europe. He will be on Wake Is until November and should have received a keyer by now.

D44AC is sometimes to be found after 0500 on Sundays on 7MHz ssb. A station claiming to be in Angola and using the callsign D2ASV has been worked around 2100 on 14MHz cw and at noon on 21MHz cw. EA2OZ/D2 was also on the air at Christmas. No information on the authenticity of either station is available but D2ASV gives OK3AL as QSL manager. D68WB is a new station in Comoro, and TZ2XN is newly on the air from Mali—he has a good signal on 7MHz ssb around 1900. DF3NZ/ST2, who has been in Sudan since 1980, will return to Germany this month.

Graeme, VK5ZW, should be on the air until mid-1984 from Willis Is as VK9ZW. He may be active on rtty and Oscar 10 as well as on cw and ssb.

Dave, VP8AQA, closed down operations from Faraday Base, Antarctica, on 1 January and leaves for the UK (via CE, PY, Falkland, and other Antarctic bases) in mid-March. His brother, GM4GRC, already has his logs, and QSL cards will be on their way soon (see "QTH Corner"). G3VPW should be in Falkland now and was hoping to be able to reactivate his old VP8KF call on all bands (including the new ones) on cw and ssb. He may also operate /MM from the *Uganda*. Look for him about 25kHz above lower band edges on cw. QSL cards for this operation and for VP8s LP and AIB should go to the address in "QTH Corner".

VE7BC will be back at BY1PK at the end of this month for a four week stay. It is rumoured that he will have five other North American amateurs with him.

Stations in Macao began to use the XX9 prefix on 1 March in place of CR9. Torres, who was formerly CR9AJ (and also CR5AJ, CR8AJ and CR9ITU) is now back in Portugal and on the air as CT1APD.

Overseas news

Guy Simmons, G4DWV, has emigrated to Israel and QSLs for his UK call, and for G4DWV/4X, should now be sent to the address in "QTH Corner".

Rudi, DL7AA, besides asking for the whereabouts of PK4VD, PK5AA, and FI8ZZ, reports that during 1983 he worked 71 countries on 1·8MHz, 102 on 3·5MHz, 108 on 7MHz, 52 on 10MHz, 128 on 14MHz, 25 on 18MHz, 144 on 21MHz, 19 on 24MHz, and 138 on 28MHz—as well as 20 on 144MHz—and all on cw. Quite a performance.

A sad letter from Eric Trebilcock, BCRS195, brings the news of the death of his wife Genevieve, to whom he had been married for over 40 years. All

*10 Knightlow Road, Birmingham B17 6QB.

would wish to express sympathy to one of Australia's leading listener dxers. He also enclosed cuttings from the *"Pacific Islands Monthly"*, one of which referred to VR6TC—the actual item having been copied from the *Fiji Times*. It said "Tom Christian of Pitcairn Is hitched a 5,000km boat ride across the Pacific recently on his way to get a medal from the British Government representative in Wellington, New Zealand. Christian, radio operator for Pitcairn Is, flagged a passing chemical carrier for the nine-day trip to New Zealand enroute to receiving his MBE medal at a ceremony in Wellington. Tom Christian of Pitcairn is descended from another expert at diverting ships—Fletcher Christian, leader of the 1790 Bounty mutiny". A further item mentions that Sir Tom Davis (who is also ZK1AN) led the party which won the general election held in the Cook Is last November.

Gerrard Kelly, G3CBF, having read the item referring to G3SYM in December *MOTA*, reports that he has been resident in Libya for 12 years. All attempts made via the correct channels to obtain an amateur licence have failed and there are no Libyan nationals with licences. Gerrard is 700km east of Tripoli and believes that G3SYM may have better luck if he is in one of the main cities and has personal acquaintances in important places.

The Southeastern DX Club will be holding DXPO Atlanta on the weekend of 3-5 May 1985. More information will be available later but anyone needing further information now should write to DXPO-Atlanta, 720 Starlight Lane NE, Atlanta, Ga, 30342, USA.

The International DX Convention (sponsored by the S California DX Club) will take place from 13-15 April at the Holiday Inn in Visalia, California. Pre-registration (which includes cocktail parties, the banquet, Sunday breakfast, and prizes) costs $38 to those who apply before 15 March, and applications should go to Nick Winter, WB6DXU, 1426 N Avon St, Burbank, Ca, 91505. Invited speakers include 9N1OAT, 1A0KM, K7NW, XU1SS, HK0TU, and many others. If you are making hotel reservations you are advised to mention the convention's name ($40 single, $47 double).

. . . WCY

A list of some of the many stations that were on the air celebrating World Communications Year (with QSL route in brackets) may be useful and goes as follows (prefix only given—all had the suffix WCY): DF5 (DF2WF), DF7 (DF7ZH), DK1 (DF1LX), DL2 (DL5EAN), ED3 (EA3CTI), GB2 (G3XEP), GB0 (GD3KHE), LZ0 (LZ1KAB), OK0 (OK2KGV), OZ9 (OZ3QN), PF1 (PA0FHG), PF2 (PA0ATG), PF3 (PA0MTE), PF4 (PA0GAM), PF5 (PA0LVB), RG6 (Box 88), RH8 (UJ8JCQ), RJ8 (UK8JAA), RL7 (UK7PAL), RM8 (UK8MAA), RO5 (UK5OAA), RP2 (UK2BBB), RQ2 (UK2GAB), RR2 (UK2RAN), RT5 (UK5MAF), RV1 (UK1ADZ), RV3 (Box 88), RV4 (UK4FAV), RV6 (UK6LAA), RV9 (UK9CAA), RV0 (UK0AMM), TA2 (DJ0UJ), TS8 (IS0LYN), ZS6 (ZS6TJ), 4N1 (YU1AHI), 4N7 (YU7GMV), 4O1 (YU1FJK), 4O2 (YU2DX), 4O3 (YU3ER), 4O5 (YU5CXY), 4O7 (YU7GMN),4O9 (YU7BCD), 4O0 (YU5GBC), 4T4 (Yasme), 4X4 (4X4AT), 4X6 (4X6DK), 4Z4 (4Z4KX), 5H3 (SM0DJZ), 5N1 (5N8ARY), 5N6 (K6EDV), 5N8 (Bureau), 6U1 (DF7ZH), and 9Y4 (Box 1167, Port of Spain).

Welcome

To the following who joined the Society during December 1983—A4XJT, A4XJW, A71AD, A71BK, JA1EYP, K2POF, ON1KXX, VK5AJG, W2TTM, A. Fitzjohn (5Z), G. Rutherford (5H), A. McLean (HZ), L. Moore (9H), G. Cazzola (I), A. Eng (LA), and H. Suzuki (JA).

Morokulien

This enclave on the Swedish-Norwegian border celebrates its 25th anniversary this year. The restaurant has been enlarged and the Border House renovated. LG5LG/SJ9WL is active on rtty again with a Siemens T100S and the TU SM6HAB, together with an IC720 and an IC251 with dipoles for 3·5 and 7MHz and TH6DXX for 14, 21 and 28MHz. The house may be booked for Kr100 per day (off-season) and Kr150 per day during the holiday period. Contact Enar Jansson, SM4IM, Gerdesgatan 5, S 670 50 Charlottenberg, Sweden (tel: 46 57120093) for more information.

Arabian Gulf football tournament

The Royal Omani ARS will be celebrating a special event during the period 9 to 26 March when a football contest involving teams from seven countries (A4, A6, A7, A9, HZ, YI and 9K) will be taking place in the sultanate. All A4X stations will add the suffix "/GTF" to their callsigns, and a special award will be available to anyone who works five stations using the special call during the competition. Send certified log details—any band/mode may be used but the five contacts must each be made on different days—with 10 ircs to: Awards Manager, ROARS, PO Box 981, Muscat, Sultanate of Oman.

Unitech, the Technical University of Papua New Guinea, took part in JOTA. The picture shows a member of the Unitech Brownies talking to an Australian JOTA station. The hand holding the microphone is that of Mike Hennessey, P29MH. Thanks to the efforts of Unitech ARS several native New Guinians sat the RAE in November, and when the academic year started in February a further recruiting drive was planned

MOTA Alltime Countries Table

Scores at 15 January. Bandleaders in bold type.

Callsign	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G3KMA	**84**	**219**	**291**	329	**331**	**316**	1570
G3GIQ	53	185	226	329	329	308	1430
G3MCS	45	199	244	318	319	305	1430
G3UML	3	187	206	327	294	254	1271
G3HTA	58	161	213	306	280	242	1260
G4DYO	46	123	186	303	299	283	1240
G3XTT	83	167	203	261	273	242	1229
G4FAM	50	149	213	265	264	242	1183
G2DMR	39	142	150	286	287	252	1156
G3RUV	6	142	161	285	285	234	1113
GW4BLE	22	148	166	262	261	241	1100
G3NOF	4	79	72	**339**	317	274	1085
G3TXF	46	159	170	249	248	207	1079
G3XJS	26	102	116	274	286	272	1072
G3RUR	1	134	156	276	253	223	1043
VK9NS	36	141	200	270	223	173	1043
G3XQU	1	105	143	264	257	234	1004
G3YMC	69	88	143	212	227	176	915
G4BWP	29	127	131	167	186	236	876
G3JFF	25	78	112	232	225	179	851
G4KPE	1	146	162	176	165	134	785
GM3PPE	41	117	140	181	167	138	784
G4LJF	1	95	99	220	186	182	783
GM3YOR	53	78	112	180	175	174	772 (cw only)
GW4OFQ	30	132	97	138	145	107	649
G4GGY	2	100	76	182	142	100	602
Average	33	135	161	255	247	220	1051

The next table (in three months' time) will be for "all-time" countries worked on the *current* DXCC list only. This is a new table with no carry-over from this month, and all entrants must stipulate that no deleted countries have been included. In future "all-time" tables will alternate between with- and without-deleted countries. Also please note that entries for the **new 1984 yearly table** should reach G3GIQ by 15 March to appear in the May issue, and for the all-time table by 15 April.

Final 1983 28MHz Countries Table

G3VOF — 195
G3XQU — 186
G3KHZ — 185
G3GIQ — 175
G3JFH — 135
G3KDB — 129 (cw)
G3TXF — 105 (cw)
G3SXW — 104 (cw)
G4OBK — 104
G4MUW — 104 (ssb)
G3XBY — 101
G4GGY — 92 (ssb)
G4GOF — 78 (ssb)
G4PEL — 77
G3XTJ — 66 (cw)
G4EHQ — 61
G6HM — 57
G4SDZ — 54 (ssb)
G4PKP — 49
G3KSH — 44
G4RPX — 43
G3PXT — 40
G3JFF — 38
GM4RFE — 35
G3XBM — 35
G3URA — 30 (cw)
G3PSM — 26 (cw)
G4FVK — 25

The first 1984 table will appear in April issue.

QTH CORNER

A22CA	C. Allison, Box 29, Selebi-Phikwe, Botswana.
A22KE A22ME	M. Elazer, USA Embassy, Gaberone, Dept of State, Washington DC, 20520, USA.
AT0A	VU2IF, Dr A. Singh, Box 4015, New Delhi 017, India.
CT1DEJ	via G3AOS, QTHR
D68WB	Bill Barnett, Box 540, Moroni, Comoro Is.
PA0BOE/LX	PO Box 523, Dordrecht, Netherlands.
N6ADI	QSL Service, Box 379, Ojai, Cal, 93023, USA.
TJ1QS	H. Loubere, F6DZU, Escardron Mobile 3 11, F-40 600 Biscarrosse, France.
VK9ZW	via VK6YL, G. Weaver, 23 Corbel St, Shelley, W.A 6155, Australia.
VS5I VS5IB VS5IC	PO Box 222, Bandar Seri Begawan, Brunei.
VP8AQA	Glenrothes & District ARS, 41 Veronica Crescent, Kirkcaldy, Fife KY1 2LH.
VP8KF	J. Wright, 5 Warmans Close, Wantage, Oxon OX12 9XS.
VP2MDB	via W2WSE.
VU7WCY	(second expedition) D. Gopal, PO Box 3755, Coimbatore 641018, India.
4T4WCY	YASME Foundation, PO Box 2025, Castro Valley, Cal, 94546, USA.
G4DWV/4X	G. Simmons, PO Box 5007, Herzlia, Israel.

Awards

The Ex-G Certificate

This is issued by the Ex-G Radio Club to licensed amateurs and listeners who have confirmations from (a) at least eight members of the club in the USA (no more than two from any call area), (b) four members in Canada, and (c) four other members outside Canada or the USA. Send a list of QSLs—certified by two amateurs or a club secretary—plus eight ircs to Lt Cdr H. Cunningham, G8FG, 235 Station Rd, West Moors, Dorset BH22 0HZ. Applicants from outside Europe (but not in the USA/Canada) should apply to Don Rayner, W3CTR, Awards Manager, 416 Burkhart St, Johnstown, Pa, 15906, USA. Note that QSLs for dates before 1977 do not count.

Birmingham Postal Zone Award

Issued by the S Birmingham RS to licensed amateurs and listeners. In three classes: (1) Bronze—for 25 points; (2) Silver—for 50 points; and (3) Gold—for 75 points. Points are gained as follows: five for working/hearing G3OHM or G8OHM (this is obligatory), two for working/hearing SBRS members in different postal zones, and one for working/hearing other Birmingham stations who are not members (in different zones). There are 98 zones in the postal area. Send check-list (QSLs may be requested) with £1, six ircs or US $3 to award manager John Harvey, 38 Bodenham Rd, Birmingham B31 5DS.

Commonwealth Century Club

This new award was described in November *MOTA* and the HF Committee has confirmed that the starting date for contacts is to be 1 January 1984. The whole RSGB hf certificate programme is to be reviewed in the near future.

Contests

CQ WW WPX Contest (SSB section)

0000 24 March to 2400 25 March

1·8 to 28MHz. Contacts with own continent count two points on 14, 21, and 28MHz, on other bands four. QSOs with other continents count three and six points respectively. Own country may be worked for multiplier credit only. The multiplier is the number of different prefixes worked—each counts once only irrespective of the number of bands it is worked on. Exchange RS and serial QSO number (from 001). There are single-operator single- and multi-band, and multi-operator single-transmitter multi-band classes (the last mentioned must only use one transmitter and the same band for the same 10min—changing to another band to work a multiplier is not allowed during this period). There is also a multi-operator multi-transmitter class in which all equipment must be located within a 500m radius. The final score is total QSO points multiplied by number of prefixes worked. There is a QRP section for stations running no more than 5W output and "QRP" must be clearly marked on the entry sheet. Note that in the single-operator classes only 30h operation may take place and the 18h rest period taken in up to five parts. To qualify for an award at least 12h activity must be logged—in the case of multi-operator entries this must be 24h. Logs should show date, time, station worked, numbers sent and received, if new prefix, and points claimed. A prefix check-list must be included. Entries must be postmarked no later than 6 May and sent to CQ Magazine, WPX Contest, 76 N. Broadway, Hicksville, NY, 11801, USA. Please mark envelopes clearly "SSB" as there is a cw contest later in the year.

Graeme, VS5DX, entertaining a visitor from the USA. *Photo:* G3HZG

Around the bands

G8KG's latest summary reads as follows: "The steep fall in solar activity during most of 1983 seems to have ended towards the close of the year, and to have been followed by a period of relatively level but rather low activity. From mid-November to mid-January the 27-day average solar flux fluctuated gently between 90 and 97 sfu with daily values lying between 80 and 112 sfu. During the period 22-26 November (which included the first day of the CQ WW DX Contest) the sun was "spotless" and the solar flux in the low 80s. the last period of five or more spotless days was back in December 1976.

"Spotless days have been observed in peak years in the past, and it is probable that the November event was only a temporary lull. It was not repeated in the next two solar rotations, and it seems probable that the recent spell of generally low activity, while providing a foretaste of conditions near to a solar minimum, was only a minor trough in the curve and that activity will pick up towards the middle of the year."

In spite of all this some very nice dx has been worked, even on 14MHz. The poor period around the CQ WW DX Contest resulted in complaints from some who entered on 21MHz that not even one JA signal was heard! A very unusual state of affairs.

The following kindly supplied logs this month: G2HKU, G5JL, G3s GHY, GVV, IGW, KSH, GW3YDX, G3YRM, G4s EHQ, KGG, GW4KGR, G4s NXG/M, OTY, PEL, UOL, and RS10906—to whom, many thanks.

Stations listed in italics were using A1A.

1·8MHz 0000 *HZ1HZ, UM8MAZ.* **0200** *HK1AMN, TI2BEV, 4U1UN.* **0400** *AZ5ZA.* **0500** *FG7AM, YV2IF,* **0700** *KH6CC, K7VIC* (Mont), *KL7GXY, 6Y5IC.* **0800** *NA5B* (Okla), *TF3KG, VE7CRU, W6RW, N7EIJ* (Ida), *W8LRL, ZLs 1AH, 2BT.* **2000** *CT2DV.* **2100** *HZ1AB, SV1JG, VE1BVL, VK6HD.* **2200** *EA8AK, JAs 1BFN, 2GQO, 5DQH, 6LCJ, UP2BBTIU6V, 4X4DX, 9H1CG.* **2300** *W3RCQ, AA4V, HV3SJ, UL7BAK, ZB2EO.*

3·5MHz. 0000 NP4AT, OY8R, *W1YB.* **0100** *FB8WK.* **0200** *J37AE.* **0600** *FG7BP, VP2ES.* **0700** *W6QL/HC1, N5VV* (N.M.), *N7RU* (Ariz), *ZLs 1AIZ, 2FI.* **0800** *ZL3GQ.* **1900** *VK4SS.* **2000** T77V, *9J2AK.* **2100** VK6LK. **2200** *HV3SJ, HZ1HZ, JAs, TS8WCY,* VU7WCY, ZB2GZ, *8Q7XX.* **2300** *HH2VP,* JA6XMM, *N2TM/SV5.*

7MHz. 0700 *C6AZA, CO, HK, LU, PY.* **0800** *JHs 1GTV, 7BRG, JW5NM, VK, ZL, 3A2LC.* **0900** *JAs 7DRM, 8DIM.* **1700** *UL7OAM, 4S7EX.* **1900** VK3MR, W1PL. **2000** *7X2CR.* **2100** *ZS1CT.* **2200** *HV3SJ, SV2TR.* **2300** *AZ5ZA, S44KB* (= SV), *TR8JLD, VK6WT, VU2BK, ZS4JB.*

10MHz. 0700 *JP1BTA.* **0800** *DL7AD/EA8, JA6HW, W6-W7, VK, ZL.* **2300** *VP2ES.*

14MHz. 0800 KL7SK, KX6AH, VK, *VP8AVV,* VS5GA, ZL. **0900** AH2AC, BY4AA, C21KH, *JT0EC,* KC6DS, *KL7NA,* P29GF, *VK,* YI1BGD, *ZL.* **1000** A71AD, KH2BB, 9L3WCY, 9M2NB. **1500** VK6HG. **1600** FB8s WJ, WP, VU7WCY, 7P8CM. **1700** FH0GA, FG0MU/FS7, VE8YQ, W6-W7, OE8HFL/YK, 9X5NH. **1800** C53GD, VP8AST, ZL4BC. **1900** FY7AN, XT2BR, ZD9GA. **2000** TL8CK, VP8AQA, ZD7CW, 5V7JJ. **2100** *KL7H,* VP8MT. **2200** *TR8WCY.*

18MHz. 0900 *DL, G, HB, OE.*

21MHz. 0800 JA, TR0AB. **0900** *TA4TAT, TL8ER, TR8WCY,* VK, *ZS, 8Q7BX.* **1000** A71BK, DU1LB, VU7WCY, ZL, 3B8FG. **1100** G4DUW/DU1, *TA1UA, TR8JLD,* VP8MT, VS6CT. **1200** G4DUW/DU1, FM7BX, *FR7AI/T,* VK, VK6CI, *VU2BK, 4S7EMG,* 9L1SL. **1300** AM7CFW, AP2P, ZF2AG, 9K2s FX, YA. **1400** J28DX, 5N8SHE, 5Z4DV. **1500** HT1IAG, PA3CNK/PJ2. **1600** J39BS, TJ1AF, W6-W7, 3X4EX, 6W1LL. **1700** ZD9BV, 5R8AL.

24MHz. No reports.

28MHz. 0900 *SV9SK, ZC4CW.* **1100** *HZ1AB,* 5N3WCY. **1300** D68AM, VP8LP. **1400** ZC4EPI. **1500** HH2WL. **1600** XE1MDX.

Acknowledgements to the authors of the following for information extracted: *CQ Magazine* (W1WY), *DXNL* (DL3RK), the *DX Bulletin* (K1IN), the *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G3XTT/G3ZAY), the *Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip* (VE3GCO), *Lynx DX Group Bulletin* (EA2JG/EA3CBQ), and *DX'press* (PA0GAM).

Closing date for **May** issue **27 March**—everthing to G3FKM no later please. □

HF propagation predictions for March 1984

Using the table

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie ♀ = 0000, ♀ = 0200, ♀ = 0400 etc.

The probability of signals being heard is given on a 0 (indicated by a dot) to 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1·8MHz openings are indicated by a dagger (†) sign in the 28 and 3·5MHz columns respectively. The higher probability figures are printed in **BLACK**, lower probability in RED and lowest probability in GREEN type.

	28MHz				21MHz				14MHz				10MHz				7MHz				3·5MHz			
GMT	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122
	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802
EUROPE																								
Moscow	. . .	. 2	221	. . .	. . .	57	777	2 . .	. . .	677	778	83 .	433	654	446	886	875	322	223	689	†53	. . .	. . .	3††
Malta	. . .	12	222	. . .	. . .	67	777	5 . .	1 . .	687	778	972	764	755	456	898	998	532	224	689	†††	2 . .	. . .	3††
Gibraltar	. . .	. 1	1 . 1	. . .	. . .	25	655	5 . .	. . .	188	778	971	452	675	556	897	998	743	223	689	†††	4 . .	. . .	3††
Iceland	. . .	. . .	. . .	. . .	. . .	. 1	333	2 . .	. . .	27	778	84 .	21 .	166	556	784	874	643	334	578	†††	42 .	. . .	24†
ASIA																								
Osaka	. . .	. 1	. . .	. . .	. . .	45	2 . .	. . .	. . .	264	323	31 .	. . .	31	113	652	. . .	1 .	. 1	462	. . .	. . .	. . .	. 3 .
Hong Kong	. . .	23	31 .	. . .	. . .	267	752	1 . .	. . .	134	346	72 .	1 . .	11	113	674	1 . .	. . .	. 1	475	. . .	. . .	. . .	. 42
Bangkok	. . .	34	44 .	. . .	. . .	367	774	1 . .	. . .	24	346	731	3 . .	. 1	113	686	2 . .	. . .	. 1	477	. . .	. . .	. . .	. 44
Singapore	. . .	34	452	. . .	. . .	367	777	2 . .	. . .	14	346	831	3 . .	. 1	. 13	687	1 . .	. . .	. 1	477	. . .	. . .	. . .	. 44
New Delhi	. . .	144	55 .	. . .	. . .	467	773	. . .	1 . 1	113	346	432	621	. . .	. 13	687	62 .	. . .	. 1	478	3 . .	. . .	. . .	. 45
Teheran	. . .	155	553	. . .	. . .	566	787	3 . .	2 . 2	422	346	843	854	1 . .	. 13	688	851	. . .	. 1	478	†2 .	. . .	. . .	. 4†
Colombo	. . .	155	553	. . .	. . .	456	788	3 . .	1 . .	112	346	853	62 .	. . .	. 13	688	61 .	. . .	. 1	478	3 . .	. . .	. . .	. 4†
Bahrain	. . .	156	663	. . .	. . .	566	788	3 . .	412	311	346	865	863	. . .	. 13	689	861	. . .	. 1	478	†3 .	. . .	. . .	. 4†
Cyprus	. . .	166	665	1 . .	. . .	588	889	71 .	523	765	567	986	987	432	335	799	985	2 . .	12	588	††2	. . .	. . .	25†
Aden	. . .	166	775	1 . .	. . .	566	688	61 .	622	311	236	887	974	. . .	. 13	689	861	. . .	. 1	478	†4 .	. . .	. . .	. 45
OCEANIA																								
Suva (S)	. . .	. . .	. . .	. . .	. . .	. . 1	331	1 . .	. . .	. 34	445	62 .	. . .	332	113	61 .	. . .	21 .	. . 1	3 . .	. . .	. . .	. . .	. . .
Suva (L)	. . .	. 1 .	. . .	. 2 .	11 .	. 62	1 . .	272	112	664	323	751	. . 1	531	. . 3	62 .	. . .	21 .	. . .	3 . .	. . .	. . .	. . .	. . .
Wellington (S)	. . .	. . .	1 . .	. . .	. . .	. 14	442	. . .	. . .	354	448	61 .	. . .	432	113	62 .	. . .	21 .	. . 1	31 .	. . .	. . .	. . .	. . .
Wellington (L)	. . .	. . .	. . .	. . .	11 .	. 2 .	. . .	. 32	223	462	. . .	363	. . 2	431	. . 1	53 .	. . .	21 .	. . .	31 .	. . .	. . .	. . .	. . .
Sydney (S)	. . .	. 23	11 .	. . .	. . .	377	554	1 . .	. . .	464	346	72 .	. . .	131	113	651	. . .	. 1 .	. . 1	43 .	. . .	. . .	. . .	. . .
Sydney (L)	. . .	. . .	. . .	. . .	. . .	. 31	. . .	. 21	111	164	211	174	. . .	231	. . 2	452	. . .	. 1 .	. . .	32 .	. . .	. . .	. . .	. . .
Perth	. . .	155	41 .	. . .	. . .	478	753	1 . .	1 . .	234	346	752	3 . .	. 11	. 13	686	1 . .	. . .	. 1	474	. . .	. . .	. . .	. 4 .
Honolulu	. . .	. . .	. . .	. . .	. . .	. . .	. . .	2 . .	. . .	. 13	214	62 .	. . 1	232	113	3 . .	. . 2	41 .	. . 1	1 . .	. . .	. . .	. . .	. . .
AFRICA																								
Seychelles	. . .	134	552	1 . .	. . .	555	777	61 .	632	1 . .	236	887	962	. . .	. 13	689	84 .	. . .	. 1	478	†2 .	. . .	. . .	. 4†
Mauritius	. . .	157	776	2 . .	. . .	566	788	721	742	211	336	898	962	. . .	. 13	689	84 .	. . .	. 1	478	† . .	. . .	. . .	. 4†
Nairobi	. . .	155	675	3 . .	1 . .	555	538	841	862	31 .	136	898	995	1 . .	. 13	689	882	. . .	. 1	478	†5 .	. . .	. . .	. 45
Harare	. . .	46	787	4 . .	1 . .	466	688	952	873	411	136	899	995	2 . .	. 13	689	883	. . .	. 1	378	†5 .	. . .	. . .	. 45
Capetown	. . .	56	788	61 .	1 . .	276	679	973	862	632	136	899	996	3 . .	. 3	689	885	1 . .	. . .	378	††2	. . .	. . .	. 4†
Lagos	. . .	67	888	62 .	21 .	186	668	973	983	741	115	899	998	51 .	. 2	689	787	3 . .	. . .	378	5†4	. . .	. . .	. 4†
Ascension Is	. . .	46	446	51 .	11 .	87	556	863	885	462	1 . 1	699	998	63 .	. . .	389	887	41 .	. . .	168	5†5	. . .	. . .	. 35
Dakar	. . .	37	777	72 .	11 .	77	667	982	886	363	112	699	998	63 .	. . .	379	887	41 .	. . .	158	†55	. . .	. . .	. 25
Las Palmas	. . .	26	656	51 .	. . .	78	888	96 .	564	476	666	897	998	754	333	689	988	521	1 . 1	378	†††	2 . .	. . .	. 4†
S AMERICA																								
South Shetland	. . .	. . .	577	72 .	11 .	. . 4	778	872	786	454	334	567	788	631	. . 1	235	577	41 .	. . .	. 12	245	. . .	. . .	. . .
Falkland Is	. . .	. 2	777	72 .	. 1 .	16	777	772	786	364	332	367	898	631	. . .	136	787	41 .	. . .	. 3	4†5	. . .	. . .	. . .
Rio de Janeiro	. . .	. 5	534	52 .	. 1 .	. . 8	655	772	776	344	211	268	999	631	. . .	. 38	888	41 .	. . .	. 15	††5	. . .	. . .	. . 2
Buenos Aires	. . .	. 2	766	62 .	. . .	17	756	672	676	254	311	257	899	631	. . .	. 26	788	41 .	. . .	. 3	4†5	. . .	. . .	. . .
Lima	. . .	. . .	555	52 .	. . .	. . .	765	551	343	142	321	. 25	798	542	. . .	. 3	588	41 .	. . .	. 1	2†5	. . .	. . .	. . .
Bogota	. . .	. . .	444	52 .	. . .	. . .	765	551	333	. 23	321	. 26	888	432	. . .	. 4	688	41 .	. . .	. 1	4†5	2 . .	. . .	. . .
N AMERICA																								
Barbados	. . .	. 1	545	52 .	. . .	. 6	765	661	343	125	311	147	898	532	. . .	. 16	887	41 .	. . .	. 3	††5	. . .	. . .	. . .
Jamaica	. . .	. . .	333	41 .	. . .	. . .	765	651	322	. 23	321	125	787	332	1 . .	. 3	688	41 .	. . .	. 1	3†5	2 . .	. . .	. . .
Bermuda	. . .	. . .	333	41 .	. . .	. 2	766	661	321	. 14	321	256	887	332	1 . .	. 25	788	41 .	. . .	. 2	4†5	2 . .	. . .	. . .
New York	. . .	. . .	122	2 . .	. . .	. . .	566	65 .	21 .	. 3	332	255	775	222	11 .	. 24	687	41 .	. . .	. 2	3†5	. . .	. . .	. . .
Mexico	. . .	. . .	. 22	2 . .	. . .	. . .	166	53 .	21 .	. 1 .	332	113	475	231	11 .	. . 1	277	41 .	. . .	. . .	. 45	. . .	. . .	. . .
Montreal	. . .	. . .	. 12	2 . .	. . .	. . .	465	64 .	21 .	. 3	333	355	775	222	11 .	. 24	587	41 .	. . .	. 2	2†5	. . .	. . .	. . .
Denver	. . .	. . .	. . .	. . .	. . .	. . .	. 14	42 .	11 .	. . .	134	223	353	22 .	111	. . 1	257	41 .	. . .	. . .	. 25	. . .	. . .	. . .
Los Angeles	. . .	. . .	. . .	. . .	. . .	. . .	. 4	42 .	1 . .	. . .	. 25	211	243	121	. 12	. . .	. 37	41 .	. . .	. . .	. 4	. . .	. . .	. . .
Vancouver	. . .	. . .	. . .	. . .	. . .	. . .	. . .	11 .	1 . .	. . .	. 14	432	232	22 .	. 13	1 . 1	136	41 .	. . .	. . .	. 3	. . .	. . .	. . .
Fairbanks	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. 11	123	431	221	332	113	432	113	41 .	. . 1	1 . .	. . .	. . .	. . .	. . .

The provisional mean sunspot number for December 1983 issued by the Sunspot Index Data Centre, Brussels, was 33·4. The maximum daily sunspot number was 82 on 10 December, and the minimum was 10 on 28 and 31 December. The predicted smoothed sunspot numbers for March, April, May, and June 1984 are, respectively: (classical method) 54, 53, 51 and 49; (SIDC adjusted values) 54, 43, 42 and 36.

Contest News

144MHz Fixed Contest December 1983 results

For those lucky enough to live in the south or the Midlands, the 1983 144MHz Fixed Contest provided a rare opportunity to work a feast of dx stations from the comfort of a warm shack. The exceptional conditions ensured that the scores of the leading stations were more than double those of previous years, and produced totals which would have been respectable for a 24h event. The 200 or so OZ and SM stations active helped to ensure that average scores of 17 points/QSO were commonplace.

Conditions in the north were not so good though: "Flat"—said G6MEM; "Awful from this QTH"—said GM8YJU. Nevertheless some good long-haul contacts with EA were made.

QRM caused problems to many stations, but this was mainly due to the high level of activity. No confirmed bad signal reports were received. A number of entrants sent in 4422 summary sheets—these are not required for single-band events.

For the first time, the VHF Contests Committee has instituted awards based on the seven RSGB zones, the intention being to encourage activity from less favoured areas. Congratulations to the winners, runners-up and the zonal award winners in each section, and to the Norfolk VHF-UHF Contest Group in particular, who have won their section for the last seven years.

G4ERP

MULTI-OPERATOR SECTION

Posn	Callsign	Points	QSOs	QTH	Ant	Best dx	Km
1	G4ANT*	11,799	682	AM27	4×9Y	SM5CNQ	1,074
2	G4NXO*	11,044	536	YL29	2×16Y	SM7DKF	1,087
3	G8ZHP*	10,061	497	ZM29	2×16Y	SK6HD	1,060
4	G4RZO	9,635	526	AL45	2×9Y	SM5CNQ	1,199
5	G1ACC	8,452	456	ZM05	2×17Y	SM6JWH	993
6	G4BWG	8,246	498	ZL60	19Y	SM5CNQ	1,252
7	G6OOZ	7,900	465	AL52	17Y	SM6KNK	1,134
8	G8GRL	7,723	476	AL33	16Y	OZ1CSI	1,029
9	G4PSX	7,625	438	ZL56	16/16	SM5CNQ	1,250
10	G6JIA*	7,529	365	ZN08	17Y	SM7KNK	963
11	G4RFR	7,324	411	ZK11	2×14Y	SM7BHM	1,209
12	G6LZT	7,277	417	YL66	2×16Y	DL5LH	939
13	G6DOD	6,177	397	ZL09	2×9Y	SM6KEG	1,031
14	G4NUT	5,688	368	ZM77	16Y	SM6JWH	1,021
15	G3UKC	4,877	307	AL56	2×14P	SM7BHM	1,000
16	G3WOI	4,955	331	ZL44	17Y	SM6CMU	1,085
17	G6TMP	4,802	334	YM38	2×16Y	DD9HT	861
18	G3OGY	4,749	352	ZL74	10Y	SM5CNQ	1,334
19	G8LMW	4,518	290	ZM24	2×12Y	OZ1AFF	910
20	G6IOV	4,325	292	ZK05	4×9Y	DF5LS	896
21	GW4ULG*	4,105	358	YL37	8Y	EA1TA	1,004
22	G4TVI	4,062	308	AL24	16Y	Y22HA	802
23	G3BZU	4,012	322	ZK05	14Y	SM6BCD	1,118
24	G4KAR	3,975	268	AK12	10XY	OZ1FF	925
25	G3TRF	3,772	298	AL63	8Y	SM6FZD	1,023
26	G4UHF	3,770	314	ZL26	6Q	DL5LS	851
27	G3WSC	3,706	303	ZL79	16Y	SM6JWH	1,065
28	GW6KOJ	3,630	254	YL25	17Y	DL1YCA	813
29	G4TBR	3,450	240	ZL27	9Y	DL4LB	878
30	G4GTT	3,389	279	ZL38	14P	SM6JWH	1,045
31	G3IGQ	3,270	294	ZL68	14P	SM6MNS	1,090
32	G6UBE	3,006	303	AL33	16Y	DG2LA	741
33	G6YXT	2,862	195	YK43	8Q	DB1LI	1,031
34	G3TAD	2,759	221	YL48	6Y	DL5LH	901
35	G1CDN	2,739	179	ZN34	2×10Y	DF5LS	825
36	GM8YJU*	2,549	301	YO05	17Y	TO6HRP	700
37	GW4VRV	2,470	207	YL42	14Y	DB9DN/P	762
38	G6APD	2,359	171	ZK15	9Y	DF5LS	905
39	GD4IOM	2,269	227	XO67	2×16Y	EA1TA	1,231
40	G6LRC	2,267	199	ZL07	6Q	DD9HT	788
41	G6CAQ	2,259	191	ZL39	11Y	DD7LD	803
42	GU6PGS	2,062	200	YJ48	8XY	EI4EY	530
43	G4TLH	1,975	284	YN38	16Y	DL5DAV	715
44	G4KUX	1,969	186	ZO21	4×19Y	DL9YBJ	754
45	G6LYU	1,906	183	ZM57	6Q	SM6JWH	1,008
46	GW2OP	1,657	145	XL26	2×10Y	EA1ZK	1,045
47	G8IQO	1,503	132	AK12	9Y	OZ1ASP	825
48	GW4PUH	1,493	217	YN54	17Y	DD0HZ	850
49	G6BBC	1,295	181	ZM41	8Q	OZ1ASP	851
50	G8IGQ	1,292	147	ZM04	2×16Y	DL8BR	757
51	G6SQH	1,270	110	XK09	16Y	EA1ZK	907
52	G4OTV	1,232	170	AL62	8Q	—	—
53	G3CMH	1,227	124	YK07	9Y	DF6LN	935
54	G6GWZ	1,146	154	ZM59	16Y	DL8GP	631
55	G6TTX	1,065	171	AL32	8Q	F6ETI	499
56	G4SHC	1,050	197	YN40	20Q	EA1TA	1,228
57	G4KTP	1,013	125	ZO11	12Y	DF2ZC	733
58	G3SDC	1,010	176	ZM25	8Y	DL5DAY	582
59	G6YZA	950	124	AL64	—	—	—
60	G3GBU	890	174	YN80	11Y	F6APE	643
61	G4PKO	876	144	YN55	5Y	PA3AVL	599
62	G6MEM	829	155	YN30	11Y	F1FHI	724
63	G4TTT	817	145	YM20	6Q	PA3BJN	530
64	G3XEU	726	70	YK23	14P	DC2JN	753
65	G3LRS	659	131	ZM25	10Y	DB8WK	583
66	G4FWC	610	126	ZM32	12Y	TO6HRP	449
67	GM6LNM	608	60	XP07	17Y	G4BWG	593
68	G3CXX	574	138	YN49	14P	PE1FPC	520
69	G6SKU	551	106	YM60	17Y	F1FHI	570
70	GM8MNG	549	75	YP16	4×17Y	G4VJF	580
71	G6WRS	546	115	ZN23	8Y	PA3CEJ	618
72	G6PNB	494	97	YL38	9Y	PE1JUP	492
73	G6WJY	483	85	ZO13	16Y	PE1FPC	535
74	G3ERD	466	67	ZM03	4Q	DJ9YE	683
75	G4UXC	451	91	ZM71	6/6	F1FHI	551
76	G6XYH	413	99	ZO03	17Y	G4ILI	340
77	G1AKG	212	63	YO27	10Y	G3WSC	437

SINGLE-OPERATOR SECTION

Posn	Callsign	Points	QSOs	QTH	Ant	Best dx	Km
1	G4MDZ*	9,151	480	AL76	2×14Y	SM7IWG	1,118
2	G3NNG*	7,935	459	ZL23	16Y	Y22IC	1,043
3	G4MHC*	7,655	441	YM79	9Y	SM7LAD	1,104
4	G4DCV	7,589	480	AL67	14Y	SM7IWG	1,105
5	G8SRL	5,706	340	ZL67	9Y	OZ1KAL	893
6	G6ECM	5,445	403	AL56	11Y	SM6JWH	971
7	G4DEZ	5,379	409	AL35	16Y	SM6JWH	976
8	G8CKZ	4,867	367	ZK04	4×13Y	SM6JWH	1,125
9	G6VDM	4,622	285	AK03	12Y	SK6HD	1,142
10	GU6EFB	4,466	267	YJ48	2×14P	SM6JWH	1,310
11	G4BAH	4,357	314	AM77	16Y	OZ1CSI	952
12	G4ASR	4,263	380	ZL40	16Y	SM6JWH	1,042
13	G6YYC	3,546	246	ZL34	9XY	DF6LN	810
14	G4RLF	3,470	276	ZL71	14P	OZ1CSI	1,199
15	G6MGL	2,786	285	AL31	8Q	SM7LAD	986
16	G6DER*	2,691	202	ZN33	14P	DG2LD	767
17	G8LFB	2,488	170	ZL30	16Y	SM7DKF	945
18	G4HLX	2,427	247	ZL23	9Y	DK1KR	852
19	G3YDY	2,190	200	AL23	7Y	SM6JWH	965
20	G6ETA	2,027	154	AL56	19Y	OZ1FDJ	890
21	G8ERX	1,943	181	ZN27	14P	OZ1ISD	789
22	G6THQ	1,935	155	AL07	9Y	DF5LS	704
23	G4UNA	1,853	156	ZN23	16Y	DL4WCY	795
24	G6LUD	1,850	217	AL43	8Q	SM6KEG	1,007
25	G6TOE	1,564	139	AM44	16Y	DK6XY	692
26	GI4OPH*	1,553	153	XO33	2×16Y	EA1TA	1,230
27	G8UCN	1,431	116	ZN43	17Y	OZ1AFF	897
28	GW6ZUQ*	1,244	124	YL37	8Y	EA1TA	1,013
29	G4RWT	1,104	112	AL62	12Y	DF6LN	741
30	G4KVI	1,057	115	ZL37	9Y	DD0HZ	754
31	G6WZU	1,019	109	AL07	10Y	DL8BBE	482
32	G4ILI	956	162	YL10	9Y	GM6LNM	—
33	G4URT	944	119	AK02	16Y	OZ1ASP	816
34	G4DEE	932	151	YN39	16Y	DF6LK	817
35	G8ZQB	843	136	ZM35	10Y	ON4BG	536
36	G8PNN	784	114	ZP52	2×11Y	PE1EWR	544
37	G4NSD	782	110	AL51	4Q	OZ1DYC	937
38	G4DDL	691	123	ZL47	9Y	DG1BP	594
39	G4NVA	685	139	YN69	16Y	PE0IPP	540
40	G8YGD	653	109	ZL67	8Y	DF6LN	—
41	G6ICR	631	143	YN46	16Y	GM3ZBE	437
42	G8XTJ	623	78	ZL27	4Y	DD4OI	559
43	G4MKD	605	109	ZL80	11Y	G4PEM	393
44	G6JGQ	574	110	YM49	9XY	PA3BZZ	502
45	G3JMB	548	88	ZL80	7Y	DL5DAV	516
46	G4FVK	529	97	ZM39	9Y	F1FHI	610
47	G4PDP	520	90	ZM80	7Y	F6ETI	538
48	G4JLG	488	116	YN39	10Y	TO6HRR	580
49	G8XWA	470	66	YO57	4Q	G4DCV	435
50	G4TMF	459	95	YN40	16Y	TO6HRP	565
51	G6DTD	402	92	YN48	8Y	G3TRF	318
52	G4MYB	395	119	YN49	12Y	G8CKZ	—
53	G4PIO	389	69	AL16	6Q	TO6HRP	472
54	G6HXU	386	81	YN68	6Q	TO6HRP	525
55	G4VJM	385	97	YN37	8Q	G4DCV	364
56	G8AKB	375	67	ZM27	10Y	GJ8GDX	399
57	G6IOM	348	54	AL67	13Y	PE1JTE	388
58	G6DIH	221	43	YM50	8Y	TO6HRP	440
59	G2DHV	136	14	AL41	6/6	DF6LN	710
60	G6DCF	86	36	YN38	8Y	G3OGY	292
61	G6BQJ	71	31	ZL19e	5Y	TO6HRP	400
62	G6CSY	40	14	AL41	Halo	G4NXO	169

Checklogs received from: G6CSY/P, G8XTV, PE1EWR, G6PJB, PA3BHK, G4NOK/A, PD0MQD, G8JAY.

The following were disqualified: G6THD (Rule 2); G6EKL, G5MYX, G6BDV (Rule 23b); PE1GPP (Rule 3); G4TZM, G4DKI (Rule 23a); G4TNB/A (Rule 4).

*Indicates zonal award winners.

Second 1·8MHz Contest 1983 results

The contest this year was blessed with good dx conditions, and this resulted in stations from four continents—North America, Asia, Africa and Oceania, being worked, together with the normal collection of European stations.

An analysis of the logs shows a total of 410 stations active during the contest, of these, 219 were from the UK, representing 53 counties (where were the other 25?), while the 191 non-Europeans represented 33 countries (including those from the USSR). Among the active stations were W, VE, HB0, VK6HD, FC9VN, SV0AA, EA8QO, 5N8ARY, UA9, UM8, and ZB2EO.

Mike Bazley, VK6HD, wrote to say—"This was an exercise in frustration. The band was wall-to-wall with Gs, some who had signals pushing over S9 on the Icom, and I could not break through." He did finally manage to QSO two G stations in the first half-hour of the contest, and if more stations had listened hard at this time it is certain that they would have heard Mike in there. Something to remember for next year perhaps.

Equipment used:

G3RVM FT101E feeding inverted-V dipole, apex 110ft
G3MXJ SB401/SB301 feeding a 264ft inv-V at 60ft
G3SJJ/A TS180S feeding a dipole at 80ft

The standard of logs was generally high, although two entrants did have unmarked duplicates. The level of activity remained high throughout the contest perhaps indicating a need to restore contest periods to a 5h duration.

Subject to Council approval the Victor Desmond Trophy will be awarded to G3RVM. Certificates of merit will be sent to G3MXJ, G3SJJ and to the other stations indicated.

Comments from the logs

"Conditions extremely good—six Ws and two VEs worked"—*G4BUO*; "At present one gets bonuses for all G counties but one W is the lot. Some extra

incentive to work them might be introduced by bonus points for each state/Canadian province or at least for each call area"—*G3FXB;* "Conditions unbelievable! Just like the cq contest!"—*G3MXJ*; "Conditions were good and lots of stations heard"—*G8RZ;* "Top band has certainly changed character over the past few years with the arrival of so many new countries; It's a definite change for the better!"—*G3TXF*; "Conditions were excellent, and low QRN levels"—*G3SXW*;" In view of the amount of activity, may be a return to a 5h contest could be considered with a 2000gmt start"—*G3SJJ*; "Sounded more like 7MHz than 1·8MHz"—*G4UPS;*" I noticed a much higher than usual number of accurate RST reports. Must be a lot of masochists in amateur radio!"—*GM4SID.*

Check log received with thanks from G2DHV. *G4DJX*

BRITISH ISLES SECTION

Posn	Callsign	QSOs	Bonuses	Points
1	G3RVM *	176	72	879
2	G3MXJ *	174	66	850
3	G3SJJ/A *	169	68	846
4	G3FXB	173	64	834
5	G4BUO	174	61	825
6	GM3ZSP	159	66	800
7	G3PDL	158	66	787
8	G3RRS (G3UKS) † *	161	68	782
9	G3RFS †	142	70	761
10	G3IGW	154	59	734
11	G3TXF	142	59	720
12	G6UT (G3WUX)	149	62	701
13	GM3YOR	128	64	699
14	G3ZRS (G4BYG)	146	57	690
15	G3FKH	131	60	682
16	G4DKG	124	57	649
17	G3SXW	118	56	634
18	G4OBK †	122	54	629
19	G3JKS	110	55	595
20	G4UPS †	111	51	570
21	G3VIP/A	109	51	567
22	G3CCZ	99	49	531
23	G3SJE	94	48	522
24	G3OLB	96	45	504
25	G4RNF †	91	44	490
	G2MJ	90	47	490
27	G4MEM †	84	51	472
28	G4EXD/A	88	44	458
29	GM4SID	79	42	447
30	GM3OXC	80	45	444
31	G3LHJ	76	44	438
32	G3SWH	73	40	413
33	G3VYI †	77	43	410
34	G3WRR	73	38	407
35	GW3KOR	72	38	404
36	G8RZ	64	40	392
37	G3KSH * ‡	64	38	366
38	G4ECI	64	35	358
39	G3BGM ‡	60	35	333
40	G4OGB †	57	38	328
41	G3BPM	71	39	326
42	G4DJX	54	32	319
43	G3ZRZ	48	29	266
44	G3GMM	43	29	260
45	G3AWR	41	29	249
46	G8QZ	25	20	172
47	G3FVW	27	21	168

OVERSEAS SECTION

Posn	Callsign	QSOs	Bonuses	Points
1	UA2FCW *	74	39	387
2	DF3KT *	65	34	353
3	OZ1W *	73	44	339
4	F6HYR *	52	29	300
5	DJ3XD	60	33	298
6	UQ2GKM *	42	29	252
7	UT5AB *	37	27	229
8	UA3PFN *	36	26	223
9	OK1RR *	35	25	219
10	PA3AMA *	34	21	204
11	UC2AA *	29	23	181
12	DL1SN	23	19	164
13	UK9CAA *	23	19	161
14	UK5WAZ	21	17	128
15	UA9CBO	13	13	104
16	PA0DIN	13	11	94
17	OE1TKW	14	12	91
18	UB5VK	11	8	73
19	UB5KAG	5	5	25
20	VK6HD *	2	2	16

* Certificate winner † First-time entrant ‡ Senior citizen

28MHz Cumulative Contests 1983 results

The five sessions held in November and December 1983 were well supported, with over 190 different stations appearing in the 45 logs received. At times during the sessions 28MHz exhibited good examples of some of the different propagation modes that make this band so interesting. There were ground-wave, tropo and sporadic-E QSOs in addition to ms activity. Many tropo contacts were made, with distances of 100-200 miles commonplace. A few entrants, mostly those with beam antennas or high verticals, were able to cover longer distances, and there were 17 different 300 mile-plus contacts between UK stations—possibly the longest being between Sussex and Aberdeen. There were several short Es openings and much to the surprise of some entrants, OK, HA and LZ were worked in addition to several DLs (possibly these were via tropo). A number of entrants reported on the high level of meteor activity and the enhanced reception obtained during the "pings". Several competitors believe that some of their longer distance contacts may have resulted from ms reflections, but this seems doubtful.

During the quieter periods conditions were very variable and one needed a sensitive receiver and good ears to dig out the really weak signals. CB QRM, electrical noise and tv line timebase interference, together with deep QSB, did not help, but the concentration of so many cw signals on the low end of the band proved to be a real deterrent to those intruders who tried to hold ssb and fm contacts in the band.

The highest number of contacts (over 55 per session) was made by your adjudicator, who waives his right to a certificate. Next highest was G4HMS, the RNARS station on board HMS *Belfast* in the Pool of London, and the group was awarded a certificate of merit for its excellent performance. There were so many good logs from both old-timers and newcomers that the committee had considerable difficulty in deciding where to award the other certificates of merit. After a careful review of the logs, it decided to give awards to G8JM as the best "old timer", and to G4VCO for his efforts as a new licensee. Both had very accurate logs, coupled with good scores. A further "newcomer" certificate was awarded to G2PA, for in spite of his old-timer call, he has only just been licensed for the first time, G2PA was his mother's call pre-war and this contest was his first on cw.

Five receiving logs were sent in and all were very accurate. As the minimum number of entrants specified in the rules was reached, the committee awarded two certificates. The first, for the highest number of points, went to M. Harrington, BRS20249. It is a pity that Mr and Mrs Dunwoody did not give their RS numbers or their address on their logs, as the committee decided that Mrs Dunwoody should receive a certificate for her efforts as the best newcomer. This was her first contest and she only became a swl in September 1983. Her letter was postmarked Liverpool, and if she would contact the adjudicator, a certificate will be despatched to her.

Comments

Almost every entrant included comments with their logs and without exception they were in favour of the contest being an annual event. A number asked if a "phone" cumulative could be arranged during the summer months in addition to the cw sessions. This should be possible and the HF Contests Committee will discuss the proposal at a future meeting.

All the entrants were in favour of the rules, although a number felt that the omission of a QTH locator, county code or QTH caused difficulties for those who were certificate hunting, or were keen to see how far they were working. The county-code will certainly be included in the contest exchange in all future 28MHz cumulative contests. The rules did not require entrants to include declaration forms, however it was expected that entrants would include their names and addresses on the logs. Unfortunately, quite a few competitors forgot to do this and one even omitted to include his callsign, making it necessary to get this information from the logs of other stations.

Timing and dates seem to have met with universal approval. The committee thanks all those who sent in logs as well as all the other UK stations who appeared on the band during the five sessions. Next time it is hoped that they will send in entries or check-logs and not forget to include their QTH and callsign information! *G6LX*

TRANSMITTING SECTION

Posn	Callsign	Sessions 14/11	22/11	30/11	8/12	16/12	Best 3 total	Remarks
1	G6LX	135	153	141	—	138	432	HFCC
2	G4HMS*	120	139	144	117	108	402	Club
3	G4RCG	90	105	120	123	—	348	Club
4	G4VCO*	66	—	—	69	87	339	
5	G3IGW	93	90	117	72	60	300	
6	G8JM*	—	87	102	75	51	264	Lic Feb '37
	G3IMW	—	78	99	—	87	264	
8	G3MCX	57	84	78	60	90	252	
9	G2PA*	81	—	75	63	84	240	Lic late '83
10	G4OGB	66	75	93	63	66	234	
11	G4OTV	—	75	75	60	57	210	
12	G2HLU	57	—	84	33	51	192	
13	G3GHY	48	54	78	30	45	180	
14	G4PUR	45	—	69	51	57	177	
15	G4DBL	69	18	78	—	—	165	
16	G4EYD	51	54	51	27	15	156	
17	G4NFX	—	—	51	51	51	153	
18	G3OZT	39	51	60	—	39	150	
	G3URA	27	39	54	27	57	150	
	G4ENA	33	36	69	45	27	150	
21	G4IXE	33	45	57	33	39	141	
22	G4FNC	39	42	57	36	27	138	
	G4FKS	42	54	39	42	42	138	
	G3GQC/A	CK	—	42	51	45	138	Club
25	G3KCD	21	42	51	30	—	123	
26	G3WP	21	57	—	21	39	117	
	G3BUF	9	36	24	42	39	117	
28	G3VDW	36	18	45	30	30	111	
29	G4NVO	18	21	39	27	42	108	
30	G3HAL	—	39	36	18	27	102	
31	G4OBK &/M	—	—	45	36	15	96	
32	G4KKZ	36	27	30	CK	CK	93	
33	G3ICH	30	—	12	18	33	81	
	G4SDZ	21	21	39	18	12	81	
35	G4UNE	21	24	—	—	30	75	Lic Aug '83
36	G4PMM	36	—	36	—	—	72	
37	G4SUO	15	15	18	—	33	66	
38	G3XYF	—	18	21	15	12	54	
39	G2BTO	—	—	—	30	18	48	
40	GW4ULG	15	18	12	12	12	45	
41	G3AWR	6	6	—	—	—	12	
—	G4BUO	CK	CK	CK	—	CK	—	HFCC
—	G4KIE	CK	—	CK	CK	CK	—	
—	G4RWW	CK	CK	—	—	—	—	HFCC

RECEIVING SECTION

Posn	Station	Sessions 14/11	22/11	30/11	8/12	16/12	Best 3 total
1	BRS20249*	57	42	30	—	—	129
2	BRS44395	36	51	36	27	18	123
3	Mrs R Dunwoody*	—	—	—	18	57	75
4	P. Dunwoody	12	12	—	—	—	24
5	C. Wilde	4	2	6	—	—	12

*Certificate winners

432MHz Cumulative Contest 1983 results

A different format, an eight-day cycle alternating between 432MHz and 1,296MHz, was used for the 1983 cumulatives. Most entrants preferred the new format, but several would have liked no change. All the comments received will be carefully considered before the 1984 format is decided. The

committee were pleased to receive two entries from GM—please will the southern stations beam north occasionally?

Conditions were generally average except in session 2 (23/10), when the remains of a major tropo lift to D, OZ and SM greatly benefited stations in the south-eastern corner of the country, especially those at low altitudes. This determined the results of the contest, and made the scores in the other sessions of academic interest only. One leading station scored 10 times his average score in the other sessions, while stations in the north and west were struggling to obtain even a modest increase from the lift. Log keeping was generally good, but most stations lost a few points for occasional errors.

Congratulations and certificates go to G4LOJ and G8FEZ. *G4JLG*

Posn	Callsign	Points	QTH	Power (dbW)	Ant	Best dx	Km	Sessions
1	G4LOJ	2,060	AM37	+26	27QLY	DL1ZC	601	1,2,3
2	G8FEZ	1,821	AL56	+18	17Y	OZ1CST	998	1,2,3
3	G8TFI/P	1,767	YL29	+26	4×16Y	PE1GYE	550	2,3,4
4	G4THB/P	1,741	ZL53	+25	21Y	DK3FB/A	630	1,2,3
5	G8ZHP	1,619	ZM29	+25	2×21Y	DB2VY	641	2,3,4
6	GW8REQ/P	1,273	YN64	+17	17Y	PE1EWR	498	1,2,3
7	G4NVA/P	1,221	YN79	+18	2×19Y	F1DME	572	2,3,4
8	G4FRE	1,193	AL07	+26	19Y	SM7NNL	1,101	2,3,5
9	G6ETA	1,006	AL56	+19	17Y	DL1ZC	662	1,2,3
10	GW3EOP/P	895	YL23	+17	2×19Y	PE0MAR	526	1,2,4
11	G8HHI	774	ZL56	+19	2×21Y	PA0VVH	468	1,2,4
12	G3GJL	670	YM58	—	—	PE0MAR	447	1,2,3
13	G6HKM	582	AL31	+10	19Y	DF4KT	474	1,2,3
14	G4TAW	472	AL51	+10	19Y	DL3IS	648	2,3,4
15	G4DDL	396	ZL47	+9	19Y	PE1AFY	383	2,4,5
16	G6CSY/P	320	AL51	+7	12Y	GW8AAP/P	304	3,4,5
17	GM8MJV/P	299	YP19	+23	2×21Y	G4HWA	506	2,4,5
18	G8FMK	295	ZL26	+16	11Y	GD2HDZ	357	1,3,4
19	G6GJD	288	YN15	+15	2×48MB	G4COR	385	1,2,5
20	G8AAY	251	YK20	+9	18PBM	PE1EWR	398	1,2,4
21	G6KCG	202	AM27	+10	20QLY	PE1DOE	325	1,2,5
22	G4AFJ	193	ZM05	+20	18PBM	PE1CKK	430	1,2,3
23	GM8GFF	21	YP04	+10	18PBM	GM4HIG	155	2,4,5

10GHz Cumulative Contest 1983 results

Almost all entrants commented that activity was down when compared to last year. There was also very little narrowband activity, possibly because some of the high power stations were not very active this year. The adjudicator was pleased to receive a large entry from Germany, Austria and Switzerland. The RSGB is trying to sponsor the idea of a 10GHz cumulative contest throughout Region 1, and this year the Germans managed to organize a contest on one of the RSGB dates. Since they were not active for three events, their entries cannot be considered for awards, and so they are tabulated separately.

Congratulations to the following stations, who will receive certificates: GW3PPF/P (overall winner, and leading low power wideband station); G3PHO/P (runner-up); G4MBS (leading fixed station); F8WN/P (leading foreign station); and G4FHQ/P (leading station who has not won an award before). G3WDGG

UK stations, and foreign stations active for three events

Posn	Callsign	Points	QSOs	Best dx	Km	Mode	QTH
1	GW3PPF/P	2,417	25	G3PHO/P	141	WB	YM
2	G3PHO/P	2,324	28	GW3PPF/P	141	WB	ZN
3	G8HMV/P	1,940	35	G3PHO/P	103	WB	YM
4	G3ZME/P	1,901	32	G8AFC/P	128	WB	YM
5	G4FHQ/P	1,783	32	GW3PPF/P	92	WB/NB	ZM
6	G4FRE/P	1,735	9	PE1CKK	256	NB	AM/AL
7	G8ASW/P	1,567	23	G8AFC/P	122	WB	YM
8	G8UDT/P	951	21	F3LP/P	158	WB	ZK
9	F8WN/P	890	10	G8GKV/P	176	WB/NB	ZJ/AJ
10	G8GKV/P	750	18	F8WN/P	176	WB	ZK
11	G4EML/P	734	19	G8KHU/P	70	WB	ZL
12	G2DSP/P	681	21	G6TEA/P	101	WB	ZK
13	G4ETU/P	655	21	G6TEA/P	101	WB	ZK
14	G4NBC/P	610	19	GW8CKT/P	152	WB	ZL/ZK/XK
15	G3AYJ/P	595	11	G8AGN/P	95	WB	YM
16	G4MBS	385	11	G3FYX/P	107	NB	ZL

Foreign stations active for one event

Posn	Callsign	Points	QSOs	Best dx	Km	Mode	QTH
1	DJ4YJ/P	3,388	17	DB9US/P	247	WB	FH
2	DL8RAH/P	2,537	23	DJ4YJ/P	243	WB	GI
3	DJ9SR/P	2,314	20	DJ4YJ/P	243	WB	GJ
4	DG2ND/P	2,272	19	DJ4YJ/P	247	WB	GJ
5	DH5RAB/P	2,136	18	DJ4YJ/P	220	WB	GI
6	DB9US/P	2,127	18	DJ4YJ/P	247	WB	GJ
7	OE2GKM/2	1,797	19	DK1JU/P	154	WB	GH
8	OE2JG/2	1,661	18	DJ1SR/P	143	WB	GH
9	HB9MMM/P	1,520	12	F1ELJ/P	183	WB	EH
10	DL6MH/P	1,488	15	DK3AS/P	162	WB	GI
11	DJ7FJ/P	1,456	15	DJ4YJ/P	229	WB	EH
12	DK3AS/P	1,382	11	DB9US/P	183	WB	FH
	DK3AU/P	1,382	11	DG2ND/P	183	WB	FH
14	DK9RF/P	1,320	13	DJ4YJ/P	243	WB	GJ
15	DF9MT/P	1,279	12	DJ9SR/P	154	WB	GH
16	OE8MI/P	1,270	12	DJ9SR/P	155	WB	GH
17	DL9RAH/P	1,264	11	DJ9SR/P	153	WB	GH
18	DC5GF/P	1,217	13	DJ4YJ/P	229	WB	EH
19	DJ5AP/P	1,188	13	DJ4YJ/P	229	WB	EH
20	OE2BM/2	1,167	14	DJ9SR/P	144	WB	GH
21	DJ3MY/P	1,081	9	DB9US/P	175	WB	FH
22	DK1WH/P	852	6	DJ9SR/P	173	WB	GH
23	DJ2UH/P	806	8	DG2ND/P	152	WB	GH
24	HB9MIO/P	769	10	HB9BAT/P	177	WB	DH
25	DD5CA/P	687	10	DJ4YJ/P	187	WB	EI
26	HB9MIN/P	663	8	HB9MMM/P	177	WB	DH
27	DG1RS/P	509	10	OE8MI/2	110	WB	GI
28	DL9GBJ/P	437	5	HB9MMM/P	163	WB	EI
29	DC6GS/P	421	9	OE8MI/2	110	WB	GI
30	DK4GD/P	378	6	DJ4YJ/P	185	WB	EI
31	DF5SL/P	217	4	DC5GF/P	70	WB	EI
32	DL2AS/P	138	4	DC8NV/P	61	NB	GH
33	DJ8VY/P	35	1	DL2AS/P	35	NB	GI
34	DJ6XV/P	12	1	DL5YAG/P	12	WB	EJ

The following stations were also active: G8MWR, G3PFR, G6UHF, G4OLO, G6CUN, G6EWZ, G8UGL, G3YJH, G8SWZ, G3KEU, G3FYX, G3VKV, G8PEE, G8EBM, G8ROU, G3KPT, G4APV, G8AFC, G8CZE, G8HMV, G6CJW, G8FWA, G4LFS, G6FIO, G8AGN, G8VZT, G6FWZ, G4EBF, G3LQR, PA2DOL, PA3BPC, PA0EZ, PA2DRV, PE1GHG, PE1CKK, G3IW, G3JHM, F6DCK, F3LP, G8MBU, G8CIU, G8KHU, F1BQ, F6DPH, F1FYM, F9XG, G3YGF, G4/WB6YLI, G3KEV, G6TEA, G8EML, GW8CKT, G3UFW, G3BNL, DC1RA, HB9CKA, DH3RAB, HB9CKC, DL1SBE, DK2NF, DG2NG, DL9GBG, DL5YAG, DL8RAH, OE9MDI, DL8GBI, DJ4VJ, F1ELJ, DB3RL, HB9MTL, DL6NBM, DB2GM, DL2DO, DJ1CR, DL3ER, DJ8WS, HB9BAT, DK1JU, HB9CNU, DF2CU, DC8NV, OE1RVW, DC4GZ.

Check logs were received with thanks from G3TDX/P, G4LFS/P and G6EWZ/P.

Microwave Cumulative Contest 1983 results

This year's entry was slightly down on last year, again with no entries for 24GHz. It is possible that the co-timing of this event with the 10GHz contest is not helping activity.

Congratulations to the bandleaders G4LOJ (2·3GHz), and G4FRE/P (3·4 and 5·7GHz), who will receive certificates of merit. *G3WDG*

2·3GHz BAND

Posn	Callsign	Points	QSOs	Best dx	Km	QTH
1	G4LOJ	1,013	7	PA3AGS	225	AM
2	G4FRE/P	800	6	PA0FRE	219	AL
3	G8ADC/P	108	5	G3ROZ	76	ZL
4	G4MBS	44	1	G8EUQ	88	ZL

Bandleader's equipment: EC157 mixer, EC157 driver, EC157 pa (3W out): bipolar preamp SIM21 mixer: 20-el QLY at 20ft.

3·4GHz BAND

Posn	Callsign	Points	QSOs	Best dx	Km	QTH
1	G4FRE/P	1,175	6	PA3BPC	256	AM
2	G4MBS	95	1	G3FYX/P	95	ZL

Bandleader's equipment: BXY28 varactor tripler (1·25W out); NE64535 + V222 preamps into interdigital converter: 0·8m dish

5·7GHz BAND

Posn	Callsign	Points	QSOs	Best dx	Km	QTH
1	G4FRE/P	59	2	G3ZEZ	32	AL
2	G4MBS	37	1	G3BNL/P	74	ZL

Bandleader's equipment: VSC64J varactor quintupler (125mW out): MGF1401 to G3JVL mixer: 0·8m dish.

RSGB HF Contests Championship 1982/3 results

Posn	Callsign	Contests 1	2	3	4	5	6	7	8	9	10	Total
1	G4GIR	30	60	5	0	70	70	80	0	40	0	355
2	G3FXB	15			35			100			40	190
3	G4CNY		70			15		60		30	0	175
4	G3PDL			20	5	40		50		35	15	165
5	G3SXW		0		10	50		40		60		160
6	G3SJJ					60				50	25	135
7	G3PEK				0	0	15	70				85
8	GW3YDX			40	40							80
9	G4BUO	0	30	25	0	10		0			10	75
10	GW3NYY			30	35							65
11	G3UOF					0	60					60
12	G3XBY					0	40	10			0	50
13	G3NOM		40					0				40
	G4NUT/A	40		0								40
15	G4NDL		0			0	30					30
	G2QT	0	0			0		30				30
	G3XTJ			15	15			0				30
18	G3TXF	0	0		0	5		0		0	20	25
	GW3MPB		0					0		25		25
20	G3NKS					0				20	0	20
	G3UFY			0		20						20
22	G3SYM			10							0	10
	G3HVX		10								0	10
24	G4MBC	0	5		0							5
	G4ARI								5		0	5
	G4BOU			0	0	0				5	0	5
	G4IQM					0				5	0	5

1 21/28MHz Telephony
2 21MHz CW
3 Second 1·8MHz
4 First 1·8MHz
5 7MHz CW
6 7MHz Telephony
7 Commonwealth
8 Low Power
9 Region Round-up
10 Summer 1·8MHz

AWARDS
The G2QT Trophy to I.C. Frith, G4GIR
Runner-up certificate to A. Slater, G3FXB

21/28MHz Telephony Contest 1983 results

This year's event was again well supported, with entries from the UK only slightly down on last year. Once again conditions on 28MHz particularly were described by most entrants as very good. The receiving section once more produced a disappointing number of entries.

G3RRS, operated by G3UKS, won the Whitworth Trophy as overall winner in the UK transmitting section. The winner of the Powditch Trophy for 28MHz operation was GW4BLE, last year's overall winner. The Metcalfe Trophy for the receiving section was won again by RS32525 (this I believe is the ninth year in succession that Bob has won this trophy), and the Powditch Receiving Trophy was won by J. Singleton. In the overseas section this year's winner was UB5FDF, who won from LZ2VU. Entries in this section were down on previous years.

The standard of log keeping was generally good with one or two exceptions. There was a certain amount of confusion in some entrants' minds with regard to working British Isles stations. The vast majority did not claim and those who did have had their scores adjusted accordingly. Once again some people claimed for both I and IT, and the USSR countries also seemed to confuse some entrants. One log claimed 126 multipliers—this was reduced to 84 on checking!!

Equipment used and breakdown of the scores of the leaders

G3RRS TR7 plus linear, two-el quad at 75ft on 21, and four-el quad at 45ft on 28MHz

G3XBY TR7 plus linear, three-el Yagi at 65ft on 21, and three-el Yagi at 60ft on 28MHz

G3MXJ TS930, TH6DXX at 60ft

GW4BLE FT107M plus linear, TH5 at 50ft

	21MHz Points/mults	28MHz Points/mults	QSO total
G3RRS	1,267/84	1,770/62	1,028
G3XBY	1,604/76	1,428/58	1,013
G3MXJ	1,532/75	1,387/50	974
GW4BLE	—	2,413/65	808

Comments received with the logs included the following: "an excellent contest of just the right duration"—*G3XBY*; "Think I spent too much time looking for multipliers"—*G4BUO*; "Apart from my linear blowing up a good contest"—*G4AFJ*; "We enjoyed the day and will try and do better next year"—*G4HZW*; "Thanks to the committee for organizing a most enjoyable contest"—*G4AMT*; "It struck me that the contest was not very well supported by the UK—so come on you Brits, there's plenty of room on 28MHz for us all"—*GW4HSH*; "A lot of fun after 46 years QRT and I'm not worried if I do come bottom of the list"—*G6QQ*; "This is a very good contest to avoid rotator wear—*G4DZC/W2*; and finally "I must comment on the degree of operating skill and courtesy exhibited by British amateurs in this and other contests. I salute your amateur expertise"—*PP2ZDD/W2LEJ. G3KDB*

UK TRANSMITTING

Posn	Callsign	Points	Posn	Callsign	Points
1	G3RRS	443,402	30	G4MGQ	32,805
2	G3XBY	406,288	31	G3LTY*	30,711
3	G3MXJ	364,875	32	G4MET	29,952
4	G4IUF	270,940	33	G4FJT	29,040
5	G4BUO	266,685	34	G3UFY‡	24,067
6	G4DRS	253,162	35	G4BXN	23,954
7	G3ZYY/A	190,444	36	G4ORC/A*	18,522
8	G4NUT*	183,960	37	G4PIQ	16,591
9	GW4BLE‡	156,845	38	G2FNK‡	15,708
10	G4AFJ	145,758	39	G6QQ	15,615
11	GU3HFN*	142,056	40	G4JTR	15,228
12	G4NOK*	139,048	41	G3NSY	14,160
13	G3PJK	123,984	42	G4DXW	12,267
14	G4HZW/P*	119,584	43	G4SDZ*	11,808
15	G2QT	113,319	44	G4RJM	11,620
16	G3XWZ	106,571	45	GM4JFS	11,508
17	G4AMT	95,115	46	G3OLU	11,439
18	G3IGW	94,926	47	G4DBW	11,115
19	G4ATH/A*	93,240	48	G4IWO*	9,984
20	GW4HSH	90,825	49	G4OVG	9,384
21	G3WBM/P	53,159	50	G3ZDF‡	8,829
22	G4NLZ*	51,545	51	G4RHS	7,006
23	G4OBK	50,388	52	G4NDL	6,734
24	G4BP*	46,530	53	G3GUP	5,511
25	G3FYO*	42,840	54	G3VLX	4,950
26	G4JWD/P*	40,592	55	G4NRJ	3,432
27	G4FOH	39,666	56	G2AJB	2,508
28	GM5AXY	36,642	57	G3TGR‡	1,344
29	G8DR	35,868			

*Multi-operator
‡28MHz only
Check logs received from G3EBH, G3IQF/M, G3XQP, GM3OM and GM3OXC.

OVERSEAS TRANSMITTING

Posn	Callsign	Points	Posn	Callsign	Points
1	UB5FDF	71,526	45	UA3TN	2,090
2	LZ2VU	52,577	46	WI4R	1,980
3	PP2ZDD	51,516	47	HK3NBB	1,776
4	UB5GBD	50,200	48	N8CQA	1,650
5	UK4FAV	49,428	49	VK6IH	1,630
6	EA9LZ	37,352	50	UA3TAG	1,448
7	UA6LBC	35,340	51	LA1H	1,432
8	G4DZC/W2	29,130	52	EA5CVN	1,431
9	JY9CL	29,087	53	W1CNU	1,392
10	4N4DD	24,927	54	W4WIJ	1,353
11	UA6LHB	22,152	55	K8PYD	1,176
12	NE8I	16,652	56	EA6LA	1,134
13	UK3DDU	14,664	57	OH3NE	1,095
14	IO8WYD	12,873	58	OH4EM	1,050
15	UA3QBP	12,840		N2AMJ	1,050
16	VE3LAJ	11,682	60	YO9FL	903
17	UC2OCN	10,455	61	UP2PBM	864
18	UA9MAF	10,410	62	UA3TES	756
19	UK6LBM	10,206	63	UA3TDX/UF6	702
20	9K2BE	10,203	64	LA1XDA	684
21	CT4MS	9,894	65	LA9DA	648
22	YO6KEA	9,576	66	W3NQA	644
23	OH6GZ	8,908	67	UR2QD	612
24	LZ1CW	8,585	68	YO8AEZ	600
25	ZS6WB	8,550		OK3YK	600
26	UW1AE	8,175	70	EA3BOX	576
27	N4UH	8,008	71	JG1FVZ	528
28	EA8AKN	7,056	72	UA6LTA	516
29	EC4BIR	7,050	73	JA0VHI	408
30	W3ARK	5,340	74	UF6FER	390
31	OK3CRH	5,202	75	OH7NW	360
32	UY5TE	4,710		YU7SF	360
33	I7VEZ	4,199	77	EA5JC	260
34	ZS6KU	3,924	78	VE3FEA/M	258
35	A92P	3,861	79	N8AXA	255
36	LZ1GD	3,445	80	W8VEN	246
37	PS7KM	3,180	81	JH7YAW	240
38	YO3CD	2,805	82	YU3TE	196
39	K0SCM	2,730	83	JA0FMB	192
40	EA8TE	2,652	84	EI7CC	180
41	YO9HT	2,607	85	YO9CBZ/9	175
42	EA8ADY	2,379	86	UA2FFC	162
43	JA2APA	2,112	87	F6BVB	126
44	RA3TET	2,100	88	UD6DER	117

Contests Calendar

1 and 3 March	First Bylara *(Rules in February* MOTA*)*
3-4 March	ARRL International DX (Phone) *(Rules in February* MOTA*)*
3, 4 March	144/432MHz & SWL *(Rules in February issue)*
10, 11 March	Commonwealth *(Rules in November issue)*
17 March	Town & County *(Rules in January issue)*
17-18 March	Bermuda *(Rules in February* MOTA*)*
24-25 March	CQ WW WPX (SSB) *(Rules in March* MOTA*)*
24-26 March	BARTG Spring RTTY *(Rules in March issue)*
25 March	Barking R&ES 144MHz *(Rules in March issue)*
1 April	ROPOCO 1 *(Rules in March issue)*
8 April	432MHz CW *(Rules in February issue)*
14-15 April	BARTG Spring VHF/UHF RTTY *(Rules in March issue)*
15 April	Stevenage & DARS 144MHz fm *(Rules in March issue)*
15 April	Low Power *(Rules in February issue)*
May-September	10GHz Cumulative
May-September	Microwave Cumulative
5, 6 May	432MHz-24GHz
13 May	LF Phone WAB*
19, 20 May	144MHz & SWL
20 May	Region Round-up
2, 3 June	HF NFD *(Rules in February issue)*
3 June	70MHz & SWL
9 June	1,296MHz Trophy
10 June	432MHz Trophy & SWL
23, 24 June	Summer 1·8MHz
24 June	VHF 144/432MHz Phone WAB*
7, 8 July	VHF NFD & SWL
15 July	Low Power Field Day
4 August	432MHz Low Power & SWL
5 August	144MHz Low Power & SWL
19 August	1,296/2,320MHz
26 August	ROPOCO 2
1, 2 September (prov)	SSB FD
1, 2 September	144MHz Trophy and IARU VHF & SWL
16 September	70MHz Trophy & SWL
October-December	432MHz Cumulative
October-December	1,296MHz Cumulative
6, 7 October	432MHz-24GHz & IARU UHF
7 October	21/28MHz Phone
21 October	21MHz CW
28 October	70MHz Fixed
3, 4 November	144MHz CW & Marconi Memorial
4 November	LF CW WAB*
10, 11 November	2nd 1·8MHz
12, 20, 28 November, 6, 14, December	28MHz Cumulatives
2 December	144MHz Fixed
16 December	70MHz CW

* Rules, logsheets and other information from Steve Lawrence, 7 Ashfield Road, Market Harborough, Leics.

Posn	Callsign	Points	Posn	Callsign	Points
89	AJ0N	108	93	JF2AFJ	45
90	JA1AAT	81		JH5OXF	45
91	W9YCV	72	95	JA1JGP	42
92	JL1KCO	66	96	JA1AAV	36

Check logs: HA4XX, HA5FA, HA5UA, KD9EJ/VE3, OH3UJ, RA3AGN, SV1EN, UA3TAM, UA4CO, UA6HCS, UK5DAA and Y38UF.

UK RECEIVING

Posn	Station	Points	Posn	Station	Points
1	RS32525	89,356	5	RS26407	34,128
2	J. Singleton	78,765	6	RS1066	18,312
3	RS48909	47,025	7	RS20249	14,904
4	RS44395	35,292	8	RS28198	9,588

OVERSEAS RECEIVING

Posn	Station	Points	Posn	Station	Points
1	UB5-073-3135	15,225	8	JA6-9330/JA1	672
2	UB5-073-1610	7,467	9	OE-15818	600
3	NL 4483	4,095	10	Y2-8983/F44	567
4	UA9-165-966	3,432	11	JA6-35444	300
5	WDX9IIK	2,970	12	Y2-EA-12003/L42	210
6	UL7-023-406	1,320	13	NL 2590	150
7	DE1WSS	960			

ROPOCO 1 1984 rules

1. The general rules for RSGB hf contests, published in the January 1984 issue of *Radio Communication*, will apply.

2. Eligible entrants. All paid-up members of the RSGB resident in the British Isles holding a Class A licence. Single-operator entries only.

3. When. 0800-1000gmt, Sunday 1 April 1984.

4. Contacts. CW in the 3·5MHz band only. Entrants are requested to confine their operations to 3,510-3,590kHz. Send RST plus—for the first contact, entrant's own postal code; for the second and subsequent contacts, the postal code received in the previous contact. Contacts with European stations will not count for points.

5. Scoring. 10 points per contact.

6. Entries. Logs must be sent to G3KDB, PO Box 73, Lichfield, Staffs WS13 6UJ, postmarked not later than Tuesday 17 April 1984.

7. Awards. Certificates will be awarded to the first, second and third placed entrants.

144MHz CW Contest November 1983 results

Conditions were about average for this contest. Support in the main was up on 1982, especially for the single-operator 6h, where there were 21 entries compared with 12 last year. The support, however, for the multi-operator 6h dropped from eight to four. The 24h part of the contest was timed to coincide with the IARU Region 1 Marconi Memorial Contest, and a number of entrants asked for their logs to be forwarded for international judging.

Comments from entrants included "Thanks for a most enjoyable contest, the first I have entered", *G4RGK*; "Please introduce a rule to give a bonus or multiplier for each large locator square worked", *GW3NYY* (to persuade stations to look to the west); "Rules, times etc fine, don't change", *G3CCZ*; "Nice not to have to send QTH", *G4DCV*; "A very enjoyable contest—my first entry and I found it very challenging", *G4EZA*; "Thanks to the RSGB and ARI Contests Committees for organizing this contest. It was good to hear so much on 144MHz cw", *G4ALG*; "Suggest a special morse test before one is allowed to use an el-bug", *G3PZP*; "This was our first cw contest and thoroughly enjoyed", *G8ZK*; "How about another cw contest in summer to make it three a year (perhaps run as a cumulative)", *G4MVA*.

Overall the contest was well enjoyed and several entrants were pleased to see the QTH requirement dropped. Operating standards were high and the operating courteous and in most cases slick, although there were some exceptions. A number of the entrants were first-time contest operators who had yet to develop a polished fist. It was agreed that the timing was about right, with good support for both the 6h and 24h events. Certificates go to the winners of each section. Check logs were received with thanks from G2DHV, G3FXA, G4NPM, G4SVD and G5LR/P. *G3FZL*

SINGLE OPERATOR 6h

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4MDZ	1,654	130	AL76	DK0TU	848
2	G4DCV	1,274	108	AL67	DF5JT	681
3	G3NNG	992	102	ZL23	DK8ZB/P	805
4	G3VIP/P	828	92	ZN49	DL8GP	663
5	G4AGQ*	714	88	ZL66	F6HYE/P	742
6	G4EZA	677	73	AL05	DK0OX	632
7	G3SCZ	572	78	ZL55	DK0BN/P	643
8	G4HZF/P	538	48	ZN50	F6EZV/P	635
9	GW4ALG*	510	68	YL37	PA2VST	522
10	G4CXT	492	74	ZL46	DF0WCY	563
11	G3RZP	453	65	ZL31	DL0SE/P	647
12	G8LM	413	50	ZM26	ON5XG/A	444
13	G4ORC/P	371	55	ZN31	GU4HUY	479
14	GN3LKY/P	322	30	XO26	F6KAW/P	666
15	G3TUX	315	49	ZL77	GD4IOM	430
16	G5ECD	296	48	ZM15	F6EYM	418
17	G4OUT	281	39	YM20	F6KAW/P	388
18	G3DAO	234	26	XK30	GM3LKY/P	234
19	G2VJ	225	33	ZM42	ON5UG	385
20	GI4TAP	219	23	XO31	G3WKS/P	579
21	G4HFT	208	34	YL09	PA0FHG/P	433

*IARU Region 1 contest entry

MULTI-OPERATOR 6h

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4SFY*	899	73	AM18	OK1KTL/P	836
2	GW4MGR/P	826	90	YN64	F6BRG/P	602
3	G4NSE/P	501	49	ZO46	F6EYM/P	599
4	GM4UFP/P	137	25	YP18	PA0FHG	—

*IARU Region 1 contest entry

SINGLE-OPERATOR 24h

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	DK3UZ	2,653	209	EN20	F6KAW/P	772
2	G4NDG/P*	1,009	108	YK21	DF0WCY	786
3	G4NBS*	712	116	ZL48	DK0BN/P	608
4	G4RGK*	673	93	ZL37	F6CSQ	681
5	GW3NYY*	667	59	XL40	DF7KF	748
6	G3CCZ	624	68	AL04	DK0OX	646
7	G4SWX*	613	57	AM76	F6CSQ	613
8	G4GGV	556	94	ZL37	DL0SE/P	560
9	G4JFN*	439	63	ZL57	DL2OM	595
10	G3EDD	354	42	AM62	DK1PZ	658
11	G2FNK	337	49	YK28	PA0FHG/P	573
12	G2WS	226	38	YL56	F6FLB/P	328

*IARU Region 1 contest entry

MULTI-OPERATOR 24h

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4NUT*	2,331	246	ZM77	F6HYE/P	801
2	GD4IOM*	2,279	177	XO67	ON5PL/A	809
3	G3WKS/P*	2,063	210	AL73	DK3UZ	707
4	G4SIV*	1,992	180	ZM29	F6EAH	844
5	G4TLH/P	1,660	184	YN38	DL0SE/P	734
6	G4EKT/P*	1,520	134	ZO69	DK1PZ	734
7	G4VIX	672	100	AL32	DK0BN/P	557
8	G4PQX	625	83	YK38	DF0WCY	663
9	G8ZK*	40	8	ZM04	GD4IOM	260

*IARU Region 1 contest entry

BARTG Spring VHF/UHF RTTY Contest rules

1800gmt 14 April-1200gmt 15 April 1984

Rules for this contest may be obtained by sending an sae to Peter Adams, G6LZB, BARTG Contests Manager, 464 Whippendell Road, Watford, Herts WD1 7PT.

BARTG Spring RTTY Contest rules

0200gmt 24 March-0200 26 March 1984

Rules for this contest may be obtained by sending an sae to Peter Adams, G6LZB, BARTG Contests Manager, 464 Whippendell Road, Watford, Herts WD1 7PT.

Barking R&ES 144MHz Contest 1984 rules

25 March 1984, 1300-1700gmt

The rules for this contest, which are similar to those published in the March 1983 issue of *Radio Communication*, may be obtained from BRS31976, 32 Wellington Road, Rayleigh, Essex SS6 8EZ, on receipt of an sae. Entries should also be sent to this address, and should be postmarked not later than Saturday 14 April 1984.

Stevenage & DARS 144MHz FM Contest rules

15 April, 1300-1700gmt

144·5-144·845 and 145·2-145·475MHz.

Further information from The Contest Secretary, Bernard Dean, G6NZC, 82 Lingfield Road, Stevenage, Herts SG1 5SN. Please enclose sae.

Slade DF Qualifying Event results

Twenty-one teams gathered at Lickey Beacon, Birmingham, ready for the start of the last qualifying event of 1983, when Murphy struck again, this time at the organizer, not the competitors. Due to unforeseen circumstances the crew of station B had not made contact with the organizer by 1300bst, although both had been searching the same df site for each other for over 2·5h. Graham Taylor and Dave Holland came to the rescue and provided a suitable transmitter and operator. With a last minute change in frequency station B was on the air at 1400bst. Armed with an approximate bearing for B and a weak signal from A nearly all the competitors left the start by 1335 to travel west to the edge of the map. Station A was located only two miles away from Lickey Beacon, and most travelled six or seven miles too far. Station B was located on the Wrens Nest near Dudley, not too well hidden due to the last minute panic but surrounded by the 100ft steep sides of a disused quarry. Several competitors spent nearly an hour scaling the muddy sides in the rain before finding the right location. The 1400bst transmission was heard by most competitors but only seven found both stations.

Tea was served for 42 at the New Fullbrook, Walsall, where the results of this event and the final scores for the Bert Simmonds Trophy were given.

Posn	Name	Club	Time of arrival Station A	Station B
1	R. Parsons	Burton-on-Trent	1442	1602
2	D. Holland	South Manchester	1441	1604
3	C. Plummer	Mid-Thames	1441	1608
4	A. Simmons	Mid-Thames	1441	1609
5	B. Poole	Mid-Thames	1506	1611
6	R. Vickers	Slade	1454	1619
7	T. Gage	Mid-Thames	1508	1626
8	A. Williams	Braintree	1505	1628
9	P. Lisle	Mid-Thames	1504	1628
10	C. Merry	Dartford Heath	1442	—
11	M. Ellis	South Manchester	1442·5	—
12	B. Nepham	Mid-Thames	1508·5	—
13	N. Rathbone	Slade	1510	—
14	D. E. Newman	Slade	1514	—
15	P. Woollett	Dartford Heath	1515	—
16	D. Yorke	South Manchester	—	1536
17	I. Deacon	Dartford Heath	1613	—
18	A. Judd	Mid-Thames	1632·5	—
19	C. McKenzie	South Manchester	1616	—
20	P. M. Williams	Slade	—	—
21	M. Sheriden	Slade	—	—

R. Parsons and C. Plummer qualify for the national final.

Bert Simmonds Memorial DF Trophy results 1983

Posn	Name	1	2	3	4	5	6	7	8	Total
1	W. North	6	6	-	-	9	2	-	-	23
2	E. Mollart	9	-	-	-	1	6	6	-	22
3	M. Hawkins	-	9	6	-	6	-	-	-	21
4	A. Williams	-	-	9	3	4	3	-	-	19
5	P. Lisle	-	2	2	-	2	9	3	-	18
6	T. Gage	-	1	-	4	-	-	9	-	14
7	G. Whenham	2	-	-	6	-	4	-	-	12
8	B. Bristow	-	-	-	9	-	-	2	-	11
9	R. Parsons	-	-	-	-	-	-	-	9	9
10	D. Holland	1	-	-	-	-	-	1	6	8
11	D. Newman	-	3	4	-	-	-	-	-	7
12	B. Poole	-	-	3	-	-	-	-	2	5
	C. Plummer	-	-	-	1	-	-	-	4	5
14	I. Butson	4	-	-	-	-	-	-	-	4
	P. Tyler	-	4	-	-	-	-	-	-	4
	C. Wells	-	-	-	-	-	-	4	-	4
17	D. Brocks	-	-	-	-	3	-	-	-	3
	M. Easterbrook	3	-	-	-	-	-	-	-	3
	R. Vickers	-	-	2	-	-	-	-	1	3
20	C. Merry	6	6	6	2	-	-	-	-	2
21	A. Judd	-	-	-	-	-	1	-	-	1

1 = Oxford
2 = Chelmsford
3 = Coventry
4 = Rugby
5 = Dartford Heath
6 = Salisbury
7 = Mid Thames
8 = Slade

Verulam ARC Contest 1983 results

(In the transmitting sections only the first three stations are shown)

SECTION 1—1·8MHz

TRANSMITTING SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	G2BBC	6,255	13	G4CNH	1,219
2	GW4MTL/A	5,504	14	G4SUP	900
3	G3UJV	5,060	15	G2AIA	874

RECEIVING SECTION

Posn	Station	Points	
1	N. Henbrey, RS28198	2,400	Check log received with
2	J. Goodrick, RS44395	1,612	thanks from G3BGM.

SECTION 2—144MHz

TRANSMITTING SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	G4PSX	9,306	17	G6TTX	2,205
2	G4ARI	7,224	18	G6CNQ	1,881
3	G3VER	5,994	19	G6LUD	1,805

RECEIVING SECTION

Posn	Station	Points
1	N. Henbrey, RS28198	1,071

Check logs received with thanks from G6OHS, G6PWS, G6XBT.
The following log was posted too late for inclusion—G6EFQ.

Club News

The following is the latest information received by RRs from RSGB affiliated societies, clubs and groups in time for inclusion in this issue, plus basic unchanged information on other affiliated organizations which was last published in the January issue.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **May** issue should reach them by **16 March** and for the **June** issue by **12 April.**

Club programmes are given in order of date, subject time and place of the meeting. All callsigns of club secretaries and other contacts are QTHR (correct in the current *RSGB Call Book)* unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

REGION 1—RR W. R. Parkinson, G3FNM, 141 Norris Road, Sale, Cheshire, M33 3JR. Tel 061 973 1472.

Ainsdale (AARC)—Formal, 13, 27 March. Informal, 6, 20 March. DF hunts 4, 18 March. Meetings are now held at the Scout Headquarters, Marine Drive, Southport. Contact sec David Norris, G4TUP, tel 0704 35947 for futher details.

Bury (BRS)—13 March ("Integrated circuit fabrication", by Peter Bradley, G4EXK), 6, 20, 27 March (Informal meetings), 8pm. Mosses Centre, Cecil Street, Bury. Following the agm, the new chairman is Jack Burrows, G3SUI; sec and pro are as last year, G4TBT and G3VNQ respectively.

Fylde (FARS)—6 March ("Changes electronics have made in air navigation air traffic control", by J. Jefferson, Senior Air Traffic Controller, Blackpool Airport), 20 March ("Construction of df equipment for top band", by P. Mackrell, G3AEP, and H. Fenton, G8GG), 3 April ("RTTY", by Bill Ball, G4RSA), 7.45pm. Kite Club, Blackpool Airport. PRO G4CSA, tel Lytham 737680.

Isle of Man (IoMARS)—Mondays, 8pm. Keppel Hotel, Creg-ny-Baa. Following the recent agm Anthea Matthewman, GD4GWQ, tel 0624 22295, confirms that she has been re-elected as sec. Forthcoming club activities include operation from the Calf of Man on 4 and 7 May. All 5,000 GB0WCY QSL cards have been sent to the bureau. Attention is drawn to the special "overseas" membership of the society which is available, details from Anthea.

Kendal (Westmorland RS)—Second Tuesday in each month, 8pm. Strickland Arms, Sizbergh, nr Kendal. New sec Frank Burrow, G8BME, tel 0448 60803.

Manchester (MUARS)—The society is now QRV on 70cm atv and looking for skeds with local atv stations. Enquiries to sec Richard Skobelski, G6ROQ, Manchester University Amateur Radio Society, The Students Union, Oxford Road, Manchester M13 9PR.

Manchester (SMRC)—2 March ("History of SMRC", by Matt Barnsley, G3HZM), 9 March ("Mysteries of fm", by Trevor Hopkins, G8TYY), 16 March (Fox hunt), 23 March (Surplus equipment sale), 30 March (A talk by David Yorke, G4JLG), 6 April (Spring df event), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings in club shack each Monday evening. Sec David Holland, G3WFT, tel 061-973 1837.

Wirral (WARS)—7 March ("HF propagation", by Gordon Adams, G3LEQ), 21 March ("Lessons learned about aerial masts", by Len, G3EGX), 4 April (Sale of surplus equipment), 7.45pm. Guide Hut, Westbourne Road, West Kirby. Sec Cedric Cawthorne, G4KPY, tel 051-625 7311.

Wirral (W&DARS)—14 March ("Power supplies", by Andy, G6ALH), 28 March ("Treasure hunt", by Phil, G6SNO), 8pm. Irby Cricket Club, Irby, Wirral. D&Ws 7, 21 March at the Albion, New Brighton and Hotel Victoria, Heswall respectively. Sec Gerry Scott, G8TRY, tel 051-630 1393.

REGION 2—RR to be appointed

Goole (GR&ES)—6 March (Natter night), 13 March (Contests '84—discussion), 20 March (Talk by Steve, G6VBU, on travels in the East), 27 March (Construction evening), 7.45pm. Junior Chamber Buildings, Boothferry Road, Goole. Details from G8IOH, or G8VHL.

REGION 3—RR L. W. Craven, G4EQI, Grass Moor, Radford Road, Alvechurch, Birmingham B48 7DT. Tel 021-445 1347.

Atherstone (AARC)—Change of meeting days, now second and third Mondays in each month, 7.30pm. March events to be announced on GB2RS. Tudor Centre, Coleshill Road, Atherstone. Sec G6BEO, tel Hinckley (0455) 212051.

Birmingham (Midland ARS)—20 March (Dewsbury display), 7.30pm. 294a Broad Street, Birmingham B1 2DS. Sec G8BHE, tel 021-422 9787.

Birmingham (SBRS)—14 March (Surplus sale auction), 7.45pm. Parochial Centre, Church Hill, off Bunbury Road, Northfield. Normal meetings at Hampstead House, Condover Road, West Heath. Sec G8RGQ, tel 021-459 8312.

Bromsgrove (B&DARS)—9 March (AGM), 8pm. Avoncroft Art Centre, Bromsgrove. Asst sec G4NWQ, tel 021-476 6965.

Droitwich (DARC)—26 March ("QRP", by Rev G. Dobbs). Club now meets on second and fourth Mondays in each month, 8.30pm. Scout HQ, Droitwich. Sec G4HFP, tel Stourport-on-Severn (02993) 3818.

Dudley (DARC)—13 March ("TV outside broadcasting 1950-1980s", by Joe Jacobs), 27 March ("DXing from impossible QTH", by G3ZFP), 7.45pm. Central Library, Dudley. Sec G4SQP, tel Codsall (209) 5636.

Halesowen (MEB Sports & Social Club)—13 March ("Radio Regulatory Dept", by G4PZA), 27 March (General meeting), 8pm. MEBHQ Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.

Hereford (HARS)—2 March ("QRP", by Rev G. Dobbs, G3RJV), 8pm. Civil Defence HQ, Gaol Street, Hereford. Sec G4CNY, tel Hereford (0432) 273237.

Redditch (RRC)—8 March ("WAB", by Dr Nash, G4GEE), 8pm. WRVS Centre, Ludlow Road, Redditch. Details from sec G3EVT, tel Alcester (0789) 762041.

Shrewsbury (SALOPARS)—1 March (RSGB film "Aerial Circus", by G6CJ), 15 March (Fox hunt, first of four), 29 March (Visit and talk by G6DYW), 8pm. Albert Hotel, Smithfield Road, Shrewsbury. Sec G3UQH, tel Shrewsbury (0743) 83375.

Stourbridge (StARS)—5 March (Constructional and morse evening), 19 March (AGM), 8pm. The Robin Woods Centre, School Street, off Enfield Street, Stourbridge. Sec G8JTL, tel Lye (593) 4019.

Stourbridge (Wordsley RC)—8 March ("FSTV demonstration", by G4TGM and G6TKK), 22 March ("Antennas and feeders", by Dave Yates, G3PGQ), 8pm. Vine Inn, Camp Hill, Wordsley, West Midlands. Sec Andrew, G4TGM, tel Kingswinford (2) 295082.

Stratford-upon-Avon (S-upon-A&DARC)—12 March ("History of amateur radio", by Glen Ross, G8MWR), 26 March (AGM plus wine tasting), 7.30pm. Old Control Tower, Bearley Radio Station, Bearley, nr Stratford-on-Avon. Sec David, G8OVC, tel Stratford (0789) 750584.

Sutton Coldfield (SCARS)—12 March (Discussion evening), 26 March (Suppliers/importers demonstration). Central Library, Sutton Coldfield. Sec G6UFD, tel 021-358 6501.

Telford (T&DARS)—14 March (Junk sale), 21 March (Speaker to be announced on GB2RS), 28 March (Committee meeting), 8pm. The Phoenix Centre, Webb Crescent, Dawley. Sec G6ECA, tel Telford (0952) 503758.

Tenbury (T&DARS)—Newly affiliated. RS85465, "The Barn", Pool House, Hanley Childe, nr Tenbury Wells, Worcs. Details next month.

Warwick (Mid-Warwickshire ARS)—13 March (Junk sale), 8pm. 61 Emscote Road, Warwick. Sec G4TIL; tel Southam (092681) 4765.

West Bromwich (WBCRC)—Newly affiliated. Regular meetings Sundays, 8pm. Victoria Public House, Lyng Lane, West Bromwich. Sec Stephen, G1BGX, tel 021-544 4759.

Worcester (W&DARC)—5 March ("Rare dx operating", by Stuart Jesson, G4CNY), 8pm. Oddfellows Club, New Street, Worcester. Sec Alasdair, G4NRD, tel Evesham (0386) 41508.

Many club secretaries are forgetting to send a list of their activities to their RR,G4EQI, and thereby miss out on publicity in "Club News". There are now 63 clubs in the region and it is impossible to phone round giving reminders.

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. Tel Derby (0332) 556875.

Buxton (BARS)—13 March (Informal), 27 March (RTTY talk by G8VLJ), 8pm. Venue to be arranged. Sec Derek Carson, G4IHO, tel Buxton 5006.

Derby (D&DARS)—7 March (Junk sale), 14 March (Natter night), 21 March (AGM), 28 March ("Royal Naval communications", by Lt D. L. Alderson), 7.30pm. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby 556875.

Derby (NHARG)—Fridays, 7.45pm. Nunsfield House, Bolton Lane, Alvaston, Derby. Information from new sec John Robson, G4PZY, 31 Melton Avenue, Littleover, Derby, tel Derby 767994.

Lincoln (LSWC)—14 March ("Amateur radio on a shoestring", by G3RJV), 28 March (Activity night/ Night on the air), 8pm. City Engineers Club, Waterside South, Lincoln. Sec Pam Rose, G4STO, tel Gainsborough 788356.

Melton Mowbray (MMARS)—16 March (Visit to Nottingham Caves, lead by G8XLU, meet Wilton Road car park, 6.45pm). Sec Richard Winters, G3NVK, tel Melton Mowbray 63369.

Newark (N&DARS)—1 March ("Fault finding", by G4FUO/G4MDV), 7.30pm. Palace Theatre, Appleton Gate, Newark. Sec Roger Hiscock, G4MDV, tel East Stoke 539.

Nottingham (ARCON)—1 March (Spring junk sale), 8 March (Forum), 15 March (Talk on Raynet), 22 March (Activity night), 29 March (Constructors Cup), 5 April (AGM), 7.30pm. Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham. Sec Phil Barber, G4OSL, tel Nottingham 266082.

Spalding (S&DARS)—Second Friday in each month, 8pm. The Maple Room, White Hart, Market Place, Spalding. New sec Betty Whitley, G6YBL, tel Spalding 2781.

REGION 5—RR J. S. Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT, Beds. Tel 0582 508515, home, or 0582 21151, work.

Dunstable Downs (DDRC)—9 March (TV repeater update), 23 March (Visit by the RSGB regional representative), 8pm. Chews House. Sec P. G. Seaford, G8XTW.

Luton (Kent Process Controls ARC)—7 March ("The HW8 QRP transceiver", by John, G3DOT), 8pm. Club House, Tenby Drive, Luton. Sec G3DOT. Club open to employees only.

Peterborough (GPARC)—22 March ("Submarine radio", by Geoff, G4SQB), 7.30pm. Southfields Junior School, Stanground, Peterborough. Sec Frank Brisley, G4NRJ, tel 0733 231848.

Shefford (S&DRS)—1 March ("Building the Heathkit HW8 QRP transceiver", by G3DOT), 8 March ("The search for audio quality", by John West), 15 March (Planning for the Samuel Whitbread School Hobbies Exhibition), 17 and 18 March (Exhibition of homebrew equipment and operating of club station, G3FJE, in conjunction with the Mid-Beds Raynet Group, Samuel Whitbread School, Shefford, Beds), 22 March ("Brewing, not the home variety but the real thing!", by Derrick, G4JLP), 8pm. Church Hall, Shefford. Sec Alan, G4PSO.

St Neots (SN&DARS)—12 March (Film show), 26 March (Natter night). Horseshoe Inn, Offord Darcy, nr Huntingdon. Sec G8XSO.

Wellingborough (Nene Valley RC)—7 March (Natter night), 14 March (Video from the Grafton RS "The truth about amateur radio"), 21 March (Natter night and hf transmitting (G4NWZ)), 28 March (Lecture, "RSGB topics", by John Nelson). The 21 March meeting will be at the First St Mary's Scout Hall, Finedon. All other meetings from the Dolben Arms Public House, Finedon, Northants. Details from sec Lionel, G4PLJ.

Jim Bacon, G3YLA, (second from right) who is often seen presenting the weather forecast on BBC-TV, gave a talk recently to the Chiltern ARC. He is seen here with, l to r: G4CYR; the club's chairman, G3BRL; G4UII; Sue, G4UAH, and G2DRT. *Photo* courtesy of the Bucks Free Press

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240.

Aylesbury (AVRS)—20 March (Questions and answer session from a member of RSGB HQ staff), 17 April (Quiz and construction contest with Leighton Linslade RC). Details from Cathy Clark, tel 0844 51461.

Oxford (RAFARS Oxfordshire Area Group)—21 March, 7.30pm. Civil Service Club, Marston Road, Oxford. Monthly net on 3,710kHz, last Sunday in every month, 1145h. Details from Eric Palmer, G3FVC, tel Maidenhead 20107.

Reading (R&DARS)—New sec Paul Read, G8XBE, 205 Southampton Street, Reading RG1 2RB, tel Reading 867483. Contact him for details of meetings.

Slough (Burnham Beeches RC)—5 March (AGM), 8pm. St John Ambulance HQ, Burlington Avenue, Slough. Members please attend the meeting. Details from G4LQD.

Vale of White Horse (VWHARS)—6 March (Petra Suckling, G4KGC, will address the meeting on vhf contests). Club net Thursdays, 7.30pm, on 28·750MHz. VHF Sundays, 8pm, on 145·2MHz. Sec Ian White, 52 Abingdon Road, Drayton, Abingdon, tel 0235 31559.

REGION 7—RR to be appointed

Biggin Hill (BHARC)—20 March (Test equipment evening), 17 April (Dave Howes, G4KQH, of C.M. Howes Communications, Meopham, will be displaying his wares), 8.30pm. St Marks Church Hall, Biggin Hill. Details from Ian Mitchell, G4NSD, Greenway Cottage, Tatsfield, Westerham, Kent TN16 2BT, tel 09598 376.

Crystal Palace (CP&DRC)—17 March ("RSGB services to the radio amateur", by John Nelson, G4FRX), 8pm. All Saints Parish Room, Upper Norwood, SE19. Sec Geoff Stone, G3FZL, tel 01-699 6940.

Guildford (G&DRS)—Second and fourth Friday in each month, 7.30 for 8pm. Model Engineers HQ Building, Stoke Park, Guildford. Sec Lew Bright, G4BHQ, tel Guildford 576375.

Redhill (Reigate ATS)—Third Tuesday in each month, 8.15pm. Constitutional & Conservative Centre, Warwick Road, Redhill. Details from sec Chris Barnes, G8FEE, 3 Black Dog Walk, Northgate, Crawley, W Sussex RH10 2HL, tel 0293 23425.

Sutton & Cheam (S&CRS)—16 March (Constructional contest), 24 March (35th annual dinner, at The Woodstock). Downs Lawn Tennis Club, Holland Avenue, Cheam. Details from sec Jack Korndorffer, G2DMR, 19 Park Road, Benstead.

REGION 8—RR M. Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE. Tel 0795 70132.

Brighton (B&DARC)—Due to falling attendances and general disinterest, the club called an EGM. They are pleased to report that major changes have been made, and the club looks forward to an exciting future. The club now meets on alternate Wednesdays, commencing 1 March, 8pm. Seven Furlong Bar, Brighton Race Course, Brighton Race Hill. Details from sec Nigel V. Hewitt, G8JFT, tel Brighton 697682.

Canterbury (UoKARS)—Tuesdays, 7.30pm. Radio Shack, behind the maintenance buildings, off Giles Lane. Talk-in still on S15. Besides their normal cw practice, drink and chat, they have an active amateur tv group. Details from new club sec Christine Coles, G6RQY, Rutherford College, The University, Canterbury, Kent CT2 7NX, or from G6FRX.

Chichester (C&DARC)—6 March ("Signal processing of microwave radar systems", by John Outram, in the Long Room), 15 March (Club meeting, in the Green Room), 3 April (AGM, in the Long Room), 7.30pm. Fernleigh Centre, 40 North Street, Chichester. Terry Allen, G4ETU has resigned as club sec. All enquiries to Christopher Bryan, G4EHG, tel Chichester 789581.

Dartford Heath (DHDFC)—6 March (Meet at Horse & Groom PH), 11 March (Sunday hunt). For further details of df hunt, tel Pete, G8DYF, Greenhithe 844467.

Hastings (HERC)—21 March (Club AGM), 18 April (Junk auction), 16 May (Weather satellites), 20 June (DF/foxhunting). Club meets first Wednesday of the month for committee meetings, and the second, fourth and fifth Wednesday of the month for micro nights, all at Ashdown Farm Community Centre. Main meetings are held third Wednesday in each month. West Hill Community Centre. Details from sec George North, G2LL, tel Cooden 4645.

Horsham (HARC)—1 March (Junk sale. Doors open 7.30pm. Visitors welcome, with or without junk. (10% club commission)), 5 April (PO interference or homebrew evening), 3 May (Commander Henry Hatfield will be giving a talk on his spectroheliographioscope, two radio telescopes and magnometer), 7 June (Homebrew or PO interference (if unable to arrange this for April)), 8pm. Guide HQ, Denne Road, Horsham. Details from Tony Wadsworth, G3NPF.

Maidstone (MYMCAARC)—Fridays, 2 March (Talk on vhf and uhf operating techniques by Ken Willis, G8VR), 23 March (Talk on contest operating (with slides), by Paul Whatton, G4DCV), 8pm. 'Y' Centre, Loose Road. Details from G.D. Edy, G4AXD, tel 0622 29462.

Swale (SARC)—This club suffered the loss of their club premises which were destroyed by fire, just after Christmas. They have now removed to new, well-appointed premises at The Ivy Leaf Club, 52 Dover Street, Sittingbourne. Mondays, 12 March (Demonstration and talk on computers by Computers Plus Ltd), 19 March (Junk sale. There will be many "above average" items offered at this sale), 7.30pm. Further details from Brian Hancock, G4NPM.

Tunbridge Wells (West Kent ARS)—9 March (Talk on transport communication systems by Tim Asquitte), 23 March (Talk on UK air traffic control systems by Stephen Harkins). Adult Education Centre, Monson Road, Tunbridge Wells. 13 and 27 March, 8pm, informal meetings at the Victoria Road Drill Hall, Tunbridge Wells. Details from Brian, G4MXL, tel 0892 32877.

Worthing (W&DARC)—Tuesdays, 7.30 for 8pm. Pond Lane Amenity Centre, Worthing. New club sec Eric Sandaver, G4KIT, tel Lancing 766418.

REGION 9—RR W.J. Colclough, G3XC, "Highview", Indian Queens, St Columb, Cornwall TR9 6LL. Tel 0726 860485.

Axe Vale (AVARC)—2 March ("Static protection for ics", by Rex Williams, G3RSJ), 7.30pm. Cavaliers Inn, Axminster, Devon. A full programme of events up to the annual dinner in December has been planned by the committee. details from pro Roger Jones, G3YMK, tel 0404 864468.

Cornish (CRAC)—1 March ("Commercial international communications", by G4PEM). Computer section: 19 March ("System monitors and operating systems", by Des Old, G3CZZ). The agm will take place on 16 April, provisionally at the Church Hall, Treleigh, on the old Redruth Bypass. For confirmation and details of club activities etc, tel Simon, G4PEM, Penzance 3948.

Exeter (EARS)—12 March ("Static and chips", by Rex Williams, G3RSJ), 7.30pm. Community Centre, St David's Hill, Exeter. Informal meetings other Mondays, Emmanuel Scout Hut, Okehampton Road, Exeter. Pro Roger Tipper, G4KXR, 11 Chancel Court, Chancel Lane, Pinhoe, Exeter, tel 0392 68065.

Newquay (N&DARS)—New details from agm: chairman, Ken Elliott, G4NTX; treasurer, Bryan Pearce, G8GOR; sec Andy Angove, G6ZWI; pro and manager of club repeater, Bill Colclough, G3XC; treasurer of GB3NC, Ted Warne, G3YJX. 14 March ("Power measurements", by G3YJX), 28 March ("Simple test gear", by G3XC). Drill Hall, Quantock Street, Newquay. An interesting programme has been arranged for the season, for further details contact sec Andy Angove, 22 Bramble Close, Newquay, tel Newquay 4285.

Plymouth (P Polytechnic ARS)—Wednesdays. The society is only open to members of the Students' Union, whose address is Plymouth Polytechnic, Drake Circus, Plymouth, Devon. Sec Mike Price, GW6HOU. The society callsign is G3TCP, and the club is QRV on the hf bands with some members on 144 and 432MHz. The activity periods are 12h per day, five days a week.

St Austell (English China Clay RC)—12 March, 7.30pm. Pentewan Labs. Details from Jack Redfearn, G8HSZ, tel 0726 3647.

Torbay (TARS)—Fridays, 7.30pm. Special meetings last Saturday in each month. Bath Lane, rear of 94 Belgrave Road, Torquay. Club nets are on hf 3·755 ± QRM, Mondays and Wednesdays at 1030 and Saturdays at 1000.

REGION 10—RR E. J. Case, GW4HWR, 2 Abbey Close, Tyrhiw, Taffswell, Mid-Glamorgan CF4 7RS. Tel 0222 810368.

Aberystwyth (ARSGBG)—13 March (Dyson, GW3DRV, to give a talk entitled "Sweep generator display"), 10 April (Morse practice and station. Anyone interested in radio is welcome). Bay Hotel (on the sea front opposite the bandstand). Sec J. Mike Pryse, GW4JXB.

Cardiff (CRSGBG)—12 March (Quiz with the Newport ARS), 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec Cyril Laws, GW6ZHP, tel Cowbridge 3212.

REGION 11—RR B.H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Anglesey (AARG)—The society has temporarily closed down until further notice.

Colwyn Bay (Conwy Valley ARC) (GW6TM)—8 March (Fixture to be announced, no details at time of going to print), 7.45pm. Meetings at Green Lawns Hotel, Bay View Road. Sec J.N. Wright, GW4KGI, 46 The Dale, Woodlands, Abergele, Clwyd LL28 7DS, tel 0745 823674.
Dolgellau (Meirion ARS) (GW4LZP)—Please note revised information. First Thursday in each month, Dolserau Hall Hotel, one mile east of Dolgellau. Details from pro, c/o PO Box 2, Barmouth, Gwynedd.
Rhyl (R&DARC) (GW4ARC)—5 March (Activity night), 19 March (Talk and equipment demonstration by Gordon Adams, G3LEQ), 7.30pm. 1st Rhyl Scout HQ, Tynewydd Road, Rhyl. Sec John McCann, GW4PFC, 67 Ashley Court, St Asaph, Clwyd LL17 0PL, tel 0745-583467.
Wrexham (WARS)—First and third Wednesday in each month. Friends Meeting House, Holt Road, Wrexham. Sec Pete Higgs, GW4IGF, tel Rossett 570212.

Special open meeting of the RSGB Membership & Representation Committee at the Queen Hotel, opposite Chester Railway Station, Chester, at 3pm, 31 March. All RSGB members in Region 11 may attend.

REGION 12—RR M.R. Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH. Tel 0796 2140.

Aberdeen (AARS)—Fridays. 2 March (Junk sale), 9 March (Thoughts on field days (1984)), 16 March ("RTTY", by GM4MYL), 7.30pm. Club Rooms, 35 Thistle Lane, Aberdeen. Coffee, tea etc is available. Details from Don Travis, GM4GXD, tel 04676 251.
Dundee (Kingsway Technical College ARC)—Tuesdays, 7pm. St Michaels School, Graham Street, Dundee. The club are pleased to welcome OZ5ZF, DF2ZO, and 5B4HQ, all of whom are temporarily based in Dundee. Further details from sec/AR Berni Deans, GM4TQN, "Cavendish", 4 Deanbank Street, Dundee DD2 2EA.

REGION 13—RR Andrew Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fife KY1 2LH. Tel Kirkcaldy (0592) 200335.

Dunfermline (DARS)—8 March (Visit to Fife Education Schools TV Studios), 12 April ("RSGB" by GM3YOR), 7.30pm. Room 7, Old High School, Priory Lane, Dunfermline. Details from Neil, GM8IID, tel 728778.
Edinburgh (Lothians RS) (GM3HAM)—7 March ("Black box night", by GM8GEC), 21 March (Surplus sale), 11 April ("DF techniques and df receiver preparation", by GM4BYF), 25 April (Operational evening, contact GM4HWO for details of location), 7.30pm. Harwell House Hotel, Ettrick Road, Edinburgh EH10 5TJ. Details from Colin, GM4HWO, tel 031-332 5502 (not QTHR).
Glenrothes (G&DARC) (GM4GRC)—Wednesdays and third Sunday in each month, 18 March ("VSWR measurement at microwaves", by GM3OLK), 15 April (TBA), 7.30pm. Provosts Land Centre, Leslie, Fife. Details from Bob, GM4LYQ.
Scottish Borders Repeater Group—23 April (AGM), 7.30pm. Lilliardsedge Caravan Park, near Jedburgh (off A68). Due to some unfortunate misunderstanding regarding the Scottish Amateur Radio Convention the SBRG has had to withdraw as host for the 1984 event which they were planning to hold in Hawick. Details of group activities from Bruce, GM4BDJ, tel Langholm (0541) 80018.

REGION 16—RR T. D. Howe, G3PLF, 18 Vange Hill Drive, Basildon, Essex SS16 4DD. Tel 0268 24453.

Colchester (CRA)—8 March (Film evening), 22 March ("Marconi, the man and his work, part 2", by J. Stanley-Wood), 7.30pm. Colchester Institute, Sheepen Road. Details from Frank Howe, G3FIJ, tel Colchester 851189.
Ipswich (IRC)—14 March (The talking books for the blind services), 28 March (Constructors' contest), 8pm. Club Room, Rose & Crown, Norwich Road. Details from Jack Tootill, G4IFF, tel Ipswich 44047.
Loughton (L&DARS)—2 March (CW practice), 16 March (Club project), 8pm. Loughton Hall, Rectory Lane. Details from C. Knowles, G6FWT.
Stowmarket (S&DARS)—5 March (AGM), 7.30pm. Red Cross Hut, Station Yard. Details from Martin Goodrum, G3ZQU, tel Stowmarket 676288.
Stanford-le-Hope (S-le-H&DARC)—Mondays, 8pm. St Joseph's Parish Rooms, Scratton Road, Stanford-le-Hope. Details from Jim Thompson, G4OVG, tel Stanford-Le-Hope 642312.
Vange (VARS)—1 March (Junk sale), 7.30pm. Main Hall, Barstable Tenants Community Association, Long Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.
Norwich (Norfolk ARC)—Please note change of QTH for meetings, Wednesdays, 7.45pm. Valley Drive Community Centre, Plumstead Road, Norwich. Details from Peter Forster, G3VWQ, tel Norwich 37709.
Yarmouth (YARC)—Fortnightly on Thursdays starting 1 March. STC Sports & Social Club, Beevor Road, South Denes, Gt Yarmouth. Details from John Noy, G8VPE, tel Fleggburgh 673.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 876018.

Basingstoke (UK FM Group Southern)—At an egm on 4 January it was decided that the group be reformed into a "repeater holding group" (GB3SN). G4PSX is chairman of the new group, with G3KWU as sec. The immediate aim of the new group is to bring the Mk2 version of the Susan (GB3SN) repeater into operation as soon as possible.
Basingstoke (BARC)—13 March ("Slow scan television", by G8VOI), 7.30pm. The Swan, Sherborne St John, Nr Basingstoke. Sec G4SQZ.
Eastleigh (Itchen Valley ARC)—2 March (AGM), 16 March (Talk by G4IDQ), 30 March ("Radio Solent", by the Chief Engineer), 7.30pm. The Scout Hut, Brickfields Lane, Chandler's Ford. Sec G6DIA, tel Totton 863039.
Farnborough (F&DRS)—11 March ("Equipment design", by G4JNT), 28 March (TBA), 7.30pm. Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. Pro G4MOZ, tel Farnborough (0252) 837581.
Horndean (H&DARC)—5 March ("Operating special event stations", by G4RLE), 7.30pm. Merchiston Hall, Horndean. Sec G6IOV.
Jersey (JAEC)—14 March ("World of amateur radio", by ARRL, "Two pioneers of radio, G2DX and G6CJ", on video), 8pm. The Communicare Centre, St Brelade. Sec GJ8KNV, tel 53333.
Salisbury (SR&ES)—At the agm held on 10 January the following officers were elected: chairman, G5YN; sec, G2FIX; treasurer, G4POF. Tuesdays, 7.30pm. Grosvenor House, Churchfields Road, Salisbury. Sec, tel Salisbury (0722) 743837.
Weymouth (SDRS)—5 March (Contest evening and junk sale), 2 April (AGM), 7.30pm. Army Bridging Camp, Wyke Regis, Weymouth. Sec G3ZGP, tel Weymouth (0305) 812893.
Wimborne (FRARS)—4 March (Natter night), 11 March ("Fuel systems", by Tony Ashley), 18 March ("Nick's rambles", by G8MCQ), 25 March (Inter-club radio quiz), 7.30pm. Flight Refuelling Social Club, Merley, Wimborne. Sec G8VFY, tel Wimborne (0202) 882271.

REGION 18—RR W. A. Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland NE65 8UW. Tel Longhorsley 259.

Consett (Derwentside ARC)—Mondays, 7.30pm. RAFA HQ, Sherburn Terrace, Consett. Morse class, hf and vhf gear for use of members. Sec G1AAJ, tel 0207 520477.
Easington (EARC)—Tuesdays and Thursdays, 7.30pm. Easington Village Club, Seaside Lane, Easington, Co Durham. RAE tuition etc. Sec G4RIK.

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (C&DARC)—7 March (Junk sale, G4TQG as auctioneer), 14 March (Natter), 21 March ("PI Road Show", by members of the GB3PI Repeater Group), 28 March (Natter), 8.15pm. The Church Room, Church Lane, Wormley, nr Cheshunt, Herts. Details from Roger Frisby G4OAA, 2 Westfield Road, Hoddesdon, Herts, tel 09924 64795.
Chiswick (ABCARC)—20 March ("Further experiences in dx countries", postponed from Oct 1983), 7.30pm. Committee Room, Chiswick Town Hall, High Road, London W4. Sec W. G. Dyer, G3GEH, tel 01-992 3778.
Edgware (E&DRS)—8 March ("Talk on construction", by G3JPJ), 22 March (Film on NFD). The Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. The club has a new sec, John Cobley, G4RMD.
Harrow (RSH)—2 March ("Putting up aerials"), 9 March (Informal), 16 March (AGM), 23 March (Informal), 30 March (Junk sale), 8pm. Harrow Arts Centre, High Road, Harrow Weald. Details from Chris Friel, G4AUF, tel 01-868 5002.
Havering (H&DARC)—7 March (Informal), 14 March (Junk sale), 21 March (Informal), 28 March ("Hot air balloons", a slide show by Miss Y. Tomlinson). Fairkytes Art Centre, Billet Lane, Hornchurch, Essex. Details from J. R. Gibbs, G4UQR, 40 Bridge Avenue, Upminster, Essex, tel Upminster 26904.
London (Civil Service ARS)—5 March (To be arranged), 19 March (Lunchtime natter). Please make a date for your diary: 2 April (AGM). Meetings mainly during the lunch hour at The Civil Service Rec Centre, Monck Street, Millbank. Details from G. Costin, G4GFU, tel 01-632 3875, day time.
Southgate (SARC)—8 March ("Receiver technology", by B. Bond), 8pm. St Thomas's Church Hall, Prince George Avenue, London N14. Pro John Fitch, G8EWG, tel 01-440 7353.
Stevenage (S&DARS)—First, second and third Tuesdays in each month, 8pm. TS Andromeda, Fairlands Valley Park, Shephall View, Stevenage, Herts. Morse classes, 7.15pm. Pro Trevor Tugwell, G8KMV, sec G4BGP, tel Baldock 893736.
St Albans (Verulam ARC)—24 March (The annual G3PAO memorial lecture will be presented by George Jessop, G6JP, this year. The subject will be "Power amplifiers past and present"), 8pm. RAFA HQ, New Kent Road, St Albans. Details from Hilary Claytonsmith, G4JKS, tel St Albans 59318.
Wanstead (ELGRSGB)—This group is still in existence, and has recently had an egm to decide how it should be run. It was decided that for the time being the meetings should be held once a quarter, on Sundays, at the Wanstead House Community Centre, The Green, Wanstead, London E11. The Green is right opposite Wanstead Underground Station, and Wanstead House is very near to the station. Details from Julian, tel 01-550 7013, or RR19.

REGION 20—RR B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, Bristol BS20 8NQ. Tel 0272 848140.

Bristol (BRSGBG)—26 March (Details will be advised on GB2RS), 7.30pm. Small Lecture Theatre, Queens Building, Bristol University. Details from Tony, G4ROX, tel 0272 513573.
Bristol (North Bristol ARC)—Fridays, 30 March (RSGB film show night, including "The Secret Listeners"), 7-9pm. SHE, 7 Braemar Crescent, Northville, Bristol. Details from Ted Bidmead, G4EUV.
Bristol (South Bristol ARC)—7 March (Lecture, to be advised on GB2RS), 14 March (Constructors' night, presented by G8XIH and G4KUQ), 21 March (SWL night, by Ron Gardner), 28 March (Computer night, by G6SVR), 7.30pm. Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len Baker, G4RZY, tel 0272 834282.
Cheltenham (CARA)—2 March (Constructors' contest), 7.30pm. Stanton Room, Charlton Kings Library, Cheltenham. Details from Gill Harmsworth, G6COH, tel Cheltenham 525162.
Gloucester (GARS)—Wednesdays, meeting for 7 March has had to be rearranged and the new details will be advised on GB2RS, 7.30pm. St Barnabus Hall, Stroud Road, Gloucester. Date for the construction contest for April has still to be arranged. Secretary requests that any ex-members now living elsewhere and wishing to receive the club newsletters to please contact him. Details from Tony Martin, G4HBV.
Portishead (Gordano ARG)—28 March (Computer evening), 7.30pm. Ship Hotel, Down Road, Portishead. Details from Robin Coles, G8ROC, tel 0272 691685.
Sedgemoor (S&DARS)—19 March ("A practical demonstration of rtty", by G4EHU), 8pm. Bridgwater Arts Centre, Castle Street, Bridgwater. Details from B. Horsey, G3TTP.
Yeovil (Y&DARC)—1 March (Bring, show and talk evening), 8 March ("Oscillators", by G3MYM), 15 March ("Using an oscilloscope", demonstration by G3GC), 22 March ("QRP transmitters", by G3MYM), 29 March (Natter night), 7.30pm. The Recreation Centre, Chilton Grove, Yeovil. Details from sec Eric Godfrey, G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW, tel 0935 75533.

Members' Ads

CONDITIONS OF ACCEPTANCE

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Members' Ad form printed on the back of a *recent* address label carrier used to mail *Rad Com* to the advertiser: this will automatically provide proof of membership and should not be more than two months old. No acknowledgement of receipt will be sent, and advertisements not clearly worded or punctuated, or which do not comply with the conditions of acceptance, will be returned. No correspondence concerning this service will be entered into.

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. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

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. Advertisements for citizens band equipment will not be accepted.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £1 for 40 words or less: advertisements containing more than 40 words will cost an additional £1 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

Closing dates in 1984 for issues in brackets, are **20 March** (May); **16 April** (June); **16 May** (July); **14 June** (August); **12 July** (September); **23 August** (October); **20 September** (November); **25 October** (December); **22 November** (January 1985).

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising officer.

FOR SALE

Eddystone EA12 amateur bands rx, in vgc, £150. 18 Blucher Street, Waterloo, Liverpool L22 8QB. Tel 051-928 1127, or 051-924 5548.

IC402 70cm ssb tx/rx, fitted with beacon xtal, mains psu, MM 30W linear, to sell as package, £225. G8WQV, QTHR. Tel Medway (0634) 221061, evenings.

RTTY: Creed 7ERP, autoreader, beautifully built terminal unit, ready to go, will demonstrate, no more time wasters please, offers. *Wanted:* info and circuit for Heathkit OS2 oscilloscope, copies ok. Tel Grays Thurrock (Essex) 71475, early evenings.

Bound magazines: sale or exchange, best offer secures, buyer collects. *RSGB Bulletin* vols 2 (1935) to 32 (1957) inclusive. *Short Wave Magazine* vols 6 (1948) to 14 (1956). *Practical Wireless* 1952-6. *CQ Magazine* 1950-3. *QST Magazine* 1948-50, 52-53. *Radio Constructor* vols 1 (1947) to 9 (1956). *Practical TV* vols 3 (1952) to 6 (1956). *Wireless World* 1952-3. Unbound volumes *RSGB Bulletin* vols 33 to 40 (1964). J. Ayres, 9 Park Road, Kingston, Surrey KT2 6BX. Tel 01-546 2913, daytime.

Tektronix 545A double beam scope, CA and D type plug-ins, dc to 24MHz, current probe amplifier, probes, manuals, £100 ono. 1A2 plug-in dc to 33MHz, D type diff amp, £15 each. G3HQG, QTHR. Tel 0742 693618.

FT102, mint cond, narrow ssb filter, four months old, £585. DX33 three-el tribander, as new, £120. Reason for sale, going QRT. GW3XCR NOT QTHR. Tel 0792 401058.

Icom IC2E 2m fm handheld, 144-148, six months old, mint cond, boxed, manual, incl soft case, spkr/mic, charger, spare nicads, £150 or exchange 70cm mobile. G6SPI. Tel Ruislip (Middx) 35158.

Trio TR9130 2m all-mode tx/rx, purchased November, as new from Lowes, have register of purchase card, cost £433, asking price £365. Datong D70 morse tutor, £25. G1CGX. Tel Stan, Naphill 3626, evenings.

Yaesu FT200, FP200, average cond, bargain, £150. Microwave Modules 432/28 transverter (not repeater shift model), exc cond, £80. Gone QRT. G4FAB, QTHR. Tel Wigan (0942) 31675.

Pye uhf pocketphones, £3 each. All these receivers are complete and tested. Discone antenna, £10. Marconi sig gen model 1064, perfect wkg order, £65. Bert Canavan, 136 Rectory Road, Burnley, Lancs. Tel 0282 59320, anytime.

XYL enforces cleanout: spectrum analyser, 3-36MHz, S560, £50. Sig gen, Marconi 68-185, 450-470MHz, TF1064B/5, £100. Philips Stella four-speed, four-track reel-to-reel tape, £50. Telford TC TX9, £25. Hudson FM208, £5. All ono. G8HVV, QTHR. Tel Cambridge (0223) 812188.

TR9000 2m multimode, in orig packing, immac cond, £260. G4MZF. Tel 0772 617809.

Standard C78 fm portable, CPB78, CMB8, CLC8, C12/230, nicads, mobile colinear, cost over £350, accept £200 or exchange for hf gear. W.H.Y? G4UBP. Tel Ken, 0424 444952, after 5.30pm or weekends.

QTH locator program tapes for Commodore 64, Spectrum, ZX81-16k (specify). Input locator (coverage extends to 13 large squares) or lat/long, gives lat/long of locator, distance, beam heading, contest score and total, easy, accurate, £6. GW3RRI, QTHR. Tel 0286 881886.

Yaesu FT707S eight-band hf solidstate tx/rx. Work DXCC without tvi with this super 20W rig, in mint cond, orig packing, hb xtal vfo for split freq operation etc, very stable, £340 pair. Tel 01-578 4484, evenings.

SEM Transmatch, built-in Ezitune, five months old, £70, incl postage. G4UNM. Tel IoW (0983) 402273.

Computer: Sharp MZ80K, Basic, Forth, Pascal, Fortran, 17 games, teletype ASR33, interface as printer, 48k memory, gwo, surplus to requirements, £300. Buyer collect please, east Leeds. BRS25967. Tel 0532 861333, after 6.30pm.

Yaesu FT7, 20W p.e.p., 10-80m, ssb/cw, perfect wkg cond, £200. FTDX500, extra cw filter, £150. GW3WVG NOT QTHR. Tel Walton-on-Thames (0932) 227469.

Trio 7010 2m ssb tx/rx, 10W, mobile mount, vgc, 144·260-144·455, cw 144·040-144·060, spare xtal socket for beacons or satellite, £100 ono. SEM 50W linear preamp, £45. G6IHD, QTHR. Tel 051-638 8930.

2m 50W linear amp, preamp, Sentinel 50, hardly used, prefer QRP, £45. *Wanted:* anything for 23cm and higher frequencies. G6HHV. Tel 051-327 5804 (Merseyside) anytime.

Yaesu FT101, early model but first class cond, 80-10m, fan, 12V dc, 240V ac, unmodified, unmarked, in perfect wkg order, £220 ono. Tel Wakefield 257901.

Her indoors orders clearance: Pye Europa, LBHP, £40. HB, £35. UHF, £40. W15AM, cbox, £20. L470 on 70cm, £40. Converters, 432-144, 144-28, 116-16, 1,296-144, £15 each. Triplers, 144-432, 432-1,296, £15 each. Preamp, MMA144X2, £15. Lowe rx ASV1515, £20. Trio 2200GX, £60. VFO30, £30. All ono. Tel Cambridge (0223) 812188.

DX33 three-el beam, 20-15-10, £90. Datong FL2 audio filter, £60. FV101 ext vfo, £50. All gwo, handbooks. G3LKV, QTHR. Tel 0283 813261.

Trio TS520S, recent overhaul, £300 ono. Taylor 31A scope, manual, £15. Katsumi EK9X keyer, £10. ASP mobile 2m whip, new, not used, £12. Prefer buyer inspect, collect. G4BWJ, QTHR. Tel Brighton (0273) 779914.

Tandy TRS80 model 1 level 2, 48k expansion, two disk drives, documentation, editor assembler, various computing books, £450. G3THW, QTHR. Tel Wolverhampton (0902) 759122.

Trio TS830S, fitted with YN88CN 250Hz filter, vgc, £550. Reason for sale—TS930 ordered. G6VS, QTHR. Tel George, 0253 823541.

FRG7700 rx, 20h use only, £225. CWR600 morse master, all leads, book, £65. Hitachi VM910 video monitor, HV62 cctv camera, extra wide-angle lens, MM435/600 tv converter, all unused, £135. *Wanted:* TV502S transverter, SP820 spkr. G4JGP NOT QTHR. Tel Norman, 051-644 7118.

AR88LF, £35. Codar CR70A rx, £8. Electroniques QP166 converter, psu, 898 dial, £15. 5FP7 sstv crt, £5. HF linear, 257B, £20. Geloso 4/102 and 4/104 vfos, £5 each. G3UBL, QTHR. Tel 01-954 3764.

Trio TS520SE tx/rx, 160-10m, one owner, mint, £330. Yaesu YD844 desk mic, £10. Yaesu QTR24 world clock, mint, £12. Standard C146A 2m handheld tx/rx, xtalled S20-23, R4-5, nicads, manual, £45. Geloso 4/102 vfo, £5. G4IPI. Tel Maldon (Essex) 76572.

FT225RD, mint cond, £460. FRG7, digital freq readout, perspex dust cover, £140. Datong morse tutor, £30. New 4CX250B valve, base, chimney, offers. Nine-el X Tonna, nearly new, 50m UR67, £40. Deliver to Lincs/Surrey. Tel 0526 42710, weekends only.

National Panasonic DR28 six-band portable rx, digital readout, ssb mains battery operation, exc cond, £75. Tel 01-445 8791, evenings or weekends.

Eddystone 770R, early model, needs realignment, £50. Buyer collects. Juki 6100 printer, daisywheel, brand new, unused, £325. Tractor unit, ditto, £90. Carriage extra. Bob McHenry, G3NSM, 26 Charlbury Road, Oxford. Tel 0865 56321.

Icom IC245 2m multimode, 10-3W, £200 ovno. G4UVJ. Tel Canvey Island 697978.

TS130V, incl mic, new, £375. FT230R, intermittent fault, offers. Hallicrafters seven section mast, 35ft when assembled, £30. G4FQS, QTHR. Tel John, 01-253 0661, ext 129.

Trio TR9000 2m multimode, 7A psu, both for £240, offers? W.H.Y? Quick sale. G4TSE, QTHR. Tel Tim, Sittingbourne (0795) 75093.

Trio TS120V, fitted YK88C filter, PS20, AT130 (WARC), all boxed, immac, £340. Buyer collects please. G4BXY, 372 Gosbrook Road, Caversham, Reading, Berks.

FT101 Mk1 tx/rx, vgc, £235. Workshop manual for FT101 series, £15. Woodpecker blanker AEA, WB1A, £40. SMD100 stereo table mic, £15. Canon 110ED flash, leather case, £45. Minox B, £50. Prefer collect. G3AAG. Tel Liss 2143.

Icom IC255E 2m fm 25W twin vfo, five memories, handbook, circuit diagrams, packing, mobile mount, Securicor delivery possible, £130 or offer. Simon Baker, G8UXU, QTHR. Tel 01-467 2600, ext 597, office hours.

Trio 7010 2m ssb/cw mobile, recently checked, all ok, £85. *Wanted:* for 2m valve linear, ht transformer (2kV at 1A?), coaxial relays, bandpass filter, medium/heavy duty rotator, H100. Chris Reader, G6VAJ, QTHR. Tel Brighton (0273) 550509.

Yaesu FR50B, FL50B tx/rx, handbook, mic, in good cond, both with new valves, £120. Buyer must collect. G4BHK, QTHR. Tel 07-356 3963.

Use your ZX81 as a super-versatile cw sender (type ahead, contest, m-s, etc), cassette with full instructions, £4.40. SAE for details. A. Wallbank, G4CIZ, 22 Oakfield Road, Pamber Heath, Hants RG26 6DN.

NRD515 rx, spkr, immac, orig boxes, manual, £700 ono. Macrotronics rtty terminal interface for TRS80, comp tapes, manuals, £100 ono. Ampex 9in bw monitor, manual, £50. G4CEQ, QTHR. Tel Downland 55908.

TR2200GX, VB2200GX, accessories, R2-8, S14-23, £125. SSM iambic keying unit, £25. Twin paddle key, unused, £12. SX200N, £220. All in mint cond, post paid. G3EZZ, QTHR. Tel 0472 87385.

Sabtronic 2037A multimeter, THP20 touch and hold probe, temperature probe, cost £92, sell at £45. UGP2M groundplane, used in loft, £6. G8ESK, QTHR. Tel 0274 45611.

Electronic piano, Crumar Roadrunner, four-voice, exc cond, stand, case, etc, together with 30W amplifier, £160. Sid F. White, G4KFW, 87 Dyas Avenue, Perry Barr, Birmingham B42 1HQ. Tel 021-357 2009.

SX200N scanning rx, two months old, psu, telescopic antenna, perfect cond, £250. G8ZLD, QTHR. Tel 08893 3495, evenings.

FT-ONE Yaesu, fm board fitted, bargain at £950, no offers. G4JYH,QTHR. Tel 01-886 0126, daytime.

Yaesu FT102, a.m./fm board, £610. FV102DM digital scanner/vfo, £195. FC102 atu, £195. Datong SRB2 woodpecker blanker, £80. All brand new in

boxes, must sell. G6THT, QTHR. Tel Crawley (0293) 515201.

KW TenTec Omni-C, last of the Omni Line, digital, new bands, all cw facilities, QSK, irt, filters 2·4, 1·8kHz, two audio filters, notch, faultless since new, comp with two matching mics, headphones, straight key, superb rx, modulation, any test, separate and built-in speakers, £475. TenTec psu, £115. AEI WB1 Moscow Muffler, woodpecker blanker, works well, £50. Offered separately or £575 the lot, carriage paid. Bargain. With KW back-up, a reliable lot. G3RHM, QTHR. Tel 01-423 0306.

HQ1 mini quad, boxed, £70. Buyer collects. SB401 tx, good cond, open to offers. G4KFB, QTHR. Tel 01-578 3737.

Tektronic RM503 scope, £95. Lambda regulated power supplies, 125V input, 325/500V, 400mA output, £20. Two for series or parallel operation. 19in, 6ft rack, £5. Carriage extra. G3LXX, QTHR.

Yaesu FR50B, FL50B, vgc, in use, spare valves, manuals, £145 or offers in part exchange for new FT102 or similar. Prefer buyer inspects and arrange own delivery. G4DOW, QTHR. Tel Princes Risborough 4580, after 6pm.

Rotator: Daiwa DR7500X, £80. 2m 9-el crossed Tonna, £20. Both items as new. Buyer collects with mast thrown in or can arrange carriage. G6LLD. Tel Durham (0385) 770593.

FT101 Mk2, G3LLL clipper, fan, mic, spare pa valves, mint cond, £280. Deliver reasonable distance or carriage extra. *Wanted:* 2m 5XY beam. G3GRX, 16 Monnington Way, Penrith, Cumbria. Tel 0768 64890.

FT227R 2m mobile fm tx/rx, 142-149MHz memory scanner, 10W, remote control facility, good cond, works perfectly, 14-el Parabeam, good cond, and signal reports, offers. G8RWJ, QTHR. Tel Pett 2012.

Eddystone 770U/2, 770R, 30ft tower, 65ft by ⅛in dia coaxial, 100ft by 2·5mm, four-core armoured cable, 8MHz xtal, £1. 8·055556, £1. 8·0222(swr), £1. Xtal calibrator TF1374, £15. Colour vtr, £85. Colour vision mixer, colour camera, rack scope, £25. AVO valve tester, data, £20. G8GQS, QTHR. Tel Gainsborough (0427) 3940.

Rad Coms 1978-83, one copy missing. Four-over-four slot 2m Jaybeam, AR22R rotator, cable, feeder, offers to cover carriage or collect. G3RQJ, QTHR. Tel Four Elms (073 270) 276.

TS120V, used little, boxed, manual, mobile mount, £275. G8BZR. Tel 0635 65261.

Icom IC255E fm tx/rx just overhauled, cw acpu, 5λ/8 mag mount antenna, £200 ono, or would part exchange for small hf rig in good cond such as TS120S or similar. G3ABB, QTHR. Tel Blashill 214876.

MM4001KB rtty, two months old, £230 ono. Kenwood TS430S, cw, ssb, fm fitted, comp with fist mic, £650 ono. Kenwood PS30 power supply, £78 ono. If all bought together, £900. G4IUX, QTHR. Tel R. E. Williams, 021-475 8403.

Over 100 valves, ancient and modern, £10. 25 variable condensers, tx/rx, £10. Ten mains transformers and chokes, £10. Twelve condensers, one, two, four, mfds, 1,000V, 2,000V, £10. All untested, believed ok, collect only. G5JL, QTHR. Tel 01-561 2773.

Trio TS130S tx/rx, this superb tx/rx in exc cond, orig packing, manual, £450. HQ1 mini beam, fitted 1:1 balun, £90. Tel Ken, 021-459 7041.

RTTY G4BMK transceive program, on cassette, £8. PNP Comms Phidraa and FP1A boards, transmit only, for rtty transformer, £18. G4OWY. Tel Weymouth 786930.

KW2000A, ac dc psu, £180. Trio 7730 25W wm fm, £180. Trio 8300 10W 70cm fm, most repeaters, £100. Belcom Liner 2 2m ssb, £60. 2m nine-el Yagi, £10. Citizen stereo amp, 8W pc, £20. Celestion Hedleigh spkrs, 8Ω, 20W, £20. Tel 01-363 6075.

Atomcomm: 300/600 baud amateur communications program for 12K+via Acorn Atom, conventional data communications, plus Atom-to-Atom file transfer mode, allows you to exchange programs over air, error-free! (File transfer requires the Atom to control the ptt. Diagrams of suggested circuits included. All in machine code, less than 2k, relocatable, supplied as source code on cassette, plus full instructions, £6. Please state callsign with order. R. S. Whitworth, G4CTP, 107A Shacklewell Lane, London E8 2EB.

Racal RA117E professional comms rx, RA298 ssb demod unit, case, all leads, £320 ono for quick sale. Buyer to collect or by arrangement. Colin Ward, G6YVJ. Tel Alresford (Hants) (096273) 3059, anytime.

FDK Multi 700EX 2m fm, 25W, mint cond, 5λ/8 whip, mag mount, £150 ono. No split. G4JTK, QTHR. Tel 051-356 1757.

Daiwa rotator, four months old, vgc. *Wanted:* KR2000 rc rotator, TH6 or TH7 antenna or any very heavy rotator. Collins KWM2, must be good cond. 30A psu. Tel Derby 557705.

Yaesu FRDX400 rx, as new, £100. 70cm converter tv camera, spare tube, 2m monitor rx, lots of junk, shack clearance. Ian Bush. Tel West Wickham 01-777 5072.

Shack clearance: Icom 251E 2m multimode, £370. FT902DM, FC301 transverter, as new, £750. RAIBC operator, cannot tune Sony rx FP8880, £80. Sony ICF 6700W, £160. Both factory serviced. SEM Z-match, £65. *Wanted:* S9305 psu, and atu. Tel Bruce Taylor, 072278 396.

TS830S, SP230, VFO240, £650 ono. TS820 160-10, ssb/cw, £350. TH6, £150. Buyer dismantles and collects. Dentron 3kW 160-10 aerial tuning unit. *Wanted:* 6V 12A or 24A mains transformer with primary tappings. Tel Mold (0352) 740101, evenings and weekends.

Standard C78 70cm fm portable, nicads, mobile bracket, case, £160. Icom IC25E 2m fm mobile, 25W, five memories, orig packing, both as new. G4IOF, QTHR. Tel 01-486 8286, daytime, 01-722 7040, evenings.

Scanners: Bearcat 220, tune a.m. mod, all handbooks, wrapping, £160; SX200N, handbook, accessories, £210. G8PRR. Tel 01-340 4139.

Icom IC720A, ICAT500, ICPS20, a.m., cw filters, handbook, new, unused, mint cond, the lot, £950. Marconi TF1066B, 10-475MHz, 0·3μV-10mV calibrated output, fully wkg, £225. Jaybeam 10-el 2m, £10. 6-el 2m quad, £10. G8NTH. Tel Guildford (0483) 34954.

Drake TR44C communication station, T4C transmitter, R4C rx, noise blanker, mic, fan, handbooks, carrying case, xtalled for 15 bands, five fixed frequencies, £325. G8DQH, QTHR. Tel 0785 762555, office.

TS130S hf tx/rx, 3·5-28·0MHz, inc new WARC bands, 200W input, ssb, cw noise cancelling mic, £400. G4OCH, QTHR. Tel Keith, 0543 376366, weekends only.

Excellent for tv camera lighting: Philips Two tubular 15W 9k light box, used few hours so only £35 ono. Thurlow, G3WW, QTHR. Tel 0354 740255.

Creed 444 teleprinter, exc cond, portable 12-240V, b&w tv, Heathkit SB610 cassette recorder, offers. G3TQE, QTHR. Tel 021-783 6822, evenings.

FT101E, cw filter, G3LLL mixer, £350. FRG7, Ambit fm board, £150. Both mint in box. G4HRY, QTHR. Tel Coventry 618648.

Amateur radio magazines for sale: *Practical Wireless,* 1965-83; *Practical Electronics,* 1965-70; *Practical TV,* 1964-83; *CQ,* 1977-79-83; *Ham Radio,* 1979-82; *QST* (30), odd issues 1976-83, best offer, for complete sets only, no single issues. Carriage to UK arranged. Brendan Rooney, EI7CS, Glencar, Sligo, Ireland.

HF linear amp, Dentron MLA2500, all bands, immac cond, orig packing, £525. Receivers: Racal RA17L, £185; Eddystone (hf) 830/7,£180; Eddystone (lf) 850/4, £150. Pye uhf (70cm fm), transistor tx/rx, base station, £80. Tel 03306 613, after 7pm.

Dentron 1kW hf linear, £300. G4SGV NOT QTHR. Tel Redditch 41158.

Yaesu FT102, in perfect cond, £595 ono. FL3 Datong multimode auto notch filter, £95. *Wanted: Radio Receiver Design* by Sturley, third edition preferred. G4IZG, QTHR. Tel 0903-41109.

City University Radio Society clearout: AR88D, R1155A, A43A rxs, assorted other antique equipment. 4CX250B, brand new, suitable transformer, assorted goods. G8URG, QTHR. Tel Phil Ridgeon, Canvey Island 682149, evenings.

Datong morse tutor, £35. HK708 morse key, £10. Both fb cond. G4VXU, ex-G8FVZ, QTHR. Tel Hitchin 53097.

Interface by Kantronics, cw/rtty/ASCII link tx/rx to micro, £115. Apple software with split screen, buffers, £20. Miniterminal, tx/rx stand-alone, own display, 12V Centronics interface, £220. G8PRR. Tel 01-340 4139.

Pocketfones, pair, SU8 fitted and tuned, nicads, all ok, spare receiver, £35 the lot ono. Could swap, w.h.y? G4LIR, QTHR. Tel Phil, Burton-on-Trent 814528.

Mizuho SB2M, nicads, no charger, £70 ono. Liner 2, £60 ono. Texas TI99/4A, extended basic manuals etc, £120 ono. 2114 1k x4 sram, 50p. Heath HW17A 2m rig, £40. AS rx case and psu, film trimmers, 10pF, £1/10. G4TTZ. Tel Bob, Yateley (0252) 871077, evenings/weekends.

MBA, R0, rtty, cw reader, l.e.d. display, stand, leads, as new, £80. Datong D70 morse tutor, £38. Junker Honnef/rh dbgm morse key, used for practice only, as new, cost £42, sell £25. G6MEF, 97 Redland Drive, Northampton NN2 8UG.

Drake TR7, PS7 psu, first class order, £700. Reason for sale'going to TR7A. G4PIP. Tel 056-42 3200.

Lowe SRX30 gen cov rx, mint cond, £100. G8YVW, QTHR. Tel Sheffield 375790, anytime.

Samson ETM3C electronic key, mint cond, £48. Atlas 10XB xtal oscillator, eight/MM xtals, £25. G4LJX, QTHR. Tel Plymouth (0752) 862558.

Two ex-BT modem 20/3s, assync, full duplex up to 1200 b/sec, or simplex up to 600 b/sec, full working order, data, pcb layouts, etc, £100 the pair ono, or might split. G6UDX, QTHR. Tel Telford 507312.

Microsoft program listings. Will transfer easily to most machines. QRA locator gives bearings and distances. Lat/long calculates QRA locators from lat/long figures. Logbook keeps details of stations worked. Others written to your requirements, £2.50 each. Ross, 81 Ringwood Highway, Coventry.

Elliot ET628, 435MHz valved rack mount tx, 10W out, nbfm or simple to screen mod for television, £25. Matching valved single channel rx, £12.50. Hewlett Packard 381C precision rf power meter, £185. Marconi 995B/5 a.m. fm sig gen, immac, £395. G3LGK, QTHR. Tel 0773 833142.

FT708R, 70cm handheld, λ/4, 5λ/8 whips, charger, car converter/charger, spkr mic, soft case, £180. G4UFC. Tel Ilkeston (Derbys) (0602) 302990.

FT227R memoriser, 2m fm, 10W, mint cond, used very little, £110. FT101, 350Hz cw filter, looks and works like new, £250. G4ENW, QTHR. Tel Southend 525569.

FT101Z, not WARC, but 10MHz and 24MHz, Yaesu mod fitted, fan, mic, good cond, £350 ono. Tektronix 310A single beam scope, £40 ono. Pair Wharfedale Linton Two spkrs, good cond, £20. G3HQG, QTHR. Tel 0742 693618.

Heartbreak sale: Multi FDK2000, £125. FDK2700, £200. FT227RA, scan, £150. Standard C78, mint, £175. AR240, accessories, £95. Linears: MML432/100TV, £175; MML432/20, £45; MML144/100LS, £125. HB 2m 2x4CX250B 650W p.e.p., £300. Transverters: MMT1296/144LN, £175; MMT432/144R, £125. Scanner, SX200N, £200. All ono. G8HVV, QTHR. Tel Cambridge (0223) 812188.

Morse tuition program tapes for Commodore 64, VIC20, Dragon, Spectrum, ZX81-16k (specify, ask about others), comp with full operating and learning instructions. Checks and scores your copy. Characters introduced in stages for easy, fast learning from complete beginner to GPO test standard and beyond. Sends any amount at any speed of random character groups for learning, or a typed-in text for plain language practice. The best program to get you that A licence, £6. GW3RRI, QTHR. Tel 0286 881886.

FT901D, fitted switchable additional 1·8kHz ssb filter , £300 or offer. Purchaser to operate rig and collect. Meal provided for dx traveller if rig purchased. G2FNK NOT QTHR. Tel Martinstown (Dorset) 608.

Communications rx Yaesu FR50B, new cond, unmarked, used very little, calibrator, manual, circuit drawings, £85. Buyer collects. G3FK, QTHR. Tel Ferndown 873175.

Yaesu FT290R, gc, cw mobile mount, carry case, charger, nicads, flexi antenna, 18 months old, £230 ono. Tel 051-260 0058, after 6pm.

70cm fm handheld, Yaesu FT708R, YM24A spkr/mic, £170. Trio TR7500 2m 80ch fm mobile tx/rx, £110. Microwave Modules MMT432/144R 70cm transverter, 2m, £100. All good cond, handbooks. Post extra. G8ANU, QTHR. Tel Stafford (0785) 52693.

Icom ICR70 gen cov rx, fm option fitted, mint cond, warranty until August, £420 ono. Gem quad, two-el tri-band beam, good cond, £65 ono. G3TXQ, QTHR.

Tower, 30ft galvanised steel, three section, £150. Tel Brentwood (0277) 228525.

RAE practice program tapes for Commodore 64, Spectrum, ZX81-16k (specify). Tests you on all RAE calculations. Don't let your maths make you fail the exam. Pass with this program, £6. GW3RRI, QTHR. Tel 0286 881886.

Yaesu FT290R, orig, no mods, case, nicads, charger, £185. MM linear, 30W, 1/3W in, perfect wkg order, £35. TET eight-el Quagi, 2m, £28. Western rotator, £20. Adonis mobile mic, £15. 5/7A 12V psu, £10. G4SDK. Tel Pete, Birmingham (021) 453 5026, evenings.

FT902DM, pristine cond throughout, less than 36h, rx less than 36 minutes, tx looks and performs like it should, certified so by Holdings, £525. FTV901R, new, available at negotiated price if required. Any further information from RS52155. Tel John, 01-857 8096.

Hitachi vcr, vhs, VT5500E, perfect cond, £200 or

swap for FT790R/FT780R. Will deliver 30 miles from Exeter. G8NVT, QTHR Ottery St Mary.
Standard C58 2m multimode portable, carry case, mobile mounting bracket, magnetic mount antenna, nicads, mic, external power or cw lead, used only as secondary 2m rig, still as new, £200. G6EXN, QTHR. Tel 01-529 3969 anytime.
Collins S-line 32S3, 75S3C, 312B4, £500. Gem quad, glass fibre supports, £4 each. Advance Q meter, £25. Erskine Labs scope, £20. Linear components, valves, transformers. G2FSP. Tel 0952 83593 (Salop).
Icom IC255E, 25W fm, mobile mount, instruction manual, exc cond, £145. *Wanted:* Five-band hf vertical with radials. Collection/delivery arranged. GW3OMN. Tel 0792 472348 daytime, or 0792 582059, evening.
FT902D WARC, perfect, unmarked, handbook, packing, incl handheld, YD448 base mic, £525 ono. Spare tubes, demonstration arranged. E. Simpson, 5 Cottingham Grove, Bletchley, Bucks. Tel 0908 647076.
FT290R, nicads, charger, case, ARE mods, boxed, mint cond, £200 ono. Aston, G6HXB, 11 Salisbury Road, Southall, Middx. Tel 01-574 2957.
FT277ZD (FT101ZD) fm Mk3, nine bands, cw filter, fan, dc-dc converter, £435. MM 100KB, ASCII, morse converter, keyboard, £35. Bencher ZA1A balun, 1:1 as new, £7. Various radio books, offers. Buyers collect or postage extra. G4BGE, QTHR. Tel Bracknell (0344) 421502.
Trio 2300, nicads, charger, soft case, telescopic rubber duck, antennas, reverse repeat, handbook, £115, postage £1. Lowe SRX30 communications rx, £105, postage extra. *Wanted:* RAF type D morse key. G4UPK. Tel 0704 20003.
QTH: 450ft asl, delightful little wooded valley overlooking trout lake, three bedroom semi, Welsh cottage, ch, large workshop, half acre grounds, one mile M4, mains services, incl carpets, near Crosshands, Dyfed, £23,950. 3·5MHz rx kit, £20. Tel 0269 870139.
FT707, used little, good cond, £350. G-whip, 10, 15, 20, 40, 80, 160m mts, £15. G4EBX, QTHR.
48KB Video Genie EG3003, Lowe, l/case, keyboard, colour, sound add-ons, ref books incl rom listing, tapes incl Edtasm, Tiny Pascal, Copsys, level 3 Basic, £150. Inspect and collect. G3VWL, QTHR. Tel Worthing 41539.
TS520, mint, unmod cond, used little, £290 ono. MM 144/28 transverter, few hours use, mint, £70 ono. T1154, unmod but meters missing, best offer. HRO, orig cond, 9GC coils, offers. G3ESB, QTHR. Tel 0332 671536.
KW Atlanta tx/rx, 500W p.e.p., ext vfo, wkg well, £220. *Wanted:* HQ1 minibeam. G4BHE. Tel Basingstoke (0256) 781468.
CT436 dB scope, probes, handbook, wkg, some new valves reqd, £30. Ali tubing for 10m, 15m, full size beams, 10m, £15, 15m, £25. Sansui hi-fi stereo cassette deck. Dolby etc, handbook, £25. G3TMU, QTHR. Tel Yateley 877485, or 0276 63311, ext 3232.
FDK Multi 2700, 2m multimode, usb, lsb, fm, 5/10±, a.m., cw, vfo, 144-148, synthesizer, 143-148, vox, speech compression, 70cm converter, all inbuilt, £275 ono. G6DRP NOT QTHR. Tel Burnham (06286) 64436.
Trio TR9000 2m multimode, vgc, £240. Complete atv Wood & Douglas tx/rx, incl black and white video camera, 10W output, £110. G8VQJ, QTHR. Tel Bury St Edmunds 5004.
SP70 spkr, £5. Yaesu spkr SP102, cost £40, £15. D. Smith, BRS42590. Tel 01-670 2188.
KW2000E, matching ac psu, handbook, set of spare valves, £260. Eddystone 680X rx, gen cov, fitted product detector, £70. BC221, full charts, £20. Prefer buyer collects. G3WWJ, QTHR. Tel 0223 880101.
Trio 2400 handheld, case, charger, extended coverage, scan, memories, sturdy sensitive handheld, in good cond, £125 ono. Mark Crane, G6KHZ. Tel Hull (0482) 850968, after 6pm.
FL2100Z linear, one year old, unmarked, orig packing, handbook, £375 or best offer. Come and see it working before you take it away. E. Simpson, 5 Cottingham Grove, Bletchley, Bucks. Tel 0908 647076.
Heathkit HW100 100W hf rig, 10-80m, psu, £125. Tokyo hf atu HC200, WARC, £40. Welz SP15M swr/power meter, £20. TET MV4BH hf vertical, £25. Himound straight key, £6. Iambic keyer, paddle, £17. G4SDK. Tel Pete, Birmingham (021-) 453 5026, evenings.
Philips music centre model 961, comp with stereo spkrs, fm and mw built-in tape recorder, turntable, £29. A.T. Smart, 32 Keepers Lane, Codsall. G3TCK. Tel Codsall 2634.
G-whip, 160, 80, 20, 15, 10, coils, £10. Racal MA197B atu, £30. Racal ssb adaptor, £50. Katsumi EK150 keyer, £30. Surplus cw af filter, £10. Fiveway antenna switch with 10 bnc sockets, £10. G3RHI NOT QTHR. Tel 0942 813028.
KW Vespa Mk2 tx, cw psu, fan, spare valves, £70. KDK 2025 2m fm tx/rx, cw all accessories, packing, £90. Kenwood AT130 hf atu, £60. All items ono and can demonstrate. G4FOH, QTHR. Tel 0480 68580, evenings.
Eddystone 740 rx, matching spkr, manual, £50. Brenell reel mono tape recorder, two track, Mk5 type M series 3, operating instructions, circuit diagram, working satisfactorily but needs some mechanical attention, £30. G3DMT. Tel Long Sutton (Somerset) 461.
RAF STR 18B/2 (ARI5874) 100W 24ch standard aircraft hf tx/rx, 2·8-18·1MHz, cw/mcw/rt. Comprises: tx T4188, psu 4192, control 4243, RCU 4189, Jaybox 4191, rx R4187, atu 7180, manual, less some cables, vgc, £120 ono. Taylor, G3UCT. Tel York (0904) 29777.
TR2300 reverse repeater mod, VB2300 power amp, nicads, charger, rubber duck, 5λ/8 whip, gutter mount, £130. G8XZA. Tel 0527 26050.
Shack clearance, all mint cond in makers' boxes, Icom 701, matching psu, desk mic, Amtech atu, £525. Trio 9130, nearly new, £395. Brand new SOTA 432MHz 50W linear/preamp, £90. Microwave Modules 500MHz dfm, £50. G4OHB. Tel 021-449 3530.
Yaesu FT101, 80-10m, very nice cond, no mods, £195. Buyer inspects/collects or carriage extra. G6CUN. Tel Cheltenham (0242) 515074.
Handheld AR245, thumb-wheel controls, external mic/spkr, whip, helical antennas, charger, 144-148MHz, hi/low outputs, orig packing, £50, postage paid. GW4CPZ, QTHR. Tel 0633 67457.
TR2500, comp portable/mobile/base stn, incl spkr/mic, mobile stand/power supply, spare battery case, charger, belt clip, soft case, £195. G4PJJ, QTHR. Tel Nigel, Gloucester (0452) 75539.
HF5 10-80m trapped vertical antenna, HF5R radial kit, used little, as new, unsociable locality!? £60 ovno, plus carriage. Can deliver locally. Can sell both items separately. GM4UKG NOT QTHR. Tel Inverkeithing (0383) 416688, any evening before 7pm.
FT101 Mk2, fan, cw filter, separate FV101 vfo, immac, £300. Katsumi EK121 electronic keyer, auto and semi-auto, £16. DX100U tx, £20. Can deliver 50 miles NE Hampshire. G3BRQ, QTHR. Tel Fleet (02514) 6588.
Yaesu FRG7700M, FRT7700 atu, used little, good cond, box, £330 ono. Tel Paul, 0734 667901, after 7pm please.
FT7B hf mobile multimode, over 50W, digital display, £315 ono. FT790R 70cm multimode, portable, £255 ono. Both mint cond, boxed. Search 9 2m rx, eight xtalled channels, £25. Marconi uhf/vhf a.m./fm sig gen, £85. Pocket phones, RB10, £25. Tel Leek (Staffordshire) 384660, evenings.
Microwave Modules MML432/100 100W 70cm linear, £200 ono. 2m Jaybeam MBM88/70 70cm multibeams, £40 each, or £75 the pair. S. A. Robinson, GI8NBW, QTHR. Tel Ballymoney 62127, or 62238, office hours only.
Telequipment type DH3R dual beam rack mounting oscilloscope, £65 ono. Buyer inspects/collects. G6CUN. Tel Cheltenham (0242) 515074.
KW2000B, ac psu, mic, vgc, some spares, £165. G4UON NOT QTHR. Tel Winslow (Bucks) (029671) 2725.
Bearcat 150 scanner, £120. Trio 2300, new nicads, accessories, £100. Icom 251E, Mutek SM5 mic, £425. Linear 40W, £45. Welz swr meter, £20. Power supply, 10A, rotator, nine-el Yagi, crossed, all ono. G8XCL NOT QTHR. Tel Lydd (Kent) 20954.
NDI HC1400 2m fm, 5W or 25W, 144-148MHz, £120. Totsuko TR2100M 2m ssb, 144·0-144·4MHz, 144·8-145·0MHz, nicads, £90. G6IZH, QTHR. Tel Stoke-on-Trent (0782) 514754.
Tangerine computer boards, PGM toolkit, manual, £20. Two pass assembler, Basic, Forth extension board, £10. Eprom space to memory pcb, eproms etc. G4KID, QTHR. Tel 0953 603143.
Heathkit HW101, HP23A, ps, tx/rx, 80-10m, xtal filter, perfect cond, comp with manuals, £160. G3JYJ. Tel 0843 53279.
Moving to Somerset: detached country cottage in small village on Mendip Hills, 850ft asl, very good vhf/uhf site with planning permission for two radio masts, three beds, lounge/diner, kitchen, bathroom, utility room/shack, stable, barn, workshop, in approx ½ acre, many extras. G6HKT. Tel Derek, 0458 33145, daytime, or Wells 76574, evenings.
RTTY terminal, DT600 type, full facilities, send and receive, £35 plus p&p. *Wanted*: 812 valve, FV901DM, VIC20, CBM64, Bencher lever, Heathkit barograph, kit or complete, Marconi test equipment, microscope slides, accessories, Dorothy Hodges pollen book. G3AZI, QTHR. Tel 0772 37815.
KW202 rx, spkr, KW204 tx, QM70 50W 2m, cw/ssb, transverter, manuals, spare valves, £300 ono. G3JMO, QTHR. Tel Redcar (0642) 486155, anytime.
TS130S, WARC bands, mobile mount, DFC230 digital vfo, memories, spare power lead, up-down mic, £430. TS700G 2m multimode, £250. G4FBA, QTHR. Tel 0977 701622.
Rad Com '75-83, offers. Icom IC201 multimode, £195. Bantam fm portable, 3ch, vfo, rx, £27. Solartron CD1400 db scope, wide bw, high sensitivity y plug-ins, extended range timebase plug-in, £75. Manuals for all above. G8DVN. Tel Dave, Mansfield 882174.
Disposing of equipment on behalf of widow of the late G3MI. Send sae for list which includes Eddystone EC10, Drake 2B, Q-multiplier, Eddystone 750, HQ129X, homebrew txs, xtals galore, etc. G3PV, QTHR.
HF linear amp parts: valves and bases (813, 805, T100, TZ40), fixed and variable capacitors, coils, meters, switches, transformers, chokes, offers. W.H.Y? Would exchange for HRO or old Heathkit/USA tx/rx, good or faulty. G4RSC, QTHR. Tel Reading (0734) 871330.
Mutek SLNA 145SB preamp for Yaesu 290R, £23. Sony 2000P colour video camera, £270. Sony 2000C mixer/caption generator, £85, Sony camera psu, £40. All items brand new. Computer magazines (lots) to clear. G6THT, QTHR. Tel Crawley (0293) 515201.
Icom IC251E 2m base station, 10W fm, ssb, cw, 12V or 240V, mint orig packing, £380. Genuine reason for sale. Hampton, 21 Paul's Street, Southport, Merseyside.
Two Bantex mag mounts, one 5λ/8 144MHz, one 5λ/8 plus 5λ/8 70cm mobile whips, Antec 5λ/8 144MHz, offers please. 70cm colinear base, £6. G8ESK, QTHR. Tel 0274 497438.
FT290R, comp with carrying case, full set nicads, recharger, mains psu, eight-el beam, £220. G4DMG, QTHR. Tel 096273 4408 (Hampshire).
Icom IC290E 144MHz tx/rx fm, usb, lsb, cw, 10W, £280. G6WWH, QTHR. Tel 0663 42194.
FT707, boxed, used rx only, £325. FT102, as new, boxed, £550. Western Electronics 70TV 28-432 transverter, £50. FR101 fm board, filter, £10. G3TBF. Tel Stroud (Glos) (045382) 4853.
FT101Z dc power pack, £410. FT290R nicads, charger, case, etc, £210. Microwave Modules 144/30LS linear, £40. HQ1 mini-quad, hf antenna, £50. All items very low usage, in mint cond, could deliver reasonable distance. G4MPP, QTHR. Tel Crawley 884353.
Yaesu FT726R all mode tx/rx, modules for 2m, 70cm, satellite duplex unit, only six months old, mint, boxed, £830. Kenpro KR500 elevation rotator, £80. HL45U 70cm linear, 45W output, £80. G8FIH, QTHR. Tel 01-394 1499, evenings.
Daiwa hf auto atu CNA2002, brand new, unused, rated to 2·5kW p.e.p., £150 plus post or can deliver reasonable distance. G4MKK, QTHR. Tel 051-480 0240.
Telequipment D53 25MHz dual beam oscilloscope, manual, probe, £120. VHF uhf scanner rx, 12·5kHz channel spacing, 20 memories, mains, 12V dc, one year old, £140. Would exchange for FRG7D or R1000 rxs. Tel Bristol 666387, after 7pm.
Rad Coms: 17 bound volumes covering 1960-79, delivery by arrangement 50 miles, £30. G3TTZ, QTHR. Tel 0272 710402.
Yaesu FTDX401 QRO hf tx/rx, exc cond, comp with FV401 matching vfo, £250. G4KMH NOT QTHR. Tel Swindon 42917.
FT207R, synthesized handheld, 2m fm tx/rx, 2·5W/200mW output, NC9 charger, nicad, YM24A spkr/mic, deluxe NC2 psu/charger, stand, manual, only eight months old, comp, £145. G4ERO. QTHR. Tel Bournemouth (0202) 518012.
Datong PC1 gen cov converter, receives hf on your 2m rig, good cond, £85. Buyer collects. G8OVQ, QTHR. Tel Tiptree (0621) 816677.
Sony U-matic professional video cassette unit, model VO2630, used few times only, ideal for club use, £200 ovno. GI3ZCK, QTHR. Tel Belfast 798615, evenings.
Trio TS120V, Trio TL120 linear amp, comp with mic, morse key, cables, handbooks, all in vgc, £380 ono. G4ANW NOT QTHR. Tel 0730 61859.
FRG7, £80. TF144H, £130. Philips PM2422A dmm, rf probe, £65. Telequipment D67 25MHz scope, three probes, £180. Advance VM77 millivoltmeter, £30. 25MHz dmm, £40. Digital capacitance meter, £40. LPF, new, £7. 813 sockets, new, £1. G3UWZ, QTHR. Tel Brighton 506740.
Racal RA63 ssb unit, cased, handbook, £35. RA21 ssb unit, £20. *Radio Handbook, Editors and*

Engineers, 21st edition, £10. Taylor's electronic vtvm, £25. FT208R, vgc, charger, mic, £150. G4VMJ NOT QTHR. Tel Andover (0264) 53843, evenings or weekends.

26in colour tv, no picture, but otherwise serviceable, could be used for parts, £70 ono. G6TYP NOT QTHR, Tel Kings Langley 65823.

Rotator, light/medium duty, £25. ZX81, keyboard, 16k, £30. Daiwa vhf swr/power meter, N type sockets, £10. Adonis compressor mic, fully variable, £20. All ono. G4TQJ NOT QTHR. Tel Farnborough (0252) 514127.

Icom bargains, unable to find time for RAE: Icat 500, IC720A, ICPS520, ICSM5, KR400RC rotator, some other accessories, cost excess £1,600, only just year old, used little, mint cond, sell only as complete station, £900 ono. Tel Bill, Lincoln 730236.

Mosley TA33JR 10/15/20 beam, £120. Jaybeam 10XY 10-el 2m beam, £25. Kenpro KR400RC rotator, £80. All vgc, all ono, or £200 buys the lot. Purchaser pays carriage. G4ODK, 42 Kennedy Avenue, Laindon West, Basildon, Essex.

Trio 7800, 2m 25W, fm mobile tx/rx, unmarked, boxed, as new, £145 ono. G4LKD NOT QTHR. Tel Colchester (0206) 572772.

TR2300 fm rig, incl handbook, packing, nicads, charger, helical whip, good cond, £110 ono. Revco mag mount base, 2m whip, £15. PSU, 12V, 5A, presettable, regulated, £15. G8PPE, QTHR. Tel Kidlington 78729, after 5pm, evenings and weekends.

FT221RD Mutek board, £375. FT290R Mutek board, £230. IC451E, £575. FT208, £175. FT708, £185. NC8, £30. NC7, £15. FNB2, £15. YM38, £17. MMT432 144R, £115. Datong automatic rf speech processor, £50. Tel 0905 27793, daytime, 06845 68393 (G6CMV), 0905 352408 (G6FZV).

Valves, Loctal B8A etc, Console radio, PP6V6 output, lm, three sw bands, incl tv sound, £20. Various motors, 0·5, 0·33hp, single phase, offers? RS tapped 100V line transformers, £1 each. Plug-in relays, mostly 48V, 50p each. G4IOY, QTHR. Tel 01-455 0540.

Collins KWM2 (WE), 516F2, spare valves, hb, £300. Icom 740, int ac psu, fm board, as new, £600. G3ONU, QTHR. Tel 0923 67344.

Farnell Advance 13·8V psus, 10A, £25. 15A, £35. 0-30V 10A, £25. S/mode 20A, £40. Tandon 5·25in floppy drive, £95. Teletype stand, £45. Both with conns for BBC micro. Lindsay Hoad 75W stereo amp, £25. G6BAN, QTHR. Tel Glossop 65752.

Icom IC240, £120 ono. Tricity fridge/freezer, £80 ono. Both exc cond. G8PUY. Tel 01-599 6667.

20ft Versatower top section, surplus to requirements, needs paint, £20. Buyer to collect. G3ESB, QTHR. Tel 0332 671536.

Icom 240, mint, £105. G3VCN, QTHR. Tel 0752 339738.

Wood & Douglas 144FM2R rx, exc cond, hardly used, £20. G4IXX, QTHR. Tel 0242 526945.

MZ80K Sharp 48k computer, Basic, cw tuition tapes, some games, gwo, £230 ono. Tono 550, mint, manual, works very well, £230. Demonstration if required. *Wanted*: Trio AT230 and VFO230. Tel Gosport 585638.

Standard C58 vhf multimode portable, nicads, charger, mobile mount, orig packing, £200. 1976 Suntor Marina caravanette, three berth, ideal contests etc, good mechanics but needs respray, hence only £500 ono. Consider part exchange FT221R, video gear or mini. G4JQP. Tel 0749 840468.

FT221R multimode, £250. MM144/10US 2m linear amp, £70, or £300 together. Eddystone 880/4 professional 30-band com rx, £300. MM 2m tunable rx, £20. 2m MM 5W a.m., tx, £20, or £30 together. Three sets of Pye PF1 pocketphones on 433·2MHz, batteries, multicharger, £70. Six sets of PF70 uhf handhelds, working on 450MHz, batteries, less xtals, £45 each. Six-el Jaybeam quad, £15. Pye L9U 432MHz talkthrough remote control base station, all solidstate, ideal for 70cm repeater, nearly new, on 428MHz, £100. Two Pye 70cm cavities cat NoAE450F, £25 each. Pye uhf base station, solidstate type L460, less mic on 461MHz, £100. All items open to offers. Carriage extra. GM4UKI/GM8CNK, QTHR. Tel 0563 850976.

70cm 2m dual band mobile antenna, duplexer, cable, only £25 or would swap for working 70cm Pye pocket phones tx and rx, or PF70. Tel 0302 835280, between 6 and 8pm.

Hygain 12AVQ, support mast-chimney fixings, radials, insulators, coaxial, earth leads, £20. Gerry Marlow, G4MWT, 3 Oakways, Warrington WA4 5HD. Tel Warrington 61127.

Kenwood R1000 rx, as new, £210. Microwave Modules 28/144 transverter, £65. G4NJN, QTHR. Tel 01-684 0124, evenings.

IC202, good cond, £80. G4CJJ. Tel Sheffield (0742) 78319, evenings.

Atari morse tutor program, transmit/receive, variable speed, scores, corrects, £7.50. R100, £150. HK808 morse key, new, £30. D70 tutor, £35. MC50 desk mic, £20. Atari rtty logging, locator progs also available. G4TEN. Tel John, 0258 53075, weekends.

TRS80 micro computer system 16k level 2, basic instruction course software, reference manual, several books, small amount of software, £120. DX100L gen cov rx, £20. G6UAX, QTHR. Tel Oxford 724121, after 6pm.

IC255E 25W fm mobile tx/rx, five memories, scanning etc, in orig packing, £130, carriage extra. G4MDZ, QTHR. Tel 0303 89 2003.

IC255E 1W, 25W, perfect, 2m, £170, incl postage. *Wanted*: swr/power meter, 80-100W linear, both for 2m. Tel Clows Top (Worcs) (029-922) 279, anytime.

Drake C-line, R4C, T4XC, AC4, MS4, NB6, 1·5, 0·5kHz filters, extra xtals, exc cond, £525 ono, or exchange for good TS830S plus cw filters and external vfo. W.H.Y? G4DRS NOT QTHR. Tel John, Biggleswade 312609, evenings.

TS180 owners-save £50! Have available one brand new DF180 digital frequency control system, unwrapped, unused, yours for £50 incl p&p. One Tektronix plug-in type 3A3 twin channel differential amplifier, as new, £20 incl p&p. 1132 rx manual, £1.50. Tel Wickersley 541606.

FT101E Mk3, all extras fitted, Holdings fm tx/rx conversion, £350. 6kHz a.m. filter for 101E, £10. Shure 444D, £25. Ominex 600MHz eight digit counter, £70. Datong D70 morse tutor, £40. G4RSY. Tel Croydon (01-) 651 0633.

CR100, £25. Homebrew 4m converter, £7. Jap bug key, £5. Buyer collects. G4AWB NOT QTHR. Tel 01-864 8656, after 6pm.

Computer printer CBM2023, friction feed, dot matrix, exc cond, IEEE out, two handbooks, orig cost £575, sell at £260 or swap for w.h.y? G3AAJ, 94 Herongate Road, London E12 5EQ, tel 01-989 6741.

Telequipment scope S51E, hb, £45. Sony ICF2001, a.m., fm, ssb, pll, unwanted gift, boxed, £110. HF5 five-band vert antenna, unused, still in box, £35. G3WPI, QTHR. Tel 0703 734513.

Trio TS130V, DFC230, SP120, 270Hz cw filter, as new, boxed, 200W linear to suit above, new cost £780, sell £579. Tandy TRS80 Model 1 level 2, 48k ram, cw manuals, editor/assembler, manual, cassette, lots of software, £145. G4GRU, QTHR. Tel 061-440 0556.

Icom IC202S, vgc, xtals for 144-144·4, 145·8-146·0, ideal portable rig, exc rx for Oscar 10, £100 ono. GM4JCM, QTHR. Tel Invergowrie (08267) 286.

Racal RA1217 professional comms rx, 1-30MHz, digital readout, all filters, exc cond, nearest offer £375 secures. Yaesu FT290R, mint cond, hardly used, Arrow Electronics mods, auto toneburst, listen ip, case, £200. GW4ODL. Tel 0248 852866 (North Wales).

Yaesu FT707 100W base/mobile hf rig, matching power supply FP707, atu FC707, never used mobile, all boxed, manuals, cost £700 new, sell for £450. Securicor carriage extra. GI4PCQ, QTHR. Tel 0232 612533.

FRG7, Marconi atu, exc cond, reason for sale, moved house, £120. G6SDP. Tel Eastbourne (0323) 30888.

Video, Philips 1702, comp but needs attention, only £20. Tel Southend 202216.

HQ1 mini beam, balun, rotator, needs cleaning due five months in desert environment on dx expedition, exc results, £95, carriage extra. G4AWJ, QTHR. Tel 04352 4803.

FT207R 2m fm handheld, synthesized, case, charger, nicads, two years old, used little, £120. G8UOP NOT QTHR. Tel Terry, 0794 22630 (Hampshire).

Yaesu FL110 200W hf linear, in vgc, £99 ono. 1983 *DX* and *USA Callbooks*, £5 each. 1980-2 *DX* and *USA Callbooks* also on offer. Tel 01-578 4484, evenings.

Icom ICR70 rx, less than 12 months old, fm 12V dc options fitted, as new, orig packing, Datong active antenna system, weatherproofed, £420. 70cm atv tx, based on Wood & Douglas boards, 3/10W psp, 2ch video inputs, two freq, SU8 fm via ptt mic or 435·6 video, internal MMC435/600 up-converter, 12V dc operation, professionally built homebrew, incl all data, small monochrome tv camera, mains, requires C-mount lens, all gwo, £130 the lot. G8MGD, QTHR. Tel 0684 294082, evenings.

FT290R, full wkg order, mic, all mobile equipment, 7λ/8 whip, rack unit, 30W pa, everything ready to go mobile 2m, £220. G4JLV. Tel Julian, Reading 481962, night, 595025, ext 217, day, for demo.

Acorn Atom 12+12k fp, incl rtty chip, full information, some games, £100. *Wanted:* atu for FT107. GW4ECR. Tel 0495 821081.

Petrol electric set, 12/24V, 9A continuous, two 6V accumulators, unused, £60. Prop pitch motor with some spares, £50. Buyers collect. G2AMV, QTHR.

Heath SB104A solidstate 100W tx/rx, 400Hz filter, noise blanker, HP1144 mains psu, SB644 remote vfo, mint cond, £320. G3VLT, QTHR. Tel Chris, Wokingham 786305.

BBC 32k morse programs, incl 500 words in store, 100 real 3min tests, cw abbreviations, punctuation, saves and playback of text typed in, £4.50. Brandon, G4UXD. 1 Woodlands Road, Chester CH4 8LB.

Confidential frequency list, 5th edition, unwanted present, £6. *The World in my Ears*, by Arthur Cushen, £2. *Radio Communication*, 1982-3, £3. G6FDJ, QTHR. Tel Lyme Regis (Dorset) 5307.

Yaesu FT227R, £140. MMT432/144R, £130. MMT1296/144, £130. MTV435 atv tx, £120. Icom IC202S, £120. MML144/100LS, £110. Icom IC2E, £110. Yaesu FT202R charger, psu, £80. DRAE 6A psu, £25. G8ZXG, QTHR. Tel Gravesend 55667.

Storno CQL662 rt, manual, RB0, RB4, SU8, SU18, SU20, £75. Pye pocketfone 70, PF2UH, RB0, RB4, RB14, SU8, SU18, £75. Dummy load, 0-1000MHz, 500W cw, 1000W p.e.p., £75. Antenna combiners: Mutek two-way, £22; homebrew four-way with cables, £25. Video Genie, expansion interface, 48k, 80 track disk drive, green screen monitor, software etc, offers. Molimerx Pascal compiler, V5·3 for Genie/TRS80, £55. Write for full details. Mike Tubby, G8TIC NOT QTHR. PO Box 119, Leicester LE7 2EP.

Liner 2, built-in preamp, pip tone, pw speech processor, xtal for 144·340-144·380MHz, handbook, £55. Hameg HM412 dual trace, 20MHz oscilloscope, cost £400 new, selling £220. G4UWK. Tel 062-982 3072, evenings or weekends.

Hygain 12AVQ dx verticals, £33. Yaesu desk mic, £15. Yaesu SP901 shack spkr, £19. Microwave Modules 2m converter, £19. 7MHz traps, £5 each. Stereo headphones, as new, £14. Tel Richard, 0376 84478, evenings only.

IC215 15ch fm portable, 15W pa, GP144W colinear, spare xtals, nicads, charger, £115 ono. G4OBS, QTHR. Tel 0980 862922 (Wilts).

Drake twins: T4XB tx, R4B rx, power supply, spkr, many extras, spare valves, mint cond, recently overhauled, aligned, must sell at silly price, £325 ono. G3KWT, QTHR. Tel Leeds (0532) 688821.

Partridge mini antenna, atu, 3·5-30MHz, £30. Oric 16/48k programs: rtty (requires tu), £7.50; morse tutor, £4.50; QTH locator, £4.50. Also Electron. 17A 13V power supply, £70. G8KMV, QTHR. Tel 0438 354689.

Yaesu FT207R handheld 2m tx/rx, NC1A base charger, PA2 mobile power adaptor, MMB10 mobile bracket, soft case, rubber duck, mobile λ/4 magmount antennas, all in good cond, boxes, £150. G6WYE. Tel Andy, Erith (Kent) 30653.

FC902 atu, mint, £85. 4 by 460pF variable capacitor, ideal hf linear, £15. Two-pole double change-over relay, 12V coil for linear switching, £6. Transformer, 1000V, 250mA, £15. G4SGV NOT QTHR. Tel Redditch (Worcs) 41158.

SX200, scanning rx, will scan out of band, 23MHz copied, many others, vgc, £225 ono, or exchange for gen cov rx. G1AAL, 284 Orphanage Road, Erdington, Birmingham B24 0BB. Tel Tony, 021-382 3914.

Shack clearance: 3C221, six-el 2m antenna, 60 by ⅜in dia coax, 30ft tower, Eddystone 770R, 770U/2, rack mount scope, TF1874 xtal calibrator, Heathkit af millivoltmeter, af power meter, sig gen, Avo valve tester, 70W tv, tx, Super 8 camera, much tv gear, phone for details. SAE for long list. G8GQS, QTHR. Tel 0427 3940.

Yaesu FT902DM hf rig, mint cond, must sell, hardly used, nine-band, 160-10 tx/rx, YD148 base mic, can deliver in London or Greater London, £550. Tel Andy, Grays Thurrock (0375) 891552.

FT290R, case, nicads, mobile mount, £200. GW4LZA, QTHR. Tel 0248 713262.

Yaesu FT726R 2m multimode base stn, only three months old, exc, genuine reason for sale, £600, or p/ex mobile multimode. 100W MM linear, £95. 2m atu leader LAC 897, power 100W, swr meter, £40. Isopole 2m vertical, £20. G4OLC. Tel 0670 855953 (Northumberland).

2m beam antenna, 8XY, rotator, mast, coaxial, £60. Electret mobile safety mic system, £15. Trio mobile spkr, £10. Tel Lymm (Cheshire) 6170.

Icom IC260E 2m multimode, never used mobile, £250. 40W output rf switched pa, £20. Pair Storno fm handhelds on 160MHz, £50. Wood & Douglas 2m synth, wkg, £30. Hitachi 1in vidicon, new, £10.

Burroughs 50 col printer mechanism, new, with data, £50. Shibaden SV700 vtr, £50. Hi-fi stereo preamp module, £10. TV pattern generator, £25. 2m to 28MHz converter, £5. UK101 computer, £50. Case for WW teletext decoder, £5. S100 based computer with terminal, £225. S100 boards: 8080CPU, £25. 8k ram, £25. Imsai front panel, £30. 20 slot motherboard with terminator card, £30. All items must go, so offers? *Wanted:* Info on Pilot radio X62B. G8POO, QTHR. Tel Simon, 0661 843449.

Yaesu FT221R, fitted Mutek front end, comp with handbook, mic, £275. For family of the late G8WXE: MM144/100 linear (no preamp), MM144/432 transverter, unused, offers. G3CBW, QTHR. Tel 0228 39291.

TS820, £350. FL2100Z, £325. VFO520, £60. SP820, £30. Trio dip meter DM81, £40. Trio cw filter, YG45SC, £45. Tel 0902 343068.

Yaesu FT1, all options fitted, immac, only used twice on tx, hence reason for sale, £1100 ono. Tel Watts, 01-387 9452 (business).

Drake TR7, PS7 psu, WH7 wattmeter, full service manual, 0-30MHz receive, WARC bands transmit, exc rig. G3PVX, QTHR. Tel 01-866 6432, after 7pm for details.

Teletype model 33, stand, tape punch reader, dust cover, set manuals, £20. Buyer collects. G4IOK. Tel Witney 4867.

Dynamic rams, 4116, 16k × 1, 150ns access, 50p each, eight for £3. 4027 4k × 1, 200ns, 20p each. Spectrum upgrade kit, 16-48k, £10. 4127-1 4k × 1 static rams, 75p each, eight for £4. Tel Newcastle (0632) 710834, after 5.30pm.

RTTY terminal unit, DT600 type, full facilities, send, receive, details available for computer interface, £35 plus p&p. *Wanted:* Dorothy Hodges' book on pollen. Any recent books on beekeeping. Microscope slides or accessories. Bencher lever. G3AZI, QTHR. Tel 0772 37815.

FT101Z Mk 1, 30m mod, cw filter, fan, mic, vgc, in orig packing, £390 ono. Prefer buyer collects. G3FBN, QTHR. Tel Wentworth (09904) 2211, after 6.30pm or weekends.

FT290R, 2·2AH nicads, 12V charger, one year old, no mods, £210. Can include ext spkr, 5/8 and 7/8 whips, mag or gutter mounts, VIC20 micro, tape unit, super expander cart, books, progs, carts incl morse tuition prog, as new, cover, £125. Collins 30S1 linear (floor standing), 115V/no 160m. The ultimate secret weapon—offers? G4AFF NOT QTHR. Tel 03057 75456.

Yaesu FRG7700 rx, immac cond, orig box, £210. G4UHY. Tel 01-670 7184.

Nascom 2, 32k, cased, zeap, nasdis, debug, naspen, toolkit, Nas-sys 3, Nas-gra eproms, software books, exc, £135. Video Genie EG3003, EG3014 expander, 32k, for disc interface, printer interface, monitor, books, software, lower case eprom, sound, £195. G3VMW. Tel 0937 844510.

Yaesu FT101ZD fm, cond as new, orig packing, £500. G4VBQ, QTHR. Tel Ipswich (0473) 217645, after 5pm.

Icom IC730 100W hf tx/rx, 80-10m incl new bands, cw/ssb/fm, Thanet fm board fitted, immac, incl mobile stand, other accessories, £430, or will consider part exchange FT290R with its accessories. LAR, 160-10m, hf atu, brand new, £50. Tel Mike, 0772 635560.

WANTED

ASR38 teletype, friction feed adapter, sprocket feed paper, GEC courier manual, Tektronix type ILIO spectrum analyser, scope plug-in. *For sale:* Miniature army scope type CT52, immac, £30. G4FIT, QTHR. Tel 07373 54696 (North Surrey).

GD5 digital readout for RS520. KW107 Supermatch or similar. 24h digital clock. G4VGH. Tel Malvern (06845) 6145.

Akai CCU150 camera control unit, or preferably Akai VT150 video recorder. GM3JFG, QTHR. Tel 038-17 451.

70cm Pye Westminster W15U, remote control box, circuit of scanner for use with W15U, info for fm mods to FRG7. G8ONX. Tel 0203 452780.

Heathkit GR9900 12in tv, to borrow instruction construction manual. I promise to return all material, desperate. G3ZJH, 169 North Road, Stoke Gifford, Bristol BS12 6PH.

KW109 atu, Johnson matchbox, or anything similar, rated at 1kW peak to feed balanced line feeder on all hf bands. G6MVM, 24 Seaview Road, Herne Bay, Kent CT6 6JA.

Radar tr unit for Decca 101 or EMI Electrascan. 12in ppi display, modern design eg AR1. *For sale:* Trio R1000, £175. Cleartone 660, 25W, uhf mobile pmr, £75. Rotator, cable (new), £75. All plus carriage. G4EZM, QTHR. Tel Blackpool 853933.

AR88 with manual, please state price, must be in first class cond. L. Hawkins, G3LVO, 17 Barkway Road, Royston, Herts. Tel Royston 41380.

Attempting my own "real" radio collection. Good price paid for mint 19 sets, 38 sets, 1154, 1155, BC348, anything of this era accepted. W.H.Y? G3ZYC, QTHR.

FLDX500, FRDX500 manuals. Will buy or willingly pay for opportunity to copy. G2HNO, QTHR. Tel Poole (Dorset) (0202) 708405.

Morse key, older the better. Top price paid for double current c1915 and similar. For own use by dedicated telegraphist. G3BEX, QTHR. Tel 049 46 5097.

Rogers Developments Ltd Cadet 3 hi-fi equipment data. Circuit diagrams for pre- and power amplifiers including data on plug-in equaliser modules, particularly for magnetic cartridges. GW3ZFG, QTHR. Tel 0222 693411.

MMT70/144. 4m linear amplifier, MX4. W.H.Y? G6DAW. Tel 01-856 4123.

Codar AT5 mains psu, orig gwo. G1BZQ, 3 Newis Crescent, Clifton, Shefford, Beds SG17 5HT.

For the Wireless Museum: pre-1950 radio books, catalogues, magazines, service sheets, callbooks, QSL cards, valves, components, knobs, shelving, phonogram cylinder, morse keys, components. Details please to hon curator G3KPO, 34 Pellhurst Road, Ryde, IoW. Tel 0983 62513.

Variable capacitors, wide spaced, Daiwa CN620A swr/power meter, MC50 mic, TL120 linear, semi-automatic bug key, base for TR9000. *For sale:* new valves, sae with requirements. M. Twigg, 30 Valley Drive, Yarm, Cleveland TS15 9JQ.

Handbook for Marconi counter frequency meter model number TF1417, borrow or copy, all costs paid. Tel Atherton (0942) 891140.

A book that will help me pass the RAE or the name of a book written by an amateur to help pass RAE. Have echo whiskeying for 51 years. 223 Damwood Road, Liverpool L24 2SS. Tel David, 051-486 6768.

Microscope, metallurgy or similar, with top illumination of specimen, amateur entomologist. Price and particulars to G4KFW, 87 Dyas Avenue, Birmingham B42 1HQ. Tel 021-357 2009.

Ex-animation cameraman requires vhs videotape of 1954 feature cartoon "Animal Farm" (now deleted) in perfect cond. Tel Brian, G4SPQ, Dursley (0453) 46632, evenings.

Mods for Sony ICF2001, MMT1296/144, bits at 24GHz, any info, detector set, rf interference CT-6625-99-924-1533, diagram and loops for mw and sw. Crispino Messina, I5XWW, Via di Porto 10, 50058 Signa FI, Italy.

A13, A13 tuner, rf amp, A14LP, A14HP, A40, A42, A43, B48, C13, C12, B70, PRC16, C42, C45, D11, information for A13, D141. Comp test-set FT1, FT2. G8MQT. Tel Terry, 07073 27233.

Top price for TR9, restorable condition. TR1196, control type 4, T1083 parts, T1154 generator, type 32/33, aerial ampmeter, resistance type 52, relay tape 220, plugs, 10H/319, 10H320, 10H/422, 10H/425, Cannon connectors, accessories, WS29, W.H.Y? RAF or foreign airborne. 52 Bramble Lane, Mansfield, Notts.

Valves type Z759 (CV5060) for Solartron scope CD513/CD523/AD557 etc. G4RVD, QTHR. Tel 0932 241467.

Info about, and ideally a mint example of, 1939-45 Dalton navigational computer, your price. All correspondence with sae acknowledged. GM4AGS, QTHR. Tel Newport-on-Tay 543113.

Datong D70 morse tutor, will collect. I am desperate for that A licence. G6TGZ, 96 Porter Road, Brighton Hill, Basingstoke, Hants. Tel Mick, Hackwood 4260, or work, Hackwood 4011, ext 59.

Handbook or circuit, army bench psu ref 6625, 99, 949, 5448. Johnson Globe King rx, uses HL23, three plug-in coils, kit or complete or bits acceptable. G3LYU, QTHR. Tel 0533 876459, after 6pm any time.

Trio Kenwood TL922 amp, SM220 monitor scope. *For sale:* Drake C line, T4XC, R4C, MS4, all filters, late models, £500 ono. G4EJM, QTHR. Tel Mike, Ipstones, Stoke-on-Trent (053871) 350.

DIG101Z, digital counter kit for FT101Z, handbook/manual for CD514 Solartron scope. Workshop manual for FT101Z. Suitcase spy set in good cond. G4FMK, QTHR. Tel 0268 683805.

Electronic Developments EDL432P 70cm linear, or linear suitable for 70cm atv work, 3W ip. G8UGU, 4 The Green, Great Brington, Northampton NN7 4JD.

KW103 meter. G3STT, QTHR. Tel 0704 29137.

23cm, large dish with horn feed, distance no object, please write or phone. Peter Crosland, Red Lion Cottage, Holt Heath, Worcester WR6 6TA. Tel 0905 620041, evenings, or 021-454 8585, daytime.

Manual, circuit diagram for Canadian WS No58. Buy or borrow for copying. G8IDL, QTHR. Tel 0638 76230.

ET021 tuner, vhf-uhf. G6VMO. Tel Rob, 01-341 2642, mornings, weekends.

Manual/handbook for Heathkit OS2 scope to buy, borrow or copy. G3SLN, QTHR.

Handbook or cct diagram for Labgear LG300 tx. Tel Atkinson, 0427 611160.

Atlas 180 comp mechanically but otherwise cond immaterial. G3LNP, QTHR. Tel 044 282 4402, home, 01-927 4894, office.

Yaesu FT780R or Trio TR9500, 70cm multimode, preferably still within guarantee. Two 2C39 or equivalent valves and valve holders. GM8ZZN, QTHR. Tel 0475 33544.

2N5016 pa transistor, urgently. Has anyone one of these that I could buy at a reasonable cost? Sven Weber, GM8ACC NOT QTHR. Quildon, Stromness, Orkney.

FTV250 transverter, any cond, but must have leads, manual. G6YGW. Tel 061-788 9351, anytime.

250 + 250 wide spaced variable cap, suitable for 200W Z-Match tuner. G3CPM, QTHR. Tel 0386 852753.

AR88, must be in good cond. G3LVO, 17 Barkway Road, Royston. Tel Royston 41380.

Icom 451E, cash, or would consider part exchange with my Icom 251E, mint appearance, C78, 70cm mobile portable. G4SIB, The Glade, Broad Lane, Newdigate, nr Dorking, Surrey RH5 5AT. Tel Newdigate 362, anytime.

Copy of operational notes for the National SW3, and details and circuit of the National "Four tube thrill box" SW4. G4IMT, QTHR. Tel Bath 891254.

Drake desk mic type model 7075. LPF model tv 3300LP. Details and price to G3VDU, 56 Winchester Avenue, Weddington, Nuneaton. Tel 349461.

A14 manpack parts, esp rf amplifier. Set of good nicads. No11 set, any info, bits or incomplete set for display in restored second world war vehicle. G3VKM. Tel 0502-77 622 (Norfolk).

TH2 beam ant. Books on the slate industry Devon/Cornwall/Cumbria and Leicestershire. Details to G3UAA, QTHR. Tel Leicester (0533) 875241.

Source for 12V or 24V electric motor. Approx 3hp required. Very large number of solar cells. TenTec PM3A or similar QRP rig. G4LJX, QTHR. Tel Plymouth (0752) 862558.

SP901 spkr or SP901P phone patch/spkr in good cond. G6IBF, QTHR. Tel 01-556 7759, evenings after 6pm.

Three rx xtals for Trio 70cm rig, TR3200: (1) SU16 (rx) 433·400; (2) RB10 input (rx) 434·850; (3) RB14 input (rx) 434·950. GW3HBT, QTHR. Tel Larkhall 883306, after 6pm.

Microwave Modules transverters: MMT144/28, MMT432/28S, linear amplifiers MML144/25, MML432/20. Will pay top price. G4DYM, QTHR. Tel Yatton (nr Bristol) 83348.

Inverted-V trapped dipole antenna, PKW system, 80-10m, good cond, as distributed by PM Electronic Services. Tel John, 0823 442512, evenings only.

50 + 50pF, two gang, medium spacing, not rx type. Roller inductance, 50W type, preferably three roller, would settle for two or one roller. Tel cond and price to 0454 774979.

TL922 linear, any cond considered. G3TKF, QTHR. Tel Keynsham (Avon) (02756) 3965.

Suitcase tx/rxs: any spares, incomplete or damaged sets welcome. Any spares or connecting leads etc for WS (Canadian) No29. Any commercial or military a.m. phone tx or tx/rx covering 3-8MHz continuous. Taylor, G3UCT, 8 Government House Road, York. Tel 0904 29777.

Trio 9500 in wkg, good cond, comp as possible! Ownership validation is required. G3HJK, QTHR.

80m antenna. Ideas and suggestions for antenna at restricted QTH space (sketches etc greatly appreciated). Postage, gratuity etc refunded. Hill, 37 Rock Street, Hyde, Cheshire SK14 5JX. Tel 061-366 0927, evenings.

ZX81 computer details, advice, program etc in order to use Creed 7E teleprinter as printer for computer. Any ideas? G4LRL, QTHR. Tel Bromsgrove 71692.

FRG7 in exchange for FT207R, 2m fm handheld, synthesized, case, charger, nicads. G8UOP NOT QTHR. Tel Terry, 0794 22630 (Hampshire).

Book on spark transmitters, wide spaced variable condensers, small old morse key, SP120 spkr, MC50 mic, TL120 linear, AT130 atu. *For sale:* valves. SAE with your requirements. M. Twigg, 30 Valley Drive, Cleveland TS15 9JQ.

AR88, HRO, other similar communications rx required. Anything considered but genuinely high price for first-class example. Pre-war QSLs, books, and hot jazz 78rpm records! G4LQF, 14

Regent Road, Harborne, Birmingham 17. Tel 021-426 3663.

Marconi CR100, Murphy B40 rxs. 62 set and HRO psu. Cleaver. Tel Harwich 2195.

CW filter, 300Hz type, XF8·9HCN for FT101ZD. Price including airmail postage to Pat West, 5B4PW, Apt 18 Pantheon Building, 40 Evagoras Avenue, Nicosia 136, Cyprus.

Manual and any info on mods or add on bits for Trio model 9R59DS. Willing to pay. RS84992. J. Campbell, 85 Drumcavel Road, Muirhead, Glasgow G69 9EP. Tel 041-779 2771.

PSU for Pye ssb 125 valve type rx. Copies of articles on post-war equipment as per Technical Topics page 44 in January *Rad Com*. Glass fibre whip for Redifon PC2 tx/rx. G8JAC, QTHR. Tel 01-651 2727.

Circuit diagram and/or manual Marconi CR300/2 rx. G3VDG, QTHR. Tel 0632 533605.

Versatower or similar winched tower. Will collect in Midlands or south. Tel Whitstable 274947.

Constructor requires three-pin battery plugs and aluminium shrouds. Paxolin tubes incl ¼in (22mm) od by ⅝in (16mm) id. Variable capacitor, 150pF ganged to 15pF with 2:1 reduction gear. RS85139. Tel 021-422 8905.

BMK, AMK3, good price for complete set. G3NYE, 49 Hawthorn Road, Gatley, Cheadle, Cheshire. Tel 061-863 6263 between 8am and 4pm.

Manual or circuit diagram for Sony Tektronix 335 oscilloscope, buy or borrow. GM4DAE, QTHR. Tel 041-778 5040.

For the Wireless Museum: old QSL cards, valves, components, keys, pre-1950 radio books, magazines, catalogues, service sheets, manuals, Baird record, beehive letter neon, phonogram cylinder, AVO valve tester handbook, any knobs! Details please to hon curator G3KPO, QTHR. Tel 0983 62513.

IC245E for spares, any cond considered. G4PPW, QTHR. Tel Wellingborough (0933) 651719.

Two 813 valve bases and caps. One heater transformer, 10V, 10A. EI4BB, QTHR. Tel Dublin 510655.

Yaesu FT227RB 2m fm tx/rx, £90-£100. G4SBM. Tel Loughborough 213855.

Tri band beam and rotator. G4AEI. Tel Reading 883508, home, Reading 876130, ext 7631, office.

Collins! Collins! Collins! Do you own Collins equipment? Join the Collins Owners Club. Quarterly news sheet and list of fellow Collins owners. Send details of equipment owned and sae to Bob Ralph, G4KSG, QTHR.

Meteosat uhf converter and preamp. Morris. Tel Bolton 52384.

Programmed rom or listing for G3PLX Amtor circuit in *Rad Com* June/July 1980, or software for Amtor using 6502. G3HTJ, 53 Wolfridge Ride, Alveston, Bristol BS12 2PR.

Workshop manuals or cct diagrams for following equipment: FDK vhf fm amateur rx. Yaesu FT902DM and AOR AR240A fm handheld tx/rx, will purchase or pay for photocopying. Miss June Dunne, GI4MJD, 26 Duncreggan Road, Londonderry, Northern Ireland BT48 0AD.

Info wanted: on ZHC glass fibre quad poles from users, on how they found them, any data appreciated. Poles to mast casting. G3HJK, QTHR.

ARROW

. . . Give us a ring
Tel: 0277-226470 or 219435

7 Coptfold Road, Brentwood, Essex CM14 4BN
Tel: 0277 226470 or 219435 Ansafone on 219435 Telex: 995801 (REF: A5)

CHOICE

When you are tempted to a new rig you owe it to yourself to go to a store where you can see the competing models. It doesn't make sense to travel 100 miles or more to see one brand. ARROW STOCK YAESU, TRIO/KENWOOD & ICOM.

COME AND TRY THEM SIDE BY SIDE

FT757GX

TS430S

IC745

How about a new receiver, does your dealer offer you a choice of current models or only one brand? AT ARROW YOU CAN TRY:

R2000

R70

R71E

FRG 7700

HAVE YOU TRIED & COMPARED 2M HANDHELDS IN YOUR LOCAL DEALER?

ARROW HAVE: FT208R TR2500 LS20XE C110/IC2E for you to try, together with all accessories plus the 70cm version. (Some more HOT news: Soon the new IC02E from ICOM, the FT203 from Yaesu and the SK202 from SOMMERKAMP which will really be a winner on price and performance.)

DOES YOUR DEALER PUSH HIS CREDIT CARD AT YOU, or does he offer you a choice of payment methods? ARROW will accept ACCESS, BARCLAYCARD, EUROCARD, MASTERCHARGE, VISA, TRUSTCARD, ALL "CREDITCHARGE" IN STORE CARDS, and of course we have our own card too. Cheques, Travellers cheques, most major currencies (and we can offer special export schemes saving tax). Or how about Interest Free Credit, Normal Hire purchase, No Deposit HP? We will be happy to advise you on the most economic method for your purchase.

EXPERTISE Everyone claims to have it — we'll rest on our reputation. Not every company can have designed and manufactured transmitters for commercial use including some of the very top names in Show business.

SERVICE Not just the ability to mend your gear, but a sales system where equipment is tested before despatch, where the sales staff are interested users of the equipment, where we will never refuse to service your equipment "because you didn't buy it from us" or suchlike.

PRICE With 3 store buying power Arrow buy as competitively as any dealer — bulk buying is the answer to our terrific price deals. **WE BUY BIG — RING US FOR PRICE!!!**

NOW SOME BARGAINS:

IC251E	LS20XE	DR7600	TS430S	FT726R
2M Base Station Multimode Still available	2M FM Handy	Diawa Heavy duty Rotators	Trio/Kenwood HF Trans	Yaesu Multi-bander
£499	**£128**	**£149**	**£705**	**P.O.A.**

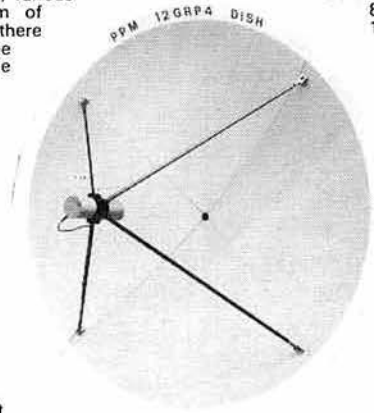
3 UK Location Nationwide or Mail Order
Peter G3LST or Bob G6AKL at Brentwood
SCOTLAND Bill GM6NHJ-041 339 6445
WALES John GW8UZL 0248 714657

"PHONE YOUR ORDER FOR TODAY'S DESPATCH ALL WE NEED IS YOUR ACCESS OR VISA NUMBER. SMALL SPARES – PLUGS – AERIALS – PHONE FOR A QUOTE FOR THAT NEW RIG!"

OPEN 5 DAYS A WEEK. CLOSED THURSDAYS

Setting up an Earth Station?

There is now so much hardware floating around in space that more and more amateurs are turning their antennas skyward for all sorts of reasons. Oscar 10 is up there and working well, various Meteosats are sending out a stream of interesting weather pictures and soon there will be Direct Broadcasting Satellites that will be beaming down television pictures. Here in the shop we have already picked up the Russian one that has two different television channels and one for radio. The American TDRS satellite is due to be launched in March and it will have an elevation of 40 degrees west and will put a 38dBW signal into Europe. Several other countries also have launches planned for the near future.
To get the best from these you will need a dish antenna. We are now the sole agents for the range of P.P.M. Microwave dishes, from 4ft up to 20ft. Standard Mounts, Feed Supports, and Feed Horn Assemblies are also available. The dishes are either Aluminium Petal type or G.R.P., which is available in most colours and suitable for Satellite T.V., professional and amateur applications.
Please note that V.A.T. and delivery are not included in the price.



DISHES

4ft Aluminium Petal Dish type 4AP6	£66.50
4ft GRP Model 4GRP4	£242.00
7ft GRP Model 7GRP375	£682.00
8ft GRP Model 8GRP4	£953.00
12ft GRP Model 12GRP4	£1415.00

Dishes up to 20 feet are available to special order.

Standard Mounts

4ft	£98.00
7ft	£193.00
8ft	£193.00
12ft	Price on request

Feed Supports

4ft	£8.70
7ft	£33.50
8ft	£33.50
12ft	£69.50

Feed Horn Housing Assembly
2 types £60.00

Meteosat Feed
Meteosat Feed Horn (1691mHz) manufactured in Copper with 'N' Type socket £60.00

See the Professionals

You'll find all you need at Photo Acoustics. We can offer help and advice, the chance to try out the gear and financial facilities too. We offer Creditcharge Instant Finance and accept Access and Barclaycard. Part exchange welcome.
Come and see us: Derek G3TGE, Roy G3TLE & Kerry G6IZF – or phone 0908 610625.

Photo Acoustics Ltd.
● OF NEWPORT PAGNELL ●

Four minutes from the M1. Exit Junc. 14. Head for the High St., Newport Pagnell. We're at No. 58. Parking at rear, opposite, or round the corner in Silver St.

ICOM FDK

FARNBOROUGH COMMUNICATIONS

PRICE? Bargain with Mick G4MPW

PRICE? Bargain with Mick G4MPW

FOR ALL YOUR AMATEUR EQUIPMENT

Yaesu, Sommerkamp, FDK, Icom, Drae, Microwave Modules, J-Beam, Shure Mics, Adonis Mics, Welz Equipment. TVI high pass and band stop filters.

Instant HP Terms

97 Osborne Road
North Camp
Farnborough, Hants
Tel: (0252) 518009

Buy it with Access

BARCLAYCARD VISA

LOSING DX?

ANTENNA FAULT? Poor reports? Check FAST with an Antenna Noise Bridge, MEASURE resonance 1-160MHz and radiation resistance 2-1000 ohms, GET answers - MORE DX, **£19-60.**

RARE DX UNDER QRM? DIG it OUT with a Tunable Audio Notch Filter, between your receiver and speaker, 40dB notch, **£16-40.**

TIME WRONG? MSF CLOCK is ALWAYS CORRECT - never gains or loses, SELF SETTING at switch-on, 8 digits show Date, Hours, Minutes and Seconds, also parallel BCD (including Weekday) output for computer, receives Rugby 60kHz atomic time signals, built-in antenna, 1000km range, TIME RIGHT, **£72-70.**

Each fun-to-build kit includes all parts, printed circuit, case, instructions, by-return postage etc, list of other kits, money back assurance, SEND away NOW.

CAMBRIDGE KITS

45 (RC) Old School Lane, Milton, Cambridge

BARGAIN CORNER

WATCH THIS CORNER EVERY MONTH

YAESU FT-980

Only £999 inc.

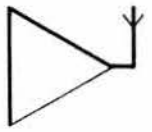
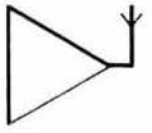
(This month!)

Don't delay! Get your order in today.
Access/Barclaycard by phone is acceptable.

Western Electronics (UK) ltd

Fairfield Estate, Louth, Lincs. LN11 0JH Tel. Louth (0507) 604955 Telex 56121 WEST G
Northern Ireland Agents: Tom & Norma Greer GI4TGR/GI4TBP Drumbo (023 126) 645

THE NORTHERN AMATEUR RADIO SOCIETIES ASSOCIATION

1984  **22nd**  1984

ANNUAL RADIO/ELECTRONIC EXHIBITION

PONTINS HOLIDAY VILLAGE AINSDALE, SOUTHPORT

Saturday and Sunday 7th/8th April 1984 Open at 11.00 a.m. each day

ACTIVITIES will include an Inter-Club quiz, construction contest, grand raffle, RSGB bookstall, amateur computers, NARSA stand & trophy, demonstration station, bring-and-buy stall and trade stands featuring all types of radio/electronics equipment.

BAR & RESTAURANT facilities will be available during the day with the Restaurant remaining open until 1900 on the Saturday.

EVENING ENTERTAINMENT—numbers will be limited by the capacity of the entertainment hall.

PLAY AREAS FOR CHILDREN will be available on both days.

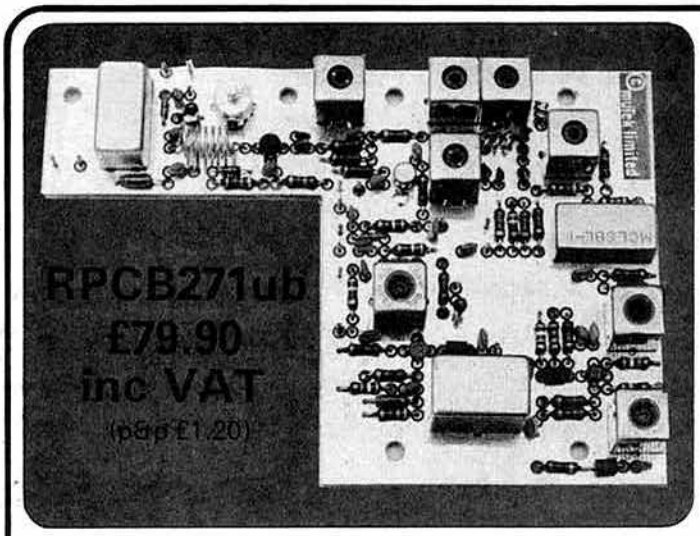
CHALETS ARE AVAILABLE and range from £11.00 + VAT (2 people) to £31.00 + VAT (6 people). The restaurant will be open for breakfast for residents. Bookings should be made direct to Pontins. Telephone (0704) 77165.

TALK-IN will be on S22 or other simplex channels which may be available.

CAR PARKING will be available at a small charge but please follow all instructions of attendants to avoid congestion.

ADMISSION will be £1 each day. Quantities of twenty or more tickets are available at 20% discount when booked in advance. Send the cash and a SAE to Mike Bainbridge G4GSY, 7 Rothbury Close, Bury, Manchester BL8 2TT.

COME AND ENJOY YOURSELVES AT THIS FAMILY WEEKEND EXHIBITION AND MAKE IT A GREAT SUCCESS!



We've done it again! The new replacement front-end for Icom's superb new IC271 transceiver is shown above. It has been designed to fit in the position normally occupied by Icom's optional 'preamp', and if you are wondering why the board is a funny shape, Icom didn't give us quite enough space and we had to turn the corner!!
Performance-wise, it's all you'd expect from a muTek front-end; good low noise figure (2dB typical), and superlative strong-signal performance. An on-board antenna transfer relay ensures that the overall sensitivity isn't limited by the sometimes dubious quality of 'black box' changeover switching too.
Fitting is really very straightforward. It's not necessary to reduce the transceiver to 'kitform', and the majority of the interfacing to the '271 is in fact via plugs and sockets!
As usual, give us a ring for more info.

Stephen Prior G4SJP.

THE RANGE		Price £
SLNA 50s	50MHz low noise switched preamplifier using BF981	37.10
SLNA 144u	144MHz low noise unswitched preamplifier using BF981	22.40
SLNA 144ub	Unboxed version of SLNA 144u	13.70
SLNA 144s	144MHz low noise switched preamplifier using BF981 0·9dB noise figure)	37.10
SLNA 145sb	Transceiver optimised preamplifier with antenna c/o switching using BF981. Intended for the FT290R, but has many other applications!	27.40
SBLA 144e	Masthead mounting 144MHz high performance low-noise high dynamic range preamplifier with balanced pair of BF981's	79.90
GFBA 144e	Ultra-high performance environmentally housed switched gasfet preamplifier using advanced negative feedback circuitry for superb dynamic performance. Supplied with ATCS 144s controller	129.90
TLNA 432s	Very high performance bipolar transistor switched preamplifier for 430-440MHz using BFQ69 for 1·4dBnf and 0dBm input intercept performance	74.90
TLNA 432u	Unswitched boxed variant of TLNA 432s	29.00
TLNA 432ub	Unboxed TLNA 432u	20.40
BLNA 432ub	Sub-miniature 1·3dBnf BFQ69 preamplifier	13.70
RPCB 144ub	Complete replacement front-end for the FT221 and FT225	71.00
RPCB 251ub	Complete replacement front-end for the IC211 and IC251	76.90
RPCB 271ub	Complete replacement front-end for IC271	79.90
BBBA 500u	20-500MHz broadband high dynamic range preamplifier	29.00
XBPF 700ub	Microstripline bandpass tvi filter	2.95
CISA 001	'UHF'(f) to BNC(m) coaxial adaptor	1.60
ATCS 144s	Transmit receive changeover sequence and controller	22.60
Carriage/Postage Rates		
	GFBA 144e and SBLA 144e	2.50
	All other products above	1.20
	All prices include 15% VAT	

muTek limited — the rf technology company

Dept. RC, Bradworthy, Holsworthy, Devon EX22 7TU (0409 24) 543

Access BARCLAYCARD VISA

AUTHORISED YAESU

JAYCEE ELECTRONICS (GM3OPW)

APPROVED TRIO DEALER

20 WOODSIDE WAY, GLENROTHES, FIFE

YAESU Phone (0592) 756962. Telex 727181 **TRIO**

COME AND SEE THE LARGEST SELECTION OF AMATEUR RADIO EQUIPMENT AND SUNDRIES IN **SCOTLAND**

Your Authorised Dealer for—
Trio - Yaesu - Jaybeam - G4MH Minibeam - TET - LAR -
Sota - Microwave Modules - Daiwa - Welz - RSGB books

QUALITY SECONDHAND EQUIPMENT

OPEN 9:00 TO 5:00 TUES. TO SAT. CLOSED ALL DAY MONDAY.

OUT-OF-HOURS SERVICE PHONE (0592) 754918

INDEX TO ADVERTISERS

CLASSIFIED ADVERTISEMENTS

Classified advertisements **25p** per word, minimum **£4.00**
Box Number £2.00 extra to wordage or minimum.
Semi-display 1/8 page 2¼" × 3½" (57 × 91mm) **£76.00**
3/32 page 1⅝" × 3½" (42 × 91mm) **£59.00**
1/16 page 1" × 3½" (26 × 91mm) **£41.00**
Please write clearly. No responsibility accepted for errors.
Latest date for acceptance—7 weeks before 1st of issue month.
All classified and semi-display advertisements MUST be prepaid.

Copy and remittance to: **M. J. HAWKINS G3ZNI, RSGB Advertisements, PO Box 599, Cobham, Surrey KT11 2QE.**
(Cheques should be made payable to RSGB.)

Members' Ads must be sent to the editor at Chelmsford.

FOR SALE

QSL CARDS printed to your own specification on white or coloured gloss card. Send S.A.E. for sample pack to: The Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey.
AMIDON TOROIDAL CORES, ferrite rings for TVI filters, ferrite beads. Send SAE for data and prices. SMC (TMP electronics), Unit 27, Pinfold Works, Pinfold Lane, Buckley, Clwyd.
QSL & LISTENER CARDS. Quality printing on coloured and white gloss card at competitive prices. SAE for samples. S. M. Tatham, "Woodside", Orchard Way, Fontwell, Arundel, West Sussex.
AERIAL WIRE Hard drawn copper 140ft 14SWG £6.90. 50 metres 16SWG £5.90, including postage. S. M. Tatham, 1 Orchard Way, Fontwell, Arundel, West Sussex.
PERSONALISED QSL CARDS, 1000 £13.75, 5000 £46.20. Sae for samples. Q/Cards, 89 Derwent Street, Blackhill, Consett DH8 8LT.
50m (165ft) AERIAL WIRE. Strong PVC covered copper only, £4.40 inc postage. W. H. Westlake, Clawton, Holsworthy, Devon.
LIST-A-RIG. The computer based selling service. Send large s.a.e. for free lists of used equipment. LIST-A-RIG, 65 Cecil Avenue, Hornchurch, Essex.
QSL CARDS. Gloss or tinted cards. SAE for samples to Twrog Press, Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd.
CREED TELEPRINTERS 444(TP15) complete with perforator and reader. Tested working. Available to Raynet members only. £36. Details Mike Watson G8CPH, Ipswich (0473) 831448.
PAG RTTY TERMINAL UNIT KIT. PLL, AFSK, auto start stop. Complete with PCB, power supplies, case components; £52. Details Mike Watson G8CPH, Ipswich (0473) 831448.
FOR SALE/WANTED. Amateur radio equipment bought, sold, exchanged. G3RCQ Electronics. Tel (040 24) 55733 evenings 6-9 and weekends.
RUBBER STAMPS are a must if you QSL. Your callsign, £2.20. Stock stamps, club stamps. 2 day service. SAE price list and catalogue. 'Ben Nevis', 42-44 Princes Road, Hull. (0482) 48134.
KENWOOD AND ICOM OWNERS. When you receive our separate newsletters you will wonder how you managed without them. Details SAE G3RKC, QTHR.
WOVEN CLUB BADGES & TIES to your design. Details Orbit, 38 Torquay Gardens, Redbridge, Essex IG4 5PT.
BBC MICRO RTTY PROGRAM. Now available on EPROM. Split screen, type ahead. Cassette and instructions, £7.50. Disk £9.50. P J Harris G3WHO, 10 Appleby Close, Great Alne, Alcester, Warks. Tel (078 981) 377.
10 METRES FM—the original 'Feedback' conversion manual from the Bury Radio Society—all conversion details plus correct channel readout, repeater operation, extended frequency coverage and more. We are now on the third reprint and still at £1.25 inclusive from The Bury Radio Society, Mosses Centre, Cecil Street, Bury.
IK-1 CMOS/VMOS IAMBIC KEYER. Only £20.45 including postage. Chris Moulding Radio Services, 276 Hulton Lane, Bolton BL3 4LE.
QSL CARDS printed at competitive rates. Send SAE for samples. Sigmaprint (RC), 62 Newark Lane, Ripley, Surrey.
ONE WAVE METER to cover 143MHz to over 2500MHz. Alpha keys. Twin or single paddle types. P. Sergent, 6 Gurney Close, Costessey, Norwich. (0603) 747782.
BLACK STAR 600MHz COUNTERS, £135 inc. post & VAT. Outperforms/ Outprices imported units. SAE leaflet. A.E.U.K./Holdings. See ad below.
FT101 Mk1-E DOUBLE BALANCED MIXER, £13. W.A.R.C. kit, £15.75. NEC stamped 6JS6C, £19.75 pair. 12BY7A, £3.75. All inc. VAT, post paid. A.E.U.K./ Holdings Ltd, 45 Johnston Street, Blackburn BB2 1EF. Tel. (0254) 59595.
COMPONENTS, VALVES, equipment, transformers, spares—many vintage. 8½" × 6" SAE for 48 page lists. R Francis, 93 Scrubs Lane, London NW10.
COMMODORE VIC20/64 QRA LOCATOR program gives distance in km. and miles. Also contest score and position in the square. Expanded screen, double height characters. £4.95. Also callsign log, £4.95; or both for £7.95. State which machine. J. Hicks, 33 Hayling Rise, Worthing, W. Sussex BN13 3AL.
BBC MICRO SOFTWARE. RTTY transceiver program now available in ROM and entered simply by typing "*RTTY". Sophisticated morse teacher, slow morse broadcast software, morse beacon. Written by professional software designers. Watch this space for further announcements. Send large SAE for detailed technical specifications. GOC Software Limited, "CQ Cottage", Longhill Lane, Audlem, Cheshire CW3 0HU.
SPECIAL OFFER LOG BOOK and call sign badge, only £2. Send now to Geefor Enterprises, 112 Leeds Road, Mirfield, WF14 0JE (Dept RC).
RTTY & CW TRANSCEIVE PROGRAMS for Dragon 32/64; and soon for Acorn Atom, Vic 20, Commodore 64. Top quality 100% machine code featuring split screen, type ahead, memories, any speed etc. State which computer. Interfaces available. G4BMK, QTHR. (0323) 893378.
ORIC PROGRAMS 16/48K: RTTY (requires TU). Features split screen, memories, auto CR/LF £7.50. Morse Tutor £4.50, QTH Locator £4.50. Also BBC, Electron programs. SAE details. T. Tugwell, G8KMV, 11 The Dell, Stevenage, Herts.

FOR SALE CONTINUED

COMMODORE VIC 20 AND CBM 64 RTTY and CW programs. Features memories which can be saved on tape. For further details SAE please to G4MQW, QTHR or telephone 021-745 4068.
PAIRS OF ANTENNA TRAPS. 7.1MHz, £8.95; 3.7MHz, £10.50. Multi-band trap dipoles with 75ft feeder, £34.00. All post free. Ralcomm, 10 Windleaves Road, Castle Bromwich B36 0BP.

WANTED

Unbroken run of Proceedings, Institution of Electrical Engineers, 1974-1983 inclusive. Paul Rockwell, W3AFM, 5800 Hillburne Way, Chevy Chase, MD 20815, USA.

AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Nick Gibson, Amateur Radio Insurance Services Ltd, 19 Quarry Street, Guildford, Surrey. Tel: 0483 33771.

HOLIDAY ACCOMMODATION

HAM HOLIDAY SRI LANKA. Write to Spangles Travels, 84 Templers Road, Mount Lavinia, Sri Lanka and enclose 5IRCs.
BOURNEMOUTH "DOLBADARN" PRIVATE HOTEL, 8 Grand Avenue, Southbourne BH6 3SU. Between sea and shops. Residential licence, room radio, call and teamaking facilities. Excellent food. Dinner, bed and breakfast from £9.50 daily. Bed and breakfast from £6.50 daily. (0202) 424826. E.W. & J.M. Batten (G3BKN).
SOUTH PEMBROKESHIRE, 2 cottages, sleep 4, excellently furnished. Also ½ acre tent site. (Good QTH VHF/HF). Elwyn Smith GW4OXL, Coed-Melyn, Stackpole, Pembrokeshire. (0646) 683578.
CAMELFORD, NORTH CORNWALL. Come and sample our real food and ale, enjoy our peaceful moors and beautiful beaches. "Fiddle from top to two" at Warmington House 17th century licenced hotel. Reasonable rates. Telephone John and June Finch (G6JUN) (0840) 213380.
CORNWALL. (Marazion area). Chalets in heart of countryside yet close to beaches. Full details from G3UCQ. Tel (0736) 752982. QTHR.
PLANNING HOLIDAYS IN SM? Will receive your family in our home in the country two weeks 1984 in exchange for similar holiday in GB 1985. Prefer family with children. Ours 10 and 8. SM6BH, K. Y. Akerstrom, P6 1376 Angatorp, 44190 Alingsas, Sweden.
COME BROADLAND CRUISING with John Williams Boats G8VSF. Small, friendly family firm. Free colour brochure. The Willows Boatyard, Stalham, Norfolk. Tel (0692) 80953.
FAIRMOUNT HOUSE—THE HOTEL TO SUIT EVERYONE. Wonderful food, lovely bedrooms (most en suite), quiet sunny gardens and a welcoming atmosphere. Old-timer G6GR operates the Yaesu-equipped shack—visitors welcome. Special offers this year, including free accommodation for children. Dogs are welcome, too. Please ask for brochure and details from Mr and Mrs Tolkien, Fairmount House Hotel, Herbert Road, Chelston, Torquay TQ2 6RW. Tel (0803) 605446.

MISCELLANEOUS

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, Career and professional examinations, etc) write or phone—THE RAPID RESULTS COLLEGE, Dept JT5, Tuition House, London SW19 4DS. Tel: 01-947 7272 (9am-5pm) or use our 24hr Recordacall service, 01-946 1102 quoting JT5.
NEW!! SCIENTIFICALLY PREPARED courses to get you through the R.A.E. examination. Ring 01-346 8597 for free booklet.
ACTIVE G8 HOLDER, 35, with progression in administration, sales management plus some capital, seeks offers Southern Home Counties. Box 194, PO Box 599, Cobham, Sy KT11 2QE.

PLEASE REMEMBER

THE ADVERTISERS APPRECIATE KNOWING WHERE YOU SAW THEIR ADVERTISEMENT.

TELL THEM YOU SAW IT IN

RADIO COMMUNICATION

Circuit Design Engineers

As a highly successful manufacturer of electronic components vital to modern industry, we are used to responding to rapid expansion. To meet the phenomenal growth potential of our quartz crystal unit at Harlow, we have created these opportunities, which are expected to be the first of several over the coming months. Career development for the successful applicants, whether along the managerial or technical path, has great potential.

SECTION LEADER. OSCILLATORS

Launch your management career with this responsible position, in which you would lead a team in the design and development of crystal oscillators and provide technical support to the production teams.

As a real, commercially biased, achiever you must be highly motivated and organised and have a minimum of five years' circuit design experience, including two as a project leader, in a closely related development environment. A degree or equivalent in Electrical Engineering, Electronics or a related subject is essential.

RF CIRCUIT DESIGN ENGINEER SAW SUBSYSTEMS

Advance the state of the art, design SAW subsystems including oscillators, discriminators and synthesizers in the frequency range 100 — 1,500 MHz.

You will need to have an Electronics or Physics degree and have gained at least two years' experience in RF design.

We offer highly competitive salaries, pleasant working conditions and a range of benefits including membership of an excellent sports and social club. Harlow is a modern town, surrounded by traditional villages and market towns. Communications to London and all parts of the South East are excellent with the M11, M25 and fast rail services close at hand. Relocation assistance, where appropriate, is generous.

Please send a full c.v. or telephone for an application form, to Annette Evans, Personnel Manager, Quartz Crystal Unit, STC Components, Edinburgh Way, Harlow, Essex, CM20 2DD. Telephone: **0279 26811 ext 2526**

STC COMPONENTS

17th WHITE ROSE RALLY

SUNDAY 1st APRIL

The Refectory, University of Leeds, Leeds 2

★ Walking distance from Leeds city centre ★
★ Talk in on S22 and SU8 ★
★ Greetings message transmission via GB2 WRR ★

50p entrance. Children and OAPs free

Rally Manager G4NDU QTHR

SPEND THIS SUMMER WORKING IN AMERICA

Hundreds of radio enthusiasts (min age 19½) needed on US Children's summer camps as counsellors from June to end of August. Return flight and visa, board and lodgings plus $230–$265 salary.

Eight sunny weeks working with up to six weeks to travel afterwards. Unique opportunities for those who like the outdoor life, hard work and who have a genuine love for children.

INTERESTED? For full details contact: **ROD CAROL, BUNAC,** 58-60 BERNERS STREET, LONDON W1P 3AE. **Tel: 637-7686/7.**

RSGB MAIL-ORDER PRICE LIST

RSGB books

	Non-members' price	Members' price
A Guide to Amateur Radio (19th edn)	£3.44	£3.10
Amateur Radio Awards (2nd edn)	£3.41	£3.07
Amateur Radio Operating Manual (2nd edn)	£5.22	£4.70
Amateur Radio Techniques (7th edn)	£6.20	£5.58
HF Antennas for All Locations	£6.91	£6.22
Morse Code for Radio Amateurs	£1.31	£1.18
RSGB Amateur Radio Call Book (1983 edn)	£5.70	£5.13
Radio Amateurs' Examination Manual (10th edn)	£3.42	£3.08
Radio Communication Handbook (5th edn) Vol 2	£9.16	£8.24
Radio Communication Handbook (Vols 1 and 2 combined, paperback)	£10.91	£9.82
Teleprinter Handbook (2nd edn)	£13.84	£12.46
Television Interference Manual (2nd edn)	£1.85	£1.67
Test Equipment for the Radio Amateur (2nd edn)	£6.00	£5.40
VHF/UHF Manual (4th edn)	£10.31	£9.29

RSGB logbooks

Amateur Radio Logbook	£2.77	£2.49
Mobile Logbook	£1.14	£1.03
Receiving Station Logbook	£2.72	£2.45

RSGB maps, charts and lists

HF Awards List and Countries List	27p	24p
Great Circle DX Map (wall)	£2.12	£1.91
IARU Region 1 Beacon List	35p	32p
IARU QTH Locator Map of Europe (wall)	£1.43	£1.29
QTH Locator Map of Western Europe (wall)	£1.43	£1.29
QTH Locator Map of Europe (card for desk)	76p	68p
UK Beacon List	35p	32p
UK Repeater List and maps	45p	41p
World Prefix Map in full colour (wall)	£2.17	£1.95
Meteor Scatter Data	£3.24	£2.92

RSGB members' sundries (members only)

Radio Communication Easibinder	—	£4.50
RSGB badge car sticker	—	49p
RSGB belt (real leather)	—	£7.57
RSGB hf contest log sheets (100)	—	£2.10
RSGB vhf contest log sheets (100)	—	£2.10
RSGB teeshirt (extra large only)	—	£3.13
RSGB tie (coffee, maroon, green or blue)	—	£3.03
RSGB station callsign plaque*	—	£9.50
Standard callsign lapel badge*	—	£1.96
De-luxe callsign lapel badge*	—	£2.80
Lapel badge (RSGB emblem, pin fitting)	—	59p
Mini lapel badge (RSGB emblem, pin fitting)	—	68p
Members' headed notepaper (50 sheets) quarto	—	£1.00
Members' headed notepaper (50 sheets) octavo	—	57p

**Delivery approximately five weeks*

Miscellaneous

"Amateur radio" (two colours) car sticker	62p	56p
DX Edge (HF propagation prediction aid)	£11.10	£9.99
"I'm on the air with amateur radio" (four colours) car sticker	84p	76p
"I'm monitoring ·5 are you?" (two colours) car sticker	62p	56p
QSL card holders	£1.23	£1.11
Radio Communication back issues *(As available)*	£1.01	91p
Radio Communication bound volume, 1980 (Parts 1 and 2)	£14.93	£13.44
Radio Communication bound volume, 1981	£14.93	£13.44
Radio Communication bound volume, 1982	£15.93	£14.34
Smith charts, pad of 25 (Chartwell D7510)	£2.23	£2.01

Other publications

	Non-members' price	Members' price
A Course in Radio Fundamentals (ARRL)	£3.77	£3.39
Active-filter Cookbook (Sams)	£12.71	£11.44
All About Cubical Quad Antennas (RPI)	£6.69	£6.02
Amateur Single Sideband (Ham Radio)	£5.46	£4.91
Amateur Television Handbook (BATC)	£2.32	£2.09
Amateur Television Handbook Vol 2 (BATC)	£2.54	£2.29
AMSAT-UK Technical Manual (AMSAT-UK) (Includes all revises and updates, including Oscar 10 data sheets)	£14.37	£12.93
Antenna Anthology (ARRL)	£3.83	£3.45
ARRL Antenna Book (ARRL) (New edn)	£8.78	£7.90
ARRL Electronics Data Book (ARRL)	£4.47	£4.02
Beam Antenna Handbook (RPI)	£4.84	£4.36
Best of Oscar News (AMSAT-UK)	£1.46	£1.31
Better Short Wave Reception (RPI)	£3.90	£3.51
Care and Feeding of Power Grid Tubes (Varian)	£3.53	£3.18
CMOS Cookbook (Sams)	£13.07	£11.76
Complete Shortwave Listener's Handbook (Tab)	£11.91	£10.72
English-French QSO Language Instruction (out of print)	—	—
FM and Repeaters for the Radio Amateur (ARRL)	£4.30	£3.87
G-QRP Club Circuit Book	£4.19	£3.77
Hints and Kinks for the Radio Amateur (ARRL)	£4.47	£4.02
How to Troubleshoot and Repair AR Equipment	£10.47	£9.42
IC Op-amp Cookbook (Sams)	£11.72	£10.55
International VHF FM Guide	£2.45	£2.21
Knowing Your Oscilloscope	£9.85	£8.87
Newcomer's Guide to Simplex and Repeaters on 2m (UK FM Group)	£1.06	95p
Radio Amateur Callbook (1984 USA listings) (ARCI)	£16.93	£15.24
Radio Amateur Callbook (1984 DX listings) (ARCI)	£16.23	£14.61
Radio Amateurs Handbook 1984 (ARRL)	£11.65	£10.49
Radio Amateurs Handbook 1984 (ARRL) (Hardback)	£15.53	£13.98
Radio Frequency Interference (ARRL)	£4.18	£3.76
Satellite Tracking Software for the Radio Amateur (AMSAT-UK)	£4.47	£4.02
Secrets of Ham Radio DXing (Tab)	£7.92	£7.13
Semiconductor Data Book (Newnes)	£7.97	£7.17
Shortwave Propagation Handbook (Cowan)	£7.79	£7.01
Simple Low-cost Wire Antennas	£7.52	£6.77
Solid State Design for the Radio Amateur (ARRL)	£6.67	£6.00
Television for Amateurs (BATC)	£1.95	£1.76
UHF-Compendium Parts 1 and 2	£14.43	£12.99
Understanding Amateur Radio (ARRL)	£4.73	£4.26
World Atlas (RACI)	£3.35	£3.02
World Radio TV Handbook 1983	£12.25	£11.03

ORDERING INFORMATION

NON-MEMBERS. Use left-hand price columns. Note that members' sundries are only available to members of RSGB.

MEMBERS. Use right-hand price columns. It is essential that you quote your call sign or BRS number so that you can be recognised as a member.

PRICES. These include postage, packing and VAT where applicable. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

POSTAL TERMS. Cash with order. **Stamps and book tokens cannot be accepted.** Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Our Giro account number is 5335256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

MORSE INSTRUCTION AIDS

G3HSC rhythm method of morse tuition		
Complete course (Two 3-speed lp records and one ep, plus books).	£6.99	£6.29
RSGB morse course Stage 1 (to 5wpm)	£3.84	£3.46

On all overseas orders for G3HSC course, including orders from Eire, add £1.12 for additional packing and postage from supplier

MAGAZINE SUBSCRIPTIONS

QST (including ARRL membership). One year	£21.24	£19.12
Two years	£42.48	£38.23
Three years	£63.72	£57.35
By air via KLM (to W Europe only) one year	£30.35	£27.31
Ham Radio Magazine (per annum) (incl air delivery)	£19.00	£17.00

ORDER FROM

RSGB Publications (Sales),

Alma House, Cranborne Road, Potters Bar, Herts EN6 3JW

(Raynet supplies should be obtained from Mrs J. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent)

B.N.O.S. ELECTRONICS

British Technology & Innovation

British Designed & Manufactured

Take a look at the world's most advanced range of 2 metre Linear Amplifiers

Over 40 years of design experience has gone into what is fast becoming acclaimed as the biggest break-through in linear technology. Performance and reliability have been designed in, which gives us the confidence to offer a free 5-year warranty. Why not take a closer look at our products and see where value for money really counts.

The LPM144 Range

This sophisticated, but simple to use, range of amplifiers have performance characteristics and extra features previously not available in the UK. The pre-amplifier uses the highly regarded BF981 MOSFET, and an LED bargraph power meter is provided, to highlight only two of the amazing number of features.

The L144 Range

To complement the LPM range, we have introduced the L series linear-only versions for the amateur who may already be equipped with a good pre-amplifier and power meter. The excellent linear performance is maintained and both RF Vox and hard-wired changeover are standard.

- *Linear all mode operation*
- *Continuous rated RF output power (RMS)*
- *RF & HARD switched changeover with selectable delay*
- *Trouble-free RF switching at low drive levels*
- *Straight-through mode when switched off*
- *Unique over-drive protection circuit*
- *Mobile mount on all 100 Watt models*

LPM144-1-100	**£172.50**
LPM144-3-100	**£172.50**
LPM144-10-100	**£149.50**
LPM144-25-160	**£189.50**
LPM144-3-180	**£215.50**
LPM144-10-180	**£212.50**

LINEAR PART NUMBERING SYSTEM

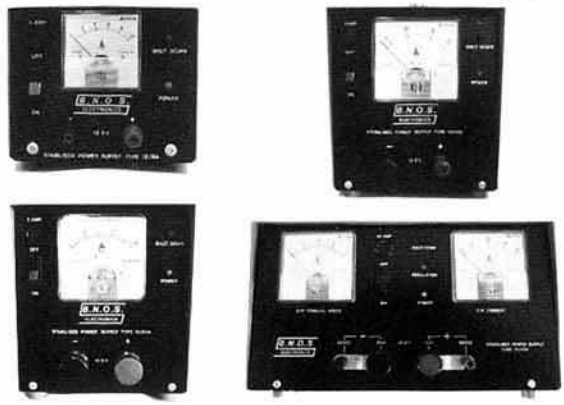
LINEAR — LPM144-3-100 — OUTPUT POWER
PREAMP
RF METER — FREQUENCY (BAND) — INPUT POWER

L144-1-100	**£138.00**
L144-3-100	**£138.00**
L144-10-100	**£115.00**
L144-25-160	**£155.00**
L144-3-180	**£181.00**
L144-10-180	**£178.00**

BNOS 'A' Series Power Supplies

12/6A £48.30
- 13·8V, 6A continuous output
- 7A maximum output current
- 10A current meter
- 10A output terminals
- LED shut down indicator
- Fully protected

12/25A £125.45
- 13·8V, 25A continuous output
- 30A maximum output current
- Large 30A current meter
- 30A output terminals
- LED shut down indicator
- Fully protected



12/12A £86.40
- 13·8V, 12A continuous output
- 15A maximum output current
- Large 20A current meter
- 15A output terminals
- LED shut down indicator
- Fully protected

12/40A £225.40
- 13·8V, 40A continuous output
- 50A maximum output current
- Large 50A current meter
- Large output meter
- LED shut down indicator
- LED out of regulation indicator
- Output sensing terminals
- Fully protected

Our Guarantee *Our aim is to provide you with high quality products at realistic prices, to give you the best value for your money.*

All products that carry our logo are designed and built by our engineers in the UK and carry a full 12-month guarantee, which includes all parts and labour.

We are so confident that our linears are simply the best that we offer to repair your unit at component cost for up to 5 years from date of purchase. That means we will repair, calibrate and return to you free of charge.

All other products sold by us carry our standard 12-month guarantee.

Available direct or from one of our many UK agents — or come and see us at most rallies and exhibitions

BARCLAYCARD VISA

BNOS Electronics (Dept RC) Greenarbour, Duton Hill, Great Dunmow, Essex, CM6 3PT
Telephone (0371 84) 767 SAE for further details

All prices include VAT. Postage free on all Mainland UK orders

YAESU MUSEN

AUTHORISED YAESU

FT-980

Special Supplier of Ham Radio Equipment for the Sarajevo 1984 Winter Olympic Games

YAESU

Every frequency related function is digitally synthesised permitting local or external control via a personal computer of: Mode, all VFO and memory functions, IF shift and width, clarifier, band limits, FSK shift—and more!

Two independent VFO's—multiple tuning methods including; flywheel knob, two speed scanning in 10Hz (also 5/500 KHz) steps and keyboard entry.

12 totally independent mode/frequency memories (whose contents can be checked even while transmitting) are provided.

Primary digital readout offers resolution to 100 or 10Hz is mode sensitive and displays offsets. A remarkable secondary display indicates frequency change by scrolling sideways, with the cursor providing resolution to 1 KHz.

Two receiver front ends are provided, one for general coverage—150KHz to 30 MHz, the other for amateur bands only. Seven high IDss JFETs produce extraordinarily wide dynamic range and the employment of ten V.C.O's secures a high carrier to noise ratio —even in the adjacent channel.

The triple conversion design of the FT980 receiver ≙ 47 MHz, ≙ 9 MHz, 455 KHz) incorporates four cascaded stages for all modes and can operate as standard on SSB, CW, AM, FSK and FM transceiving.

The transmitter covers all H.F. amateur bands in 500 KHz segments. Convenience features include: simultaneous measurement of forward and reverse S.W.R., or compression (RF processor) or Ic or Vc or output power or ALC (includes "easy adjust" peak hold facility), AMGC (reduces ambient noise on voice transmissions), and a transmission quality monitor (all mode IF demodulator).

With a P.A. rated for 560W dissipation 100W PEP is produced from a 24V line with 3 order intermodulation at typically −40dB. Full thermal (with blower and VSWR) protection (though power delivery is still 75% of full into a 3:1 VSWR!) are of course standard.

For CW, full break-in and calibrating (spotting —zero beating with other station) and choice of sidetones are fitted, and an inbuilt Curtis Keyer is optional.

Other FT980 features include AGC speed, tone, FM, squelch and centre zero meter, additional 'write' button for protected memories, display dim, dial lock, QSK linear provisions—the list is almost endless—Ask your authorised Yaesu dealer for a full colour leaflet or better still call in to him and try one out today!

GENERAL

Frequency coverage
Rx; 50 KHz—30 MHz (continuous)
Tx; 10-160M (9 bands)

Frequency accuracy
Better than ±3p.p.m (0-40°C)

Tuning steps
10Hz, 5 KHz & 500 KHz (band)
Direct/Computer keyboard entry

Modes of operation
J3E (LSB/USB), A1A (CW), A3E (AM), J1B (AFSK), G3E (FM); Rx & Tx

Power requirements
100/120-200/234 V 50/60 Hz
72VA Rx, 530VA Tx (100W out)

Dimensions (Ex./Inc projections)
370/380W x 157/165H x 350/465D mm
17Kg, Nett

Options

XF-455.8MCN	300Hz CW Filter
XF8.9HC	600Hz CW Filter
XF8.9GA	5 KHz AM Filter
MH-1-B8	Hand Scan Microphone
MD-1-B8	Desk Scan Microphone
D3000026	Curtis Keyer Unit
FIF-80	Computer Interface NEC PC8001
FIF65	Computer Interface Apple II
FIF232C	RS232 Interface

RECEIVER

Sensitivity (2-30MHz)

J3E/A1A/J1B	:0.25μV	(2.4 KHz)
(10dB S+N/N)	0.16μV	(600 Hz)
	0.10μV	(300 Hz)
A3E	:1.40μV	(6 KHz)
(10dB S+N/N)	1.25μV	(5 KHz)
	1.00μV	(3 KHz)
G3E (12dB SINAD)	:0.60μV	(12 KHz)

Sensitivity (150 KHz-2 MHz)

J3E/A1A/J1B	:4.0μV	(2.4 KHz)
(10dB S+N/N)	2.6μV	(600 Hz)
	1.6μV	(300 Hz)
A3E	:22μV	(6 KHz)
(10dB S+N/N)	20μV	(5 KHz)
	16μV	(3KHz)

Dynamic range
95dB in 300 Hz (max sensitivity)

Audio peak filter
350 Hz-1400 Hz

IF notch filter
500 Hz-2700 Hz (demodulated)

Audio
4-16 Ohms, 3W in 4 ohms (10% THD)

Image/I.F. rejection
Better than 70dB

TRANSMITTER

Power output
J3E/A1A : 100W(PEP)
A3E : 25W
G3E/J1B : 50W

Intermodulation (3rd Order)
Better than −40dB (14 MHz 100W)

Carrier suppression
Better than −50dB (peak output)

Sideband suppression
Better than −50dB (1 KHz tone)

Spurious radiation
Better than −50dB (peak output)

Audio response
Better than 250 Hz-2750 Hz @ −6dB

FM deviation
±5 KHz (maximum)

AFSK shift
170, 425, 850 Hz

Microphone impedance
600 Ohms nominal

Output impedance
50 Ohms nominal, unbalance

SOUTH MIDLANDS COMMUNICATIONS LTD
SM HOUSE, RUMBRIDGE ST
TOTTON, SOUTHAMPTON SO4 4DP

SMC

YAESU MUSEN'S ONLY AUTHORISED UK DISTRIBUTORS

G3FIK

AMATEUR ELECTRONICS UK
504-516 ALUM ROCK ROAD
ALUM ROCK,
BIRMINGHAM 8

Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, Alma House, Cranborne Road, Potters Bar, Herts EN6 3JW
by E T Heron (Print) Ltd, Silver End, Witham, Essex