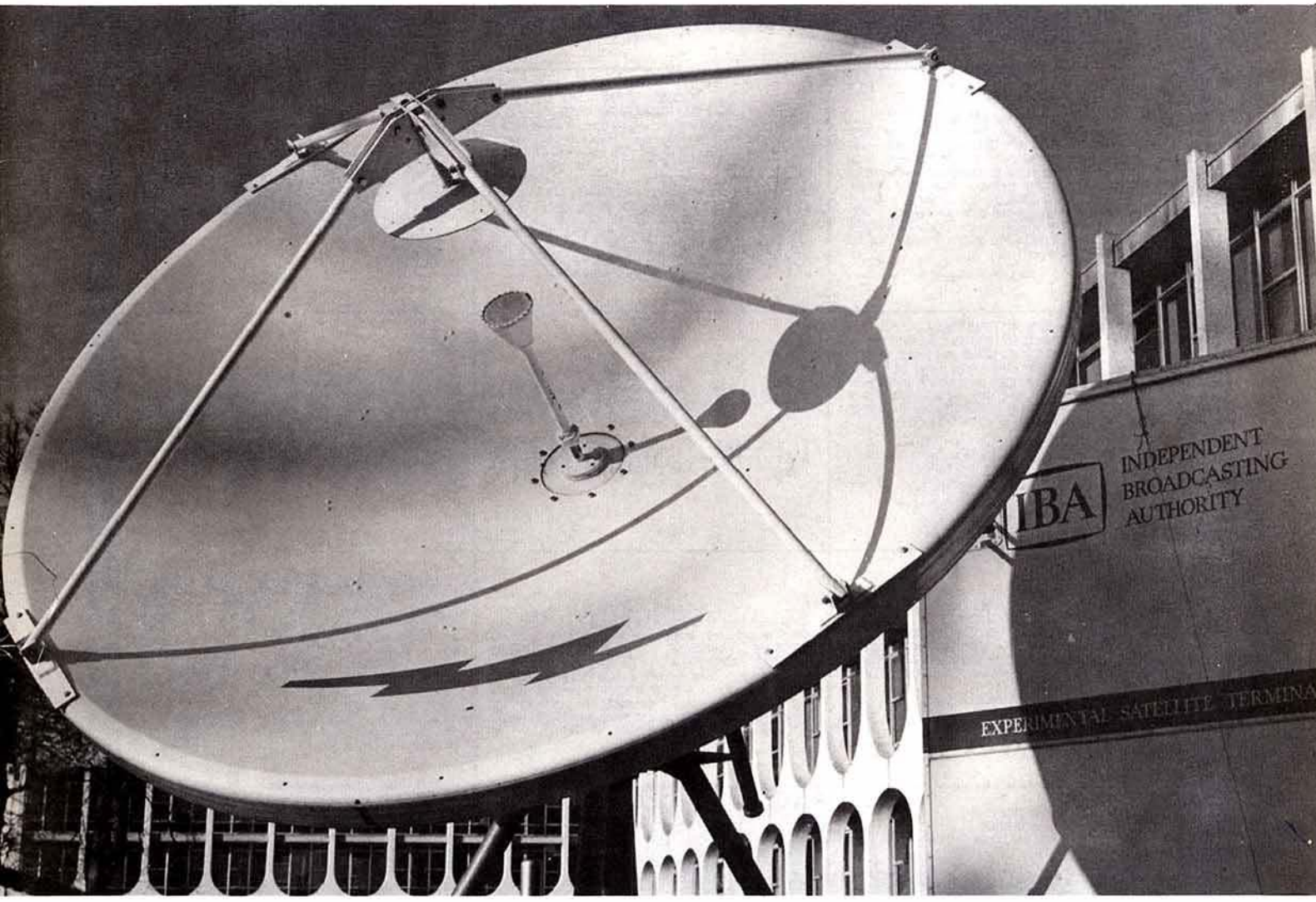
February 1984

RADio COMmunication

IBA EXPERIMENTAL SATELLITE TERMINAL



The 14GHz transportable up-link terminal used in conjunction with the OTS satellite. It has a 2·5m dish and a 1·5kW transmitter using power klystron output stage. *An IBA photograph*

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

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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.

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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: 041-945 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

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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

TW4000A £469.00 inc VAT

The TW4000A is the latest step forward in Trio's programme of providing today's radio amateur with the very best in equipment. Following the success story of the Trio TS780 dual band base station transceiver, the TW4000A gives the mobile operator a superb FM transceiver for both 70 centimetres and the 2 metre band. Not only for mobile operation is the TW4000A perfect but also for shack use where the rig with its scanning and dual band facilities enable the enthusiastic amateur to keep in touch with the local scene.

* The TW4000A covers in one compact transceiver both the 2 metre band (144.000 to 146.000 MHz) and also the full 10 MHz of the 70 centimetre band (430.000 to 440.000 MHz). Measuring 60mm high, 161mm wide, 217mm deep and weighing only slightly more than 2.0 kg, the TW4000A is smaller than most current 2 metre transceivers.
* Added to the exceptional receive performance, now a Trio standard by which others are judged, is the TW4000A's 25 watt capability on both 2 metres and 70 centimetres.
* A green backlit liquid crystal display gives frequency, memory channel, repeater offset, VFO A or B, scan function, channel occupied and "ON AIR" information.
* Ten memory channels are provided which store frequency, band and repeater offset (on 2 metres minus 600 KHz shift, on 70 centimetres plus 1.6 MHz shift). Memory 1 is used for priority watch, memories 8 and 9 for instant recall and memory 0 for split channel use (cross band operation).
* Frequency scan is extremely versatile in that the rig can be programmed to scan either all memory channels or those holding either 2 metre or 70 centimetre frequencies. The rig can also be programmed to skip those channels which the operator does not wish to monitor. The scan direction can also be changed by using the UP/DOWN switch on the microphone. In order that an important contact is not missed, when in priority watch mode, the rig switches back from the frequency in use to memory channel 1 for one second out of ten. The two most used frequencies can be placed in memories 8 and 9 respectively, common channel scan checking each alternatively for approximately 5 seconds.
* The use of GaAs FET's in the RF amplifiers on both 2 metres and 70 centimetres, as well as the use of high performance MCF's in the 1st IF section, provides a high receive sensitivity and an excellent dynamic range.
* Two VFO's are provided tuning in either 5 or 25 KHz steps, the UP/DOWN shift switch on the microphone providing control.
* Full repeater facilities are included giving the correct frequency shift, 1750 Hz access tone, and of course the essential repeater shift.
* The use of advanced diecasting techniques in the fabrication of the combined chassis/heat sink, as well as in the RF shielding results in greatly improved mechanical strength, plus a higher immunity to RF interference.

Optional Accessories
PS430 matching power supply.
VS1 voice synthesizer unit.
SP40 compact mobile speaker.
MA4000 dual band antenna with duplexer.
SW100B mobile SWR and power meter.
SW200B base station SWR and power meter.
PG3 noise filter for mobile use.

TRIO

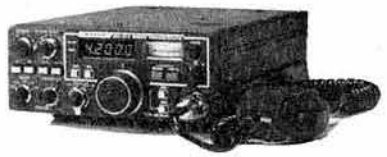
TRIO-KENWOOD CORPORATION
Shionogi Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150, Japan

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.

TS530S HF AMATEUR BAND TRANSCEIVER

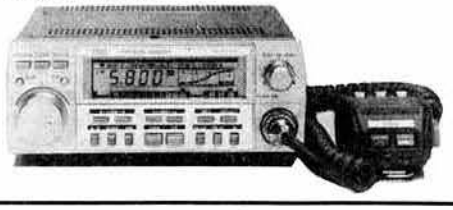
A logical progression from the reliable TS520 series the TS530S was the most popular HF rig in the range. I use the term "was" because TRIO decided to cease production and supplies were no more, however the demand from radio amateurs worldwide for the transceiver have continued and TRIO have reintroduced 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

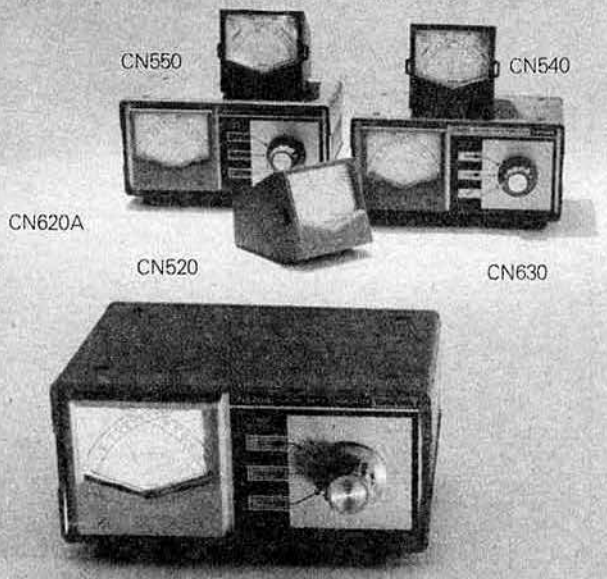
I have been waiting for this rig for the last three years, now it is here and I am using one, words fail me. Send for details.

TW4000A . . . **£469.00** inc VAT.



just a part of the range

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

SPECIAL ANNOUNCEMENT

We now have a property in Cambridge, Chesterton to be correct. 162 High Street is the address and the shop will hopefully open in April—solicitors and builders permitting.

Ring Beryl here at Matlock for the latest information on the new Cambridge shop.

EMPORIUM NEWS

Good Morning,

Two new items this month for your consideration and both from **Daiwa.** First a new coaxial switch, **the CS4. The Daiwa CS4** is a departure from the usual aerial switches which had SO239 sockets. **The CS4** is fitted **with BNC connectors** and designed to work at frequencies from **D.C. to 1.5GHz**—yes, you read it correctly the first time, **D.C. to 1.5GHz.** The CS4 costs only **£21.20,** including VAT, carriage £2.50 and is a good quality reliable item covering the more popular frequencies and yet having a wider range for the occasions when you are wanting to switch DC or linking up the microwave oven to the dish at the top of your tower. Small, well made and having that Daiwa reliability which is synonymous with good design. **Other switches in the Daiwa range** are the **CS201** and the **CS401.** Both these have SO239 connectors and are suitable at frequencies from 0 to 500MHz. The **CS201** is 2 way and costs **£15.41** including VAT and the **CS401,** 4 way at **£48.15** inc VAT. Carriage on the 2 way £2.00 on the 4 way, as it is heavier, £2.50.

We also have a receive only switch suitable for 0-30MHz: this is the **CX3A** and is priced at **£6.95,** inc VAT. The CX3A is all right for receive aerial switching but not suitable for transmitting through. The second new item, **again from Daiwa,** is the PS120M power supply. For a long time we have needed a 10 amp PSU and the PS120M is the unit. **Rates at 10amp with 12 amp maximum** the PS120M has variable voltage **from 3 to 15 volts.** The voltage is set by a front panel knob and is indicated on the front panel meter. Switching, again on the front panel, is provided so that the meter can double to read amps as well as volts. Compact, reliable and just the PSU to run that 25 watt rig. **The PS120M is £77.80,** inc VAT, carriage £6.00. The other Daiwa power supply in the range is its big brother, **the PS300.** This PSU gives **22 amps continuous** and **30 amps intermittent,** at 13.8 volts and costs £157.00 inc VAT, carriage £6.00

You will see on the opposite page the Daiwa range of meters. Each having a **"cross needle"** meter enabling power out, reflected power and SWR to be read at a glance. We are justifiably pleased about the Daiwa range of equipment. Look back at the ½ page in last month's RadCom which features the Daiwa rotators. See how **strong** the **rotator casing looks.** This month read **John's** comments on the Daiwa meters and find out what it is that's inside a Daiwa product that causes **so much satisfaction** to its owner.

I have just been looking through my file of photographs and **I came across this one.** I have not used it before as I am sure you will all consider it in bad taste. The original is large and in colour, by the time it's been reduced and printed in black and white it may just be acceptable. The girl is, of course, wearing a Daiwa infra red microphone and from the look on her face she obviously finds it no strain. Infra red, no wires and the control box fits under your rig attached with velcro pads. Many microphones in use and to clear the last few the price has been reduced to £25.00, inc VAT, carriage £2.00. **Additional microphones** are available at £12.99 and the spare sensor for £6.49. Carriage on these remaining items being 50p. **For the out of doors operator,** or if you too want to operate with your head sticking out of the sunshine roof, then a windshield is available boxed in fours in assorted colours to match your tie, dress or blouse—the windshields cost £3.00 for four, if you only have one tie or your dresses are all the same colour then they are available separately at 75p each.

I'd like to bring to your attention a new Lowe Electronics' service. Each week we prepare at Matlock, usually on a Thursday, a list of second-hand equipment held by the company. The list shows second-hand items in stock in Matlock, Glasgow, Darlington and London. Items on the list carry three months' warranty, warranty conditions being as shown on a current copy of the company price list. To secure a rig all you have to do is ring the shop concerned, check that the item you want has not been sold and reserve it. Send your cheque to the shop and the required item will be despatched to you.

Items will normally be reserved for three days to allow for your cheque to arrive—alternatively, you could always get in the car and pick it up yourself. Remember the list is revised weekly so urgent action is required to secure the item you want. Currently there are some 63 items on the list and each represents extremely good value. Remember my shop managers only take in part exchange items which they might buy themselves. Equipment which has not been looked after is rejected at the door. To avail yourself of this weekly second-hand list then send a stamped self-addressed envelope (a small one will suffice) to us here at Matlock "not the branches but to us here at Matlock"—mark the envelope 'Second-hand List' and you need not write anything else. Your envelope will be instantly dealt with and the current second-hand list despatched to you by return of post.

Been an exciting day today—received a very good signal from the **space shuttle "Columbia"** and hope that they heard me OK. Never mind if they didn't. For an **astronaut** to take his hobby into space and transmit so that my wife, my son and I, all sat in the shack, **linears glowing** and **beams pointing skyward,** heard him direct and not via the media is enough for me. You may consider me easily satisfied but I still **glow** with satisfaction when I remember the day many years ago now when I heard my signals coming back from one of the early amateur satellites. **I didn't work anybody on that occasion** I was so pleased to hear my own callsign. Today I have written in my log book **"heard space shuttle 'Columbia' W5LFL Owen Garriott";** enough for me.

Remember my Christmas competition, the winner to be announced next month. I have had a very interesting 'phone call. **The boy No. 5** rang me to announce himself: Paul Beaumont. He had received his RadCom, turned to Emporium News and was amazed to find himself **in the picture.** He showed his wife the photograph—that's me he said and rang me.

Alan (our Managing Director) **boy No. 3** and **John** (our Technical Director) **boy No. 4** didn't know the other lads so it's really amazing. A small world. Alan and John took up amateur radio in a big way. So amazingly enough did Paul after flying Lightnings in the RAF. He is now G4SXU. **I wonder what happened to boys 1 and 2?.**

Don't forget to read my enthuse on the **Japan Radio Company's NRD515.** Now priced at **£965.00,** inc VAT, carriage £6.00. I wouldn't be without mine as I write this, **HCJB,** the Evangelical Christian Radio Station broadcasting from Quito, Ecuador, is on 21.477.5 and is 30 over 9. Later on I'll tune to **Vatican Radio 6.185,** that's if **"Caroline 963"** doesn't grab me.

Anyway, that's about it for now—Jack G5UM says I must sign not only with my name but callsign so Gud DXes 73es FBYLS, XYLS, esFBOM, etc.

David G8GIY

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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. Charging may be done from a top panel connector for 13.8 volts which will also 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, 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.

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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.

IC-271E/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. If you would like to learn more specific details for the 271E or 471E, don't hesitate to ask for a brochure.

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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-25H/45E VHF, FM Mobiles

These two mobiles are amazingly small but have a powerful voice, 45W(2 m) 10W (70cm). Their lack of bulk helps a great deal when fitting into modern motor vehicles, often having very small spaces left for this type of mobile accessory.

The sets have 2 VFOs, five memories, priority channel, full duplex and reverse, LED S-meter, 25KHz or 5KHz step tuning. The 25H and 45E have multi-scanning functions from the mic or front panel. These are still the best 2M and 70CM FM mobiles ICOM have made ..... so far!

All prices shown include VAT. Interest-free credit available

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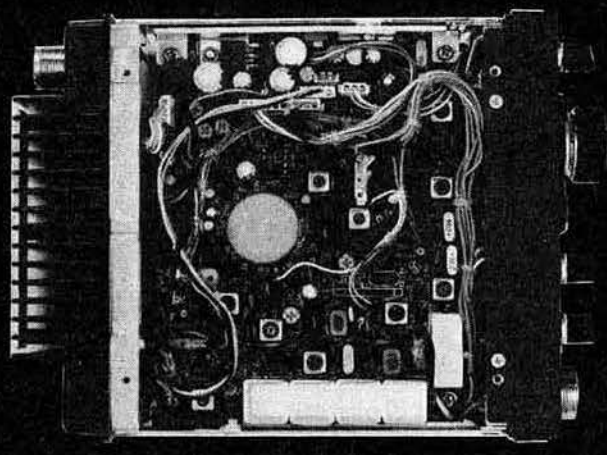

Tono 9000E Sender/Decoder

TONO 9000E, appearing as a highly sophisticated and amazingly improved 7000E, is the Micro-processor-controlled Communications Terminal which features completely automatic Send/Receive of Morse Code (CW), Baudot Code (RTTY) and ASCII (RTTY).

The most attractive feature of the TONO 9000E is that a WORD PROCESSOR is now built into this super unit!! This saves a tremendous amount of time when preparing documents and letters. In addition, a high-speed Send/Receive of graphic patterns drawn by light pen on a CRT Display can be easily operated.

By introducing these exciting developments to the amateur radio world, TONO 9000E could build a strong reputation for up-to-date performance. Battery-Backed-Up memory, which was one of the most popular characteristics of 7000E, has been enhanced by a dramatic expansion to 256 characters by 7 channels. Large Capacity Display Memory, which can cover up to 14,000 characters and Screen Format contains 80 characters/line by 24 lines. The easy-to-use, multi- applications, remarkable TONO 9000E provides all the features you could desire.!

Please contact us for more detailed information on the TONO 9000E, the best way to keep up with todays technology.

IC-290D/490E. VHF Multimode Mobiles

Securikor or post despatch free, same day if possible.

The IC-290D is proving to be an extremely popular 25 watt 2 meter mobile. It boasts a bright green display, 5 memories, scan facilities on either memory or across the whole band, an instant input for repeaters, there is also a tone-call button on the microphone. The IC-490E is the 70CM version and has similar features, but only a 10 watt voice in this case.

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

Agent Please telephone first, anytime between 0900 – 2200 hrs
Gordon . G3LEQ Tel: Knutsford (0565) 4040

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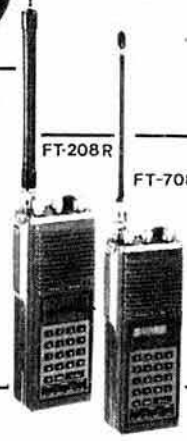

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Tono Products

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5280	550E	CW/RTTY/ASCII/Terminal RX	299.00
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5830	12/40A	Power supply 13.8V 40 amp, fully protected	225.40
5831	L144/1/100	1 watt input linear	138.00
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5833	L144/10/100	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
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6180	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			
	Oscar Special			
6160	9 & 19 element	3.3	2.0	4.27
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9965	SPC6A	Insert for 300/WV3 0-2W/0-20W 50MHz	15.95
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9980	SPC2B	Insert for 300/WV3 0-20W/0-200W 144MHz	15.95
9985	SPC02A	Insert for 300/WV3 0-2W/0-20W 432MHz	15.95
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THIS MONTH'S SPECIALS

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- 10100 Noda Tushin 427H RMS/PEP 1.8-150MHz power meter 74.95
- Full range of WPO communication kits in stock PHONE
- Many second hand items refurbished by us are now available. Typical examples: FRG 7700 from £239.00; FT290R from £185.00; 2M amplifiers from £29.00

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BEARCAT
BC-20/20FB

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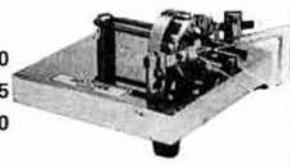
BY-1 Black Base	**£37.95**	ZA-1A Balun	**£15.00**
BY-2 Chrome Base	**£48.30**	ZA-2A Balun	**£17.25**
BY-3 Gold plated	**£92.00**	ZY-2 CW Audio Filter	**£57.50**



TONO 550 Decoder £299

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Gooday to you all,

Why the map? Well, our lucky friends in Bonnie Scotland now have a friendly local Ham Store at
ARROW ELECTRONICS (SCOTLAND)
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Where Bill McJimpsie G6NHJ will be happy to serve you with a good selection from our product range and Bill has full stocks of all our discount offers.

If you speak Welsh or English it's all the same at
ARROW ELECTRONICS (WALES)
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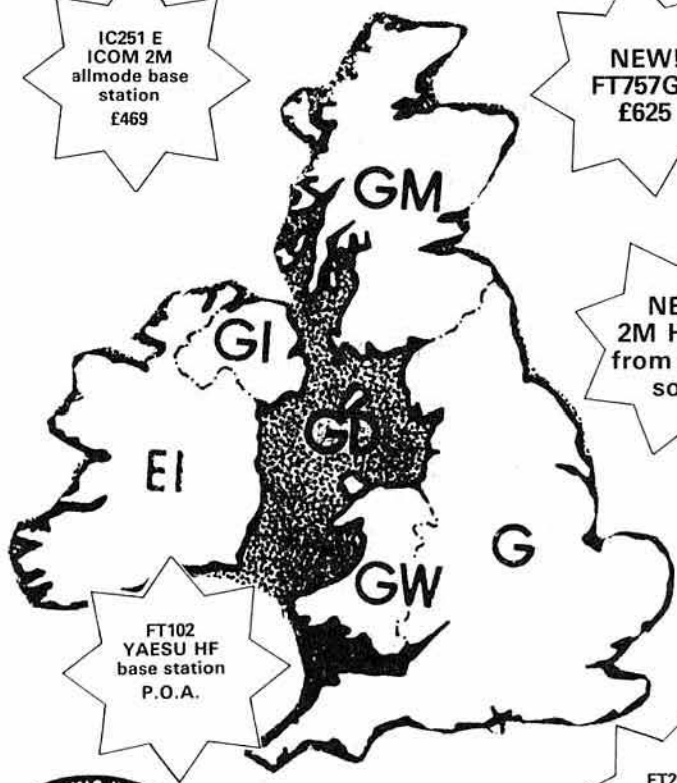
Tel: 0248 714657
where John Lewis GW8UZL will be pleased to discuss that new rig.

In view of various nasty advertising by members of the trade who should know better we wish to state our position.
1. Arrow are one of the UK's largest Amateur Radio Retailers and buy from many sources – we are proud of our good name and take every step to keep it.
2. Arrow are authorised or franchised dealers for the great majority of our products.
3. No branch of Arrow will refuse to service equipment because "you didn't buy it from us", or "because it's Kenwood" or "because it's a Grey import" or any such reason.
4. Arrow directly import many items from our range and have done for many years and we will service, provide spares, service information for anybody's imports including your own if you're brave enough.
73 de G3LST and Staff.

IC251 E ICOM 2M allmode base station £469

NEW! FT757GX £625



NEW! 2M Handy from ICOM soon

FT102 YAESU HF base station P.O.A.

FT290 R YAESU 2M allmode portable £249

TOTALLY DEDICATED TO AMATEUR RADIO. NO HI-FI, NO RECORDS OR TV ONLY:

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YAESU	one of the U.K.s largest stockists.
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NEW! FT203 Mini 2M Handy £159

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1984 BARGAIN OFFERS FROM SMC

FT902DM ALL MODE DELUXE BASE STATION TRANSCEIVER

~~£885~~
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£765 inc

Now's your chance to buy one of the last few of these deluxe transceivers, the 'Grand Tourisme' version of the FT101Z utilizing plug in edge connector boards for ease of servicing and all the little extras not fitted to the 101Z series and all for a price of around £200 less than its forerunner the FT901DM retailed for in 1978.

How much did your gin and tonic or favourite box of cigars cost in 1978

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FT707 HF MOBILE OR BASE STATION TRANSCEIVER

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KDK FM2030

NEW LOW PRICE

25W of FM and much more for only £185 inc

YAESU FV101DM DIGITAL VFO
YAESU FV901DM DIGITAL VFO

£139 inc

FV101DM

£139 inc

FV901DM

YAESU'S LINE UP FOR '84
THE FT757 SYSTEM

FT757GX	ALL MODES AND FILTERS FITTED	**£685.00 inc**
FP757GX	SWITCHED MODE PSU	**£149.50 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 iambic keyer with dot-dash memory. * Three micro processors control most of the switching and adjusting functions normally done by hand and on optional CAT interface unit allows further operating flexibility with an external computer.

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NORMAL CALLS	0703 867333

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Free Securicor delivery on major equipment.
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*On many regular priced items SMC offers.
Free Finance (on invoice balances over £120)
20% down and the balance over 6 months or
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Importer warranty on Yaesu Musen products.
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AUTHORISED 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	£58.40 inc

FT-77

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 £349 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	£8.80 inc
MMBII	mobile mount	£26.00 inc
CSC1A	carrying case	£4.20 inc
FL2010	2m 10w amplifier	£63.25 inc
FL7010	70cm 10w amplifier	£91.00

FM TRANSCEIVERS

FT230R

FT208R

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
NC9C	Handy charger	£8.80 inc
NC7	Base charger	£32.95 inc
NC8	Base quick charger + psu	£54.05 inc
PA3	DC adaptor and charger	£15.35 inc

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

AUTHORISED YAESU **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!

SOUTHAMPTON
SMC Ltd
36/38 Rumbridge Street,
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Southampton (0703) 867333
8·5.30 Mon-Sat

GRIMSBY
SMC (Humbridge)
247A Freeman Steet,
Grimsby, Lincolnshire
Grimsby (0742) 59388
9.30-5.30 Mon-Sat

STOCK
SMC (Stoke)
76 High Street,
Talke Pits, Stoke.
Kidsgrove (07816) 72644
9-5.30 Tue-Sat

LEEDS
SMC (Leeds)
257 Otley Road,
Leeds 16, Yorkshire.
Leeds (0532) 782326
9-5.30 Mon-Sat

CHESTERFIELD
SMC (Jack Tweedy) Ltd
102 High Street,
New Whittington, Chesterfield
Chesterfield (0246) 453340
9-5.30 Tue-Sat

BUCKLEY
SMC (T.M.P.)
Unit 27 Pinfold Workshops
Pinfold Lane, Buckley.
Buckley (0244) 549563
9.30-5.00 (Lunch 1-1.45) Tue-Sat

JERSEY
SMC (Jersey)
1 Belmont Gardens
St Helier, Jersey
Jersey (0534) 77067
10.00-7.00 Mon-Sat

EDINBURGH
SMC (Scotcomm)
23 Morton Street
EH15 2HN
031-657 2430
10-5.00 Tue-Fri (9-4 Sat)

JAYBEAM

				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	£2.50
PMH2/23CM	Harness 2 way		£31.05	£1.50

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

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

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	£44.95
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

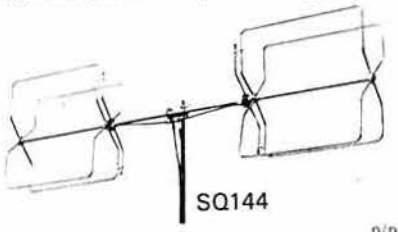
RC5W	5 Way 40p/mtr	Carriage £1.90
RC6W	6 Way 55p/mtr	Carriage £1.90
RC8W	8 Way 59p/mtr	Carriage £1.90
9523	Support Bearing 9502b F4200 **£19.65**	Carriage £2.50
KC038	Lower Mast Clamp KR400 600 etc **£12.65**	Carriage £2.50

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

SMC-HS

HF, VHF, UHF, BASE STATION ANTENNAS

SMC-HS range of base station antennas covers from 80M through to 70cm. All have S0239M 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 ¼	**£20.70**	£2.65
GP144W	2M 2 × ¼ colinear 6·5dB ¼	**£29.90**	£2.65
GP23	2M 3 × ¼ colinear 7·8dB ¼	**£43.70**	£2.65
GP432	70cm 3 × ¼ colinear 6·8dB ¼	**£32.20**	£2.65
70N2V	2M/70cm colinear 2·8dB ¼/5·7dB ¼	**£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 ¼	**£43.65**	£2.65
GDX2	50-480MHz Discone 3dB ¼	**£55.20**	£2.65
GDXA	100-480MHz Discone 3dB ¼	**£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

MORSE EQUIPMENT

MORSE KEYS

HK703	Straight Key	£25.70	£1.20
HK704	Straight Key	£17.65	£1.20
HK706	Straight Key	£14.60	£1.00
HK707	Straight Key	£13.75	£1.00
HK710	Straight Key	£36.40	£1.75
HK808	Straight Key	£45.60	£1.75
HK711	Key Mounting	£29.50	£1.50
BK100	Mechanical Bug	£22.25	£1.75
MK701	Single Lever Paddle	£25.25	£1.60
MK702	Single Lever Paddle	£26.45	£1.60
MK703	Squeeze Key	£25.95	£1.75
MK705	Squeeze Key	£22.60	£1.75
MK706	Squeeze Key	£19.50	£1.75
IKP60	Iambic	£9.95	FOC

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
SMCGCCA	Gutter mount and cable for 10SE		**£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		**£19.95**	£2.35
FSP1	Extension L/S		**£12.65**	FOC

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

STOCK-CARRYING AGENTS WITH DEMONSTRATION FACILITIES

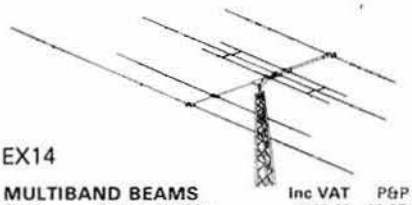
Stourbridge Andrew G4BJY (0384) 390916

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

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

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.

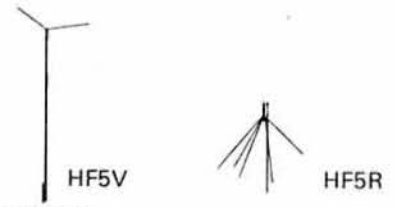


EX14

MULTIBAND BEAMS		Inc VAT	P&P
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 10-20	£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
SMCHF5Y	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.

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	39.50
FS601MH	1.8-30 MHz	200/2000W	Pep	39.50
FS602M	50-150 MHz	20/200W	Pep	39.50
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		14.95

T3-170L

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

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.

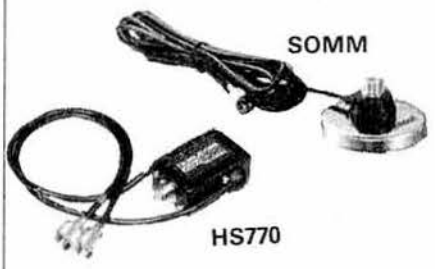
SMC 78F

GCD

SMC258

GCD

SMC-HS MOBILE ANTENNAS			P&P
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 0dB	£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 ¼ wave BNC fitting 2.5dB	£7.30	£0.65
SMC2QW	2M wave 0dB 1.6'	£2.53	£1.85
SMC2NE	2M wave fold 3.0dB 4.3'	£7.30	£2.00
SMC2VF	2M wave fold 3.0dB 3.5'	£12.65	£2.00
SMC78F	2M ¼ wave fold 4.5dB 5.7'	£14.95	£2.50
SMC78B	2M ¼ wave ball 4.5dB 5.6'	£14.95	£2.59
SMC78SF	2M ¼ wave short 4.7'	£14.95	£2.50
SMC88F	2M /8 wave 5.2dB 6.5'	£20.70	£2.50
SMC118M	Colinear 2M 11/8 wave fold 7dB 9.7'	£33.35	£2.65
SMC25B	70cm 2 × ¼ fold 5.5dB 3.1'	£13.80	£2.00
SMC358	70cm 3 × ⅝ 6.3dB 4.7'	£18.40	£2.00
SMC70N2M	Dual band 2M 2.7dB 70cm 5.1dB	£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
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
HS888K	Bumper mounted extension for 144 MHz ant.	£20.30	£2.00



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HS770

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In this issue of *Radio Communication* we are briefly describing our entire range of top quality British-made products, so that our regular customers and the many newcomers to amateur radio can see for themselves the extensive range we have to offer.

Microwave Modules, formed in 1969, is a wholly independent British company manufacturing quality products to professional standards solely for the amateur market, and it is this dedication together with strong customer loyalty that has enabled us to go from strength to strength in expanding and diversifying our product range.

Please note the addition of various new products (marked ●) which are now in full production.

A full data sheet on each product is available on request.

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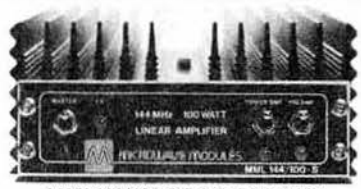
THE ENTIRE RANGE



MML144/100-S PA & PREAMP

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		Price £ inc. VAT	Post rate
MML28/100-S:	10m 100 watt linear/preamp, switchable	129.95	C
MML70/50-S:	4m 50 watt linear/preamp, switchable	92.00	B
MML70/100-S:	4m 100 watt linear/preamp, switchable	149.95	C
MML144/30-LS:	2m 30 watt linear/preamp, 1/3w i/p, switchable	69.95	B
MML144/50-S:	2m 50 watt linear/preamp, switchable	92.00	B
MML144/100-S:	2m 100 watt linear/preamp, 10w i/p, switchable	149.95	C
●MML144/100-HS:	2m 100 watt linear/preamp, 25 w i/p, switchable	149.95 ●	C
MML144/100-LS:	2m 100 watt linear/preamp, 1/3w i/p, switchable	169.95	C
MML432/30-L:	70cm 30 watt linear/preamp, 1/3w i/p	129.95	C
MML432/50:	70cm 50 watt linear/preamp, 10w i/p	129.95	C
MML432/100:	70cm 100 watt linear, 10w i/p	245.00	D

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MMC28/144:	10m to 2m up converter	29.90	A
MMC50/28:	6m to 10m down converter	29.90	A
MMC70/28:	4m to 10m down converter	29.90	A
MMC70/28-LO:	4m to 10m down converter with 42MHz LO output	32.90	A
MMC144/28:	2m to 10m down converter	29.90	A
MMC144/28-LO:	2m to 10m down converter with 116MHz LO output	32.90	A
MMC432/28-S:	70cm to 10m down converter	37.90	A
MMC432/144-S:	70cm to 2m down converter	37.90	A
MMC1296/28:	23cm to 10m down converter	34.90	A
MMK1296/144:	23cm to 2m down converter, GASFET preamp	79.95	B
MMK1691/137-5:	1691MHz Meteosat converter	145.00	B

AMATEUR TELEVISION PRODUCTS

MMC435/51:	70cm ATV converter, VHF output	37.90	A
MMC435/600:	70cm ATV converter, UHF output	29.90	A
MTV435:	70cm ATV 20 watt transmitter	159.95	B

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MMA28:	10m low noise preamp	19.95	A
MMA144V:	2m RF switched low noise preamp, 100w capacity	34.90	A
MMA1296:	23cm bipolar low noise preamp	37.90	A
●MMG1296:	23cm GASFET low noise preamp	59.95 ●	B
●MMG1691:	1691MHz Meteosat GASFET preamp	92.00 ●	B

MICROPROCESSOR PRODUCTS

●MM1001KB:	Morse keyboard	135.00 ●	C
MM2001:	RTTY to TV converter	189.00	B
MM4001KB:	RTTY transceiver with keyboard	299.00	D
MMS1:	THE MORSETALKER—Speaking Morse Tutor	115.00	B
MMS2:	Advanced Morse Trainer	169.00	B

VARIOUS

MMD050/500:	500MHz digital frequency meter	75.00	A
MMD600P:	600MHz + 10 prescaler	29.90	A
●MMD1500P:	1500MHz + 10 prescaler	97.75 ●	A
MMDP1:	Frequency counter amplifier/probe	14.90	A
MMF144:	2m bandpass filter	11.90	A
MMF432:	70cm bandpass filter	11.90	A
MMS384:	384MHz frequency source	29.90	A
MMR15/10	15dB 10 watt in-line attenuator	14.50	A
●MMR7/3:	7dB 3 watt in-line attenuator	14.50 ●	A

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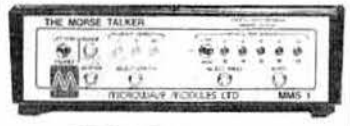
MMT28/144:	10m linear transverter, 2m input, 10w output	129.95	B
MMT70/28:	4m linear transverter, 10m input, 10w output	129.95	B
MMT70/144	4m linear transverter, 2m input, 10w output	129.95	B
MMT144/28:	2m linear transverter, 10m input, 10w output	109.95	B
MMT432/28-S:	70cm linear transverter, 10m input, 10w output	159.95	B
MMT432/144-R:	70cm linear transverter, 2m input, 10w output	184.00	B
●MMT1296/144:	23cm linear transverter, 2m input, 2w output	199.00 ●	D
●MMX1268/144:	1268 MHz Satellite Up Converter, 2w output	135.00 ●	D

POSTAGE

The above prices include VAT but not postage. Please add postage to the above at the following rates:

UNITS 'A' = £1.25 UNITS 'C' = £3.50
UNITS 'B' = £3.00 UNITS 'D' = £4.50



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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**
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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

WHAT'S IN A NAME?

One of the difficulties with words is that they take on meanings that their users wish to ascribe to them and not necessarily what others would like them to mean. The problem word one has in mind—if you haven't guessed—is "amateur". This unfortunately has two disparate meanings. The first describes a person who carries on an art, study or game for the love of it rather than for the money: this, one supposes, used to be its main usage, and one to be valued as conferring an enhanced status on both the activity and those taking part. The second definition conveys the impression of being imperfect, untrained and unprofessional, and this nowadays seems to be an equally common usage. Whether one likes it or not, whose heart does not sink just a little at the thought of the Spindlebury (or other) Amateur Dramatic/Operatic Society.

As amateurs (first definition) we have always had to accept our being referred to as "hams". We have had a recent rather niggling example in the Harrod's 1983 Christmas catalogue where we were associated with York ham and ham actors —to which, I hasten to add, we retaliated merely via a letter to the managing director. On a much more serious note, recently a professor at one of our universities, who had good reason to acknowledge the help given by amateurs to one of his projects, refused to do so because he did not wish the project to suffer from being associated with "amateurs". And one could describe many more cases.

As we all know, amateur radio, like other technical hobbies, has a great deal of which to be proud. For example, much of current development of gliders and yachts is based on the work of aeromodellers and model yacht enthusiasts. Amateur astronomers can still make a major contribution to the discovery of new comets; however, they do not suffer from the word "amateur"—an amateur astronomer is still an astronomer.

Over the years our unique hobby has gained much, simply because of its high status—we should surely take every step to maintain this position. It seems that we need a new name to describe our hobby. We probably always have needed a better name, but perhaps more so now with the more derogatory use of the word "amateur" and because amateurs no longer hold their unique position as communicators, which was once the case!

For us, the problem is that the word "amateur" has always been linked with the hobby—we are officially designated by the ITU as the "Amateur Service" and the "Amateur Satellite Service". Take away the word "amateur" and the designation ceases to exist. After all, we are essentially as others choose to see us, not necessarily as we would like to be seen. Perhaps we should run a competition to find a better name.

David Evans, G3OUF

RSGB NATIONAL CONVENTION 1984

NEC, Birmingham

PROVISIONAL PROGRAMME

SATURDAY 28 APRIL

ROOM 1

11am and 3.45pm	"An introduction to amateur radio" by the RSGB Education Committee
2.15pm	Discussion with RAE tutors at which a representative of the C & GI will be present

ROOM 2

11am-12 noon	A lecture by the RSGB EMC Committee
1pm-3pm	Raynet symposium by the RSGB Raynet Committee
3pm-4pm	"Patterns of hf propagation—or the shape of things to come" by Ray Flavell, G3LTP

ROOM 3

1pm-2pm	"Introduction to the vhf bands" by the RSGB VHF Committee
2pm-3pm	"Getting the most from your vhf station" by the RSGB VHF Committee
3pm-4pm	"An introduction to microwaves" by Charlie Suckling, G3WDG

HF CONVENTION (Pendigo Suite)

12 noon	"Operating as a dxpedition" by the RSGB HF Committee
1pm	"Linear amplifiers" by Peter Chadwick, G3RZP
2pm	Home-constructors forum. Talks by members of the G-QRP Club. Panel of experienced constructors and writers. Chaired by Rev George Dobbs, G3RJV
3.30pm	Presentation of hf awards and trophies
4pm	HF forum. Panel of members of the RSGB HF and HF Contests Committees, chaired by the Society's hf manager, John Allaway, G3FKM

SUNDAY 29 APRIL

ROOM 1

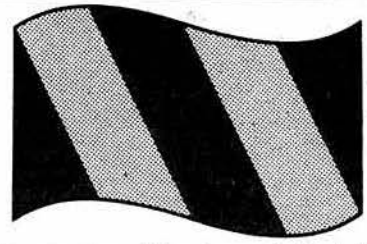
Two one-hour sessions commencing at **11.15am** and **2.15pm** for the beginner: "An introduction to amateur radio" by the RSGB Education Committee

ROOM 2

11am-12 noon	"Aspects of propagation studies as they affect the radio amateur" by Ray Cracknell, G2AHU
1pm-3pm	Raynet symposium by the RSGB Raynet Committee
3pm-4pm	A lecture by the RSGB EMC Committee

ROOM 3

1pm-2pm	"Introduction to the vhf bands" by the RSGB VHF Committee
2pm-3pm	"Getting the most from your vhf station" by the RSGB VHF Committee
3pm-4pm	"An introduction to microwaves" by Charlie Suckling, G3WDG



RSGB at the National Exhibition Centre, Birmingham 28th & 29th April 1984

This year's RSGB Amateur Radio Convention takes place on 28th & 29th April 1984 at the National Exhibition Centre. To make travel by train even easier, the Society has entered into a special arrangement with British Rail to bring you a package deal, which includes the rail journey from the station nearest your home to Birmingham International — and admission to the exhibition — all included in the price. Since members don't have to leave to go home the same day, the opportunity exists to enjoy the exhibition and also stay overnight in Birmingham and enjoy that too.

The table given below shows the inclusive prices from your county, and all that is required is to complete the coupon and send it with your remittance, and a self-addressed envelope, to: The Travel Manager, Kings Cross Station, London NW1 2RT.

Prices shown are return fares

	£
Avon, Lincolnshire, Greater Manchester, Powys	10.40
Bedfordshire, Berkshire, Merseyside, Sth Yorkshire, Gwent	11.90
Buckinghamshire, Oxfordshire	9.20
Cambridgeshire, Greater London, Surrey	15.90
Cheshire, Gloucestershire, Nottinghamshire	7.90
Cleveland, Dyfed	21.40
Cornwall, Isle of Wight (v London)	28.30
Cumbria, Devon, Dorset, Essex (v London) Surrey (v London)	19.90
Durham, Kent (v London) Sussex (v London)	22.60
Derbyshire, Leicestershire, Northamptonshire, Shropshire	6.50
Hampshire, Humberside, Gwynedd	17.40
Hampshire (v London) Suffolk (v London)	24.10
Hereford & Worcester, Warwickshire, West Midlands	3.70
Hertfordshire, Mid-Glamorgan, Somerset, Wt Yorkshire	14.60
Hertfordshire (v London) Norfolk, Nth Yorkshire, Wt Glamorgan	18.60
Lancashire, Wiltshire, Clwyd, Glamorgan Sth	13.30
Staffordshire	5.00
Tyne & Wear, Dumfries & Galloway	25.60
Northumberland	30.80
Central Scotland, Fife, Lothian, Strathclyde	33.80
Tayside	39.20
Grampian	41.70
Highland	45.90

(Children half price)

Ref: NEC RSGB Amateur Radio Convention
28th & 29th April 1984
(Please include a self addressed envelope)

Name _____ C/S _____

Address _____

_____

Station travelling from/to _____

No. of tickets Adults [ ] Children [ ]

Remittance enclosed £ [ ]

Amateur Radio News

Region 2 election

Nominations for the position of Region 2 representative have been received in respect of Mr P. N. Butterfield, G4AAQ, and Dr B. Crisp, G5PW.

Not later than 12 March 1984, members residing in Region 2 may vote for one candidate in the form prescribed below. Completed ballot forms, which must reach RSGB headquarters by the above date, should be enclosed in a sealed envelope marked "Region 2 election", and addressed to "The Secretary". The composition of Region 2 is given on page 106 of this issue.

FORM OF BALLOT PAPER

I,.....
being a fully-paid-up corporate member of the RSGB residing in Region 2 wish to record my vote in favour of
Mr,.....
as representative for Region 2
Signed.....
Callsign or BRS No.....
Address.....
.....

Shortwave listeners and transceivers

The Society receives many queries from shortwave listeners and others who are unsure of the legality of possessing equipment such as transceivers. The legal position is not obvious from the wording of the Wireless Telegraphy Acts, and a case in 1983 concerning an swl who appeared to have been prosecuted for "installing" a transceiver caused some concern. The Society requested clarification from the DTI, and has now received a reply.

The DTI has said that ". . . Section 1 (1) of the Wireless Telegraphy Act 1949 makes it an offence to establish or use any station for wireless telegraphy or to instal or use any apparatus for wireless telegraphy without a licence. No distinction is made between transmitters and receivers.

"At the same time, it is provided that the Secretary of State may make regulations exempting the establishment, use etc, of such types of wireless telegraphy stations or apparatus as may be specified in the regulations from the need for a licence.

"Where exemption regulations are made in respect of particular apparatus, it follows that it may legally be operated without a licence so long as the requirements of the regulations are adhered to in all respects.

"Regulation 3 of the Wireless Telegraphy (Broadcast Licence Charges and Exemption) Regulations 1970 provides that: 'the installation and use of wireless telegraphy apparatus used only for the reception of messages sent by telephony from authorized broadcasting stations broadcasting for general reception and messages sent by telephony or telegraphy from licensed amateur stations' is exempted from the need for a licence. In other words, any wireless telegraphy apparatus may legally be installed and used without a licence provided that it is used only:

(*i*) to receive sound radio broadcasts transmitted for general reception by the authorized broadcasting services; and/or

(*ii*) to receive transmissions from licensed amateur stations."

In other words, as far as the DTI is concerned the test for determining whether or not the equipment in question is covered by this exemption is the *use* to which it is actually put. The terms of the exemption make no reference to the purpose for which the apparatus is designed or the capabilities which it possesses. So it follows that the fact that a single item of equipment such as a transceiver may possess facilities for transmitting, or for receiving transmissions other than those mentioned in the regulation, is immaterial provided that it is only used for the two purposes mentioned above.

If this were not so, in fact, it would be illegal to use most (if not all) ordinary radios without a licence simply because they are capable of receiving transmissions of different types from those mentioned in the regulation. The average domestic fm portable radio can be tuned to emergency service transmissions, for example.

It is hoped that this clarifies the status of the swl with respect to ownership of equipment.

Planning permission?

An increasing amount of time at headquarters is taken up with problems arising out of the need for planning permission for antennas. The planning committees of many local councils tend to take breakthrough problems into consideration, despite the fact that the Town & Country Planning Act does not replace the Wireless Telegraphy Acts as the controlling legislation for radio users, and the Society is often called upon for assistance to members who are affected by decisions of this nature.

Initially, members requiring assistance are sent a special booklet containing various items of information; should they require further assistance, headquarters will refer them to the Society's Planning Panel. This is a group of volunteers who are experienced in various aspects of planning legislation, and who give their services to the Society free of charge. Members with problems will then be referred to their local Planning Panel member, who will assist them.

As is well known, Scots law is different from English law, and one small deficiency in the present Planning Panel is that there is currently no member for Scotland. Anyone who is experienced in planning legislation—either as a solicitor or as a planning officer or other official with experience in this area—and who is also interested in and conversant with amateur radio and who would be prepared to devote some free time to assisting RSGB members in Scotland who are experiencing planning permission problems is invited to write to the secretary/general manager at headquarters.

In fact, the Society would be pleased to hear from any members who have planning experience and who would be interested in joining the Planning Panel.

50MHz—more research permits

The 50MHz experiment is to be expanded, and the number of special research permits for Class A licensees is to be increased from 40 to 100 stations. The DTI has asked the Society to make recommendations for the 60 additional stations to take part in this experimental work, and the procedure will be as follows:

1. For those who have already submitted the full questionnaire to the Society's vhf manager, it is only necessary for them to inform G3WSN, in writing, that they wish to be reconsidered for the additional group of 60 stations.

2. Those who have not previously applied should write immediately to "The Secretary (50MHz)" at headquarters for a questionnaire. Upon receipt, the questionnaire should be completed and sent to the Society's vhf manager, Keith Fisher, G3WSN, 7 Burlington Road, Swanage, Dorset BH19 1LR.

The closing date for receipt of letters and questionnaires will be 31 March 1984, after which recommendations will be made to the DTI. The final selection of stations to take part in the 50MHz experiment will be made by the Radio Regulatory Department of the DTI.

The DTI has also agreed that a low-power 50MHz beacon may be established at headquarters; further details later.

Communications in Parliament

Although not strictly "amateur radio news", some rf-related news from Parliament might be of interest. On 12 December 1983 Lord Orr-Ewing asked how many new frequencies in the vhf and uhf bands had been allocated to the 47 companies providing mobile radio services during the last year. Lord Belstead replied that 52 additional channels had been made available at uhf for land mobile services in London. A further 10 vhf channels were being made available throughout the country for common base station and message-handling use. The number of additional channels in London might be increased.

On 6 December 1983 the Secretary of State for Trade & Industry was asked what action he proposed to take concerning the illegal pirate radio stations broadcasting in the London area. In reply, Mr Alexander Fletcher said that the Government was seeking new powers of seizure in the Telecommunications Bill and that, in the meantime, such stations would continue to be traced with the assistance of British Telecom's radio interference service, and those concerned would be prosecuted.

On 13 December 1983 the Secretary of State for the Home Department was asked whether he would discuss with the police the adequacy of their powers to prosecute those who abuse cb radio channels by the broadcasting of offensive or indecent messages. Mr Douglas Hurd replied that the primary responsibility for enforcement of the wireless telegraphy legislation, and for the conditions laid down for cb radio licences rested with the radio interference service of British Telecom acting on behalf of the Secretary of State for Trade & Industry.

May RAE

The May Radio Amateur's Examination will be held on Monday 14 May. RSGB examination centres are again being arranged in Derby and Central London in order to assist external candidates. Applications for a place must be made on a form obtainable from the membership services department at RSGB headquarters. An sae would be appreciated. The closing date for completed application forms to reach headquarters is Saturday 18 February.

Cable tv and amateur radio

As mentioned here recently, some franchises for cable television have now been awarded, and it is expected that cable tv distribution systems will commence operation in some areas in the course of the next few months. The Society is obviously keen to ensure that the type of problems experienced in the USA do not occur here in the UK, and it is most important that members report any instances of difficulties arising from breakthrough with their equipment either into or out of cable systems. In the first instance, please write to the secretary at headquarters.

The RAC Amateur Radio Group Scheme

Membership of this scheme is open to all amateur radio enthusiasts, and provides membership of the Royal Automobile Club at a discount of £2 below the normal RAC membership subscription rate. Since 1 June 1983 the annual subscription for members of the group scheme has been £16.50.

The group scheme's subscription renewal date is 17 May (World Telecommunication Day) each year, and all members renew on the same date. Anyone joining the scheme will pay at the pro-rata rate of £1.37 per month until the next group renewal date. In addition, the RAC once-only joining fee of £3 is also payable, regardless of the period remaining in the membership year. Radio amateurs who are already members of the RAC and who wish to transfer to the group scheme will not pay the joining fee.

Desirable options are the RAC Recovery Service and the "At Home" Service, the annual subscriptions for which are £13.50 and £5.50 respectively, annually from date of taking up the option.

No additional subscriptions are payable for a member's spouse.

The scheme is administered by the Royal Automobile Club's Scottish Western Counties Office, 200 Finnieston Street, Glasgow G3 8NZ. The co-ordinator of the scheme is Mr A. W. Hutchinson, 88 Broomfield Road, Chelmsford, Essex CM1 1SS, from whom application forms may be obtained.

News from the USA

As mentioned previously in these pages, the American FCC proposed early in 1983 that a so-called "code-free" licence—roughly equivalent to the UK Class B licence—be made available in the USA. This proposal was made without reference to the American Radio Relay League, but league members and, indeed, the ARRL itself were strongly opposed to the concept of a code-free licence, and the FCC finally dropped the proposal on 14 December 1983 after receiving an overwhelming amount of adverse comment. The proportion of those opposed to this class of licence appears to have been in the region of 21 to 1 against, and some sources have indicated that the CIA, no less, were unhappy about the proposal. The FCC finally concluded that a knowledge of morse was always useful to

A TRIBUTE TO W4KFC

As mentioned briefly in last month's *RSGB News Bulletin*, the ARRL president, Vic Clark, W4KFC, died late last year. His last editorial, in *QST* December 1983, said some pertinent things about the state of amateur radio and the ARRL, and his remarks have a good deal of relevance on this side of the Atlantic as well. By way of a tribute to his memory, we reproduce the editorial in full (The American idiom and spelling has been retained—Ed)

TEAM SPIRIT

Team spirit . . . it is a powerful force.

We surely have it in amateur radio, and it is most in evidence when we are conspicuously threatened in some way. Recent examples are to be found in the rallying to the colors by amateurs all around the world as we prepared for WARC 79, and in the outcry prompted here at home by the FCC's proposal to create a codeless class of amateur license. Our "team" was victorious in the first instance, and we dare hope that this will prove to be the case when the commission reports its decision in the latter.

Working together, folks can accomplish much more than they could ever do as individuals. Perceiving this, Hiram Percy Maxim, W1AW, back in 1914, took steps to organize the radio amateurs of his day. The motivation arose from recognition of two factors: the need for representation to the government to assure permission to operate at all, and the importance of developing procedures for cooperative use of the airwaves by all amateurs, regardless of their particular operating interest.

Fortunately for all of us who have come along later, the organization founded by HPM endured to become our mainstay against a succession of threats to the frequencies and privileges of amateur radio in ensuing years.

Here in the United States, our team is "ARRL". It is an organization of people, and it is not perfect. Nor does it "win" every game. But most of us who cherish our amateur radio privileges recognize the need to work together in the continuing effort to protect them.

ARRL is intended to be a democratic institution, providing opportunities for membership participation and influence. In recent years, through the combined efforts of concerned members, elected officials and staff, it has become much more so. There now exist not only greater opportunities for individual participation in new league organizational roles, but several additional channels have been created to enable members to express their views in shaping ARRL programs and policies.

"How, then," one might ask, "could any amateur rationalize withholding support from such a collective endeavor?"

The reasons vary; some are familiar to us. A number of amateurs fled the membership scene because of their misperception of the responsibility for "incentive licensing", others over some real or imagined difference of opinion with an ARRL policy or action. One day last summer, in a single mail, two letters arrived from amateurs who threatened to give up their membership in ARRL . . . one because the "ARRL opposes the no-code license", and the other because "the league supports a no-code license".

Then there are those who, failing to get their way in one matter or another, come to regard the league as "a group in Newington who control amateur radio".

Finally, there are the apathetic. We have many licensed amateurs who appear to feel no particular sense of commitment or obligation to their peers. They perceive no reason to join in cooperative efforts either to carry out the social responsibilities of the amateur radio service or to assure that amateur radio will be available for future generations. How do we penetrate their indifference and make them aware of the value and importance of joining the team effort? The problem is not unique to amateur radio; it is present in other segments of our society as well.

Those of us who temporarily occupy offices and staff positions in ARRL, and serve in a host of roles in its field organization, do so from a belief that amateur radio is worth working for. Having benefited from our own involvement, we wish to do whatever we can to keep it alive and thriving, to make its advantages available to others, and to assure that the commitments implicit in Part 97.1 of the FCC regulations, Basis and Purpose, are fulfilled.

The league is totally dedicated to the defense and development of the amateur radio service and to a course of cooperation with all who share in that aim. Today, approximately one-third of those holding US licenses are members of the ARRL team, and exert a profound influence through their membership toward achievement of those goals. *They* are the source of the team spirit that will enable us to cope with the challenges that loom ahead.

This is to say a hearty thanks for *your* continuing support toward that end!

the amateur, and in some cases was essential; that it was not a bar to the physically handicapped, and that the amateur service in the United States was "... healthy and growing even without a no-code licence".

Changes in cb licence

Some changes in the nature of the cb licence are to come into effect as of 5 March 1984. Licence and licence renewals taken out from that date will only be valid if the licensee is aged 14 or over. Children under this age may only use cb under the supervision of an older person. Other changes to the licence are aimed at clearing up some areas of misunderstanding: they include an explicit ban on the playing of music and the re-transmission of television and radio broadcast material. More freedom in the construction of 27MHz antennas is to be allowed, and loading coils will be permitted to be positioned at places other than the base of the antenna element. The overall length restriction, which will now include the loading coils, remains virtually unchanged.

There are currently some 280,000 cb licences in force.

QTI Talking Newspaper Association

QTI Talking Newspaper for blind and partially-sighted radio amateurs has been granted full charity status by the Charity Commission (No 326454). Donations and offers of financial support may be directed to: Mr J. Feeley, G4MRB, chairman QTITNA, 79 Narrow Lane, North Anston, Sheffield S31 7BJ.

"Mr Eddystone" dies

The name of Eddystone Radio will be familiar to many, and it is with great regret that we record the death last December of its founder, George Stratton Laughton, aged 79. One component of the family business, the Laughton Group, was Stratton & Co Ltd, which was founded in the early 'twenties—as Eddystone Radio it was sold to Marconi in 1960, and the name is still extant on high-grade vhf and uhf receivers.

New club in Bristol

A new radio club serving the amateur population in the south Bristol area has been formed at the Whitchurch Folk House, East Dundry Lane, Whitchurch. The South Bristol Amateur Radio Club meets at 7.30pm each Wednesday, and is in process of affiliating to the RSGB: a full programme of activities is available to members. Further information is available from G4RZY on Bristol 834282.

QSL Bureau

Please amend the address, given on p49 of the January issue, of the sub manager for the G8SAA-SZZ series to read: 7 Long Buftlers, Harpenden, Herts.

WAB books

The third series of WAB books is now available from Brian Morris, G4KSQ, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED. The cost is £4 plus £1 p&p in the UK; US $10, including p&p outside the British Isles.

Can you help?

Mr M. I. Cross, "Cartreff", Bedwell Road, Marchwiel, Clwyd LL13 0TS, would like to obtain a copy of the QSL card issued by his father Rex Cross, G2FZ, who died in 1959. He is taking the RAE in May, and in due course wishes to apply for his father's callsign.

Stolen equipment

From a car in Erdington, Birmingham, on 29 December 1983: Trio TM201A serial number 4010105. Information to 021-350 4768 or 0602 225253.

Trio 9130, serial number 2082943, complete with Adonis sunvisor mic and remote switch; also 7λ/8 144MHz antenna. Information to 0296 623802, or police on 0296 623122.

Sidebands

The London RAFARS Net meets each Monday on 145·325MHz, channel S13, at 8pm: its secondary frequency is 144·175MHz, with ssb. The net controller is usually Terry Owen, G4PSH, who is the RAFARS area representative for London and Middlesex.

It is well known that beacons consume electricity: however, there was a certain amount of consternation at RSGB headquarters recently when a small bill relating to the GB3CTC beacons was received. It was a gas bill—did beacon keeper G3XC know something we didn't? It turned out that the Gas Board now owns the site: mystery solved....

G6RH has just become the second British station to gain a DXCC award for contacts made via satellite. The first was awarded to G3IOR in 1979, and only six have been awarded throughout the world.

Mobile Rallies Calendar

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

5 February—Bury RS Ham Feast. Mosses Community Centre, Cecil Street, Bury. Talk-in on S22. Open 11am. Refreshments available. Bring & buy. Details from H. F. Bridge, G3VC, 17 Raglan Avenue, Whitefield, Gt Manchester M25 5US, tel 061-773 8824.

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.

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 Amateur Radio Rally. Organized by the Barry College of Further Education RS. Further details to be announced later. Rally sec Reg Rowles, GW4FOM, tel Cardiff (0222) 565656, 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—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.

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.
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.

Special Event Station

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

31 March—8 April, GB2RBL
The station will be run by the Royal British Legion, North Finchley Branch. It will operate on 144MHz vhf and 14, 7, and 3·5MHz when operators are available. Overseas dx will be on 14·185MHz depending on propagation. Special QSL cards will be available via the RSGB bureau. More details from Terry F. Owen, G4PSH, 5 Station Close, Holden Road, London N12 7EG.

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.

28-29 April - RSGB National Amateur Radio Exhibition, National Exhibition Centre, Birmingham.

29 September—Scottish Amateur Radio Convention, Hawick High School, Hawick, Roxburghshire. Details to follow.

OBITUARIES

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

Mr E. W. Yeomanson, G3IIR, RSGB Vice-President, RSGB President 1965

Photo: G2LW

Eric, or "Bill" as he was known to his professional colleagues, died on 20 December aged 75.

He first became interested in wireless while a student at the Hull Technical College, where he was involved in the formation of the wireless club. He moved to the London area in 1923, and was mainly interested in the construction of broadcast receivers and, later, shortwave receivers. He took up photography, and designed the first electronic flash unit published by *Amateur Photographer*.

He was always interested in local wireless clubs, particularly the Crystal Palace and DRC, and he joined the RSGB in 1949 as BRS18370; obtaining his licence in the following year. Eric was always an enthusiastic supporter of the Society, committing himself to considerable committee activity over the next 30 years, and was an original member in 1951 of the Exhibition Committee, of which he later became chairman. He served on Council for 15 years from 1958 to 1972, and was directly involved with the move from Little Russell Street to the larger premises at Doughty Street in 1968.

Emergency communications was always a subject in which he took a keen interest, and he was involved with George Wallace MP (now Lord Wallace of Coslany) who was instrumental in getting RAEN (Raynet) recognized by the authorities. He was a member of the Raynet Committee for many years, latterly serving as Zone 5 representative until ill-health forced his retirement a few months ago.

As a professional telephone and public address engineer he naturally became interested in rtty, and became chairman of the BARTG committee. He made the first rtty contact between this country and Holland on 144MHz, and he produced and transmitted the rtty news bulletin on both hf and vhf for the first five years of its existence. The *Teleprinter Handbook* owes much to his editorial efforts. In the recording field, he assisted the local talking newspaper by acting as service engineer; organized the new RAE tapes for RAIBC at the studios of Radio London, and later producing a large quantity of copies.

He was a first-class craftsman, a clear thinker and a forthright speaker. He will be greatly missed.

Ruth and Stuart Yeomanson wish to thank all those many members of the Society who sent expressions of sympathy on the death of Eric, and for their kind thoughts.

Mr S. Austin, G6YPI
Stuart Austin died on 2 October 1983. After passing his RAE in August he had planned to experiment on 144MHz for a while before obtaining his A licence. The Stuart Austin Memorial Fund has been set up to be used in aid of motor cycle safety training courses.

Mr H. Dunlop, G4FPF
Harry Dunlop died on 30 December 1983. He was a keen constructor, ex-Wimborne Raynet controller and, at the time of his death was treasurer of the Bournemouth RS. He came into amateur radio after his retirement.

Mr A. R. Dyer, G3IDF
Alan Dyer died, aged 56, on 23 October 1983. He joined the Society as an associate towards the end of the war, later becoming BRS11228, and was licensed as G3IDF in 1951.

Although not on the air for some years, he worked 1·8 and 28MHz from both Earlsfield and Summerstown before moving from London to Crawley in 1961. He was also a long-time ARRL member; BSWL1742; a founder member of both the Balham & District RSGB Group and the Mitcham Club, and was TR for Balham and Tooting in 1951. Alan had been with Mullards for 33 years.

Mr A. Hemming, GW3SWQ
Alan Hemming died on 5 December 1983. He had recently become active with RAIBC and will be sadly missed from GB3WW. Apart from amateur radio his many activities included being past-postmaster on Tristan da Cunha.

Mr W. D. Kieller, G6HR
Mr Kieller, who died recently, had a large collection of vintage radio equipment, which his daughter has most kindly donated to the Society.

Mr L. Newport-Gwilt, G3HPH/3A2CP
Leslie Newport-Gwilt died on 24 October 1983, aged 75. He obtained an AA licence before the second world war after a spell of pirating on the medium waves.

After retiring he went to live in Monaco where he had the call 3A2CP. Les was against rubber-stamp QSOs, was very keen on construction, and worked to a very high standard. He was not interested in contest working and spent most of his time discussing technicalities with his friends on the hf bands.

Mr George Clarence Oxley, G8MW
"Si" Oxley died on 29 September 1983 aged 72. He joined the Society in December 1936 as BRS2641, when living in Tibshelf, Derbyshire. He obtained a PMG Certificate in 1928, and worked as a Marconi radio officer on various ships until 1931, when he returned to Tibshelf and set up a wireless and electrical shop. He obtained the callsign G8MW in 1938, was a very keen experimenter and constructor, and a contributor to *The RSGB Bulletin* and *Radio Communication*.

From 1945 to 1952 Si worked with the Control Commission in Germany, holding the callsign DL2MW. In 1955 he took up fulltime teaching at Chesterfield Technical College, from where he retired in 1972. He continued with part-time lecturing of RAE students until 1976, was involved with the East Midlands Educational Union as an examiner, and was a representative on the City & Guilds of London Institute Advisory Committee.

"Si" served our Society well, being a member of the Education Committee, latterly chairman, resigning that position due to ill-health, shortly before his death.

Mr J. Perkins, G3PFL
Jack Perkins died on 20 November 1983, three hours after his usual appearance on the G5SN net on 3·5MHz. He was an old-timer of 82 years old, and got his experimental licence in 1921. He had regularly worked VK and ZL stations on 14MHz.

Mr M. Shaw, GM5CL
Matthew Shaw died on 2 November 1983, aged 80. He was one of the earliest Glasgow radio amateurs, and had possessed a licence since 1926.

Mr G. A. Steels, G4KPK
Arthur Steels died on 13 September 1983, aged 74. Without the advantage of any relevant background he obtained his full licence at the first attempt in October 1980 in his 72nd year.

Despite failing health he was very active during the short time he was operating. He was a member of Grimsby ARS.

Mr H. Thorpe, G3IZ
Harry Thorpe died on 1 November 1983. He had operated from Crosspool, Sheffield, in the days when all equipment was handmade. Recently he had been active on 144MHz, but was converting antennas to 28MHz.

Mr E. Walklett, G3RMU
Ted Walklett died on 14 November 1983, aged 55. He had been licensed for 21 years and recently had been an avid follower of the Oscar programme. He found great enjoyment in constructing and modifying his existing equipment for use with the Oscar series of satellites. He had only recently completed a new antenna for Oscar 10 but had only managed to make a few contacts. His amateur radio activities kept him in touch with the world during his illness and he spent many happy hours not only operating but also listening in on many other QSOs.

Mr S. B. White, G4BLR
Stan White died on 3 November 1983, aged 54. He joined the Royal Navy as a radio operator just before the end of the second world war. After the RN he served for many years in the DWS. He was a strong supporter of WAB and actively involved with the Milton Keynes RC, RAIBC, and RNARS.

Also:

Mr C. W. Campkin, G4JDA;
Mr J. A. Curtis, on 3 November 1983;
Mr J. Finlay, RS84583, on 5 November 1983;
Mr D. M. Heaps, G3HAF;
Mr V. Nutton, RS34524;
Mr J. R. Perry, G2FTU, on 18 October 1983;
Mr H. F. Tarring, RS30767, on 21 April 1983;
Mr J. C. Taylor, G8KBT, on 1 September 1983; and
Mr H. J. Zuur, PA0HJZ, on 8 October 1983.

APOLOGIES. . .
To Mr J. Fitzgerald, G3EUS, whose name and callsign were inadvertently included in last month's obituary list; and for a spelling error in respect of Mr W. B. Johnston, GI3EIO, BEM, in the same list.

Members' Mailbag

THE EDITOR
RADIO COMMUNICATION
RSGB BROOMFIELD ROAD
CHELMSFORD. ESSEX
CM1 1SS

HF OPERATING—AGAIN

Sir—May I crave a little space to attempt to answer G3SXW and G3FXB? I have been out of the country for six weeks, and have only just seen their letters in *Rad Com* October, in response to my poor effort.

My command of English must be failing: I am sure I never meant anything about any so-called "Class A versus Class B" issue. I would deny any wish to perpetuate any such divisive question, which in my view should not exist, and must surely be the result of some people's overfertile and neurotic imaginations.

So how did they read such things into my poor prose?

Perhaps I can make a few points:

1. I can read morse.
2. Having, in a previous employment, spent considerable time on hf, I cannot fail to recognize the musicality of good morse sending.
3. My own predilection is for high information rate, user friendly, reliable communication on the higher frequencies. Hence my call.
4. Since I profess to know morse, I profess to be able to recognize *good* morse sending. It follows that I can profess to recognise *bad* sending.
5. That leads to my complaint. Bad communication by some on HF NFD. Bad morse technique—superfluous dots due to lack of adequate control of automatic sending devices—the incapacity to slow down those devices to the speed of the correspondent, and the obvious concommitant lack of a "straight" key, or the ability to use same —bad operating practices by virtue of contraventions of articles 1, 3 and 4 of Paul M Segal's "Amateurs Code" (go on, look them up, good for your soul!). And look what resulted—comments from the adjudicators about wrong callsigns and wrong reports —a clear indication of bad communication, in fact, so bad that a simple call plus report combination cannot be passed without corruption.
6. Please note that the complaint is not about morse: it is about **the bad use of morse by those who profess to know better.**
7. See the comments from the Hastings group in the HF NFD write-up. Note that the writer of those comments has only ever had a callsign with a four in it, which must make him whiter than white to those who insist upon the spurious divide between A and B. Do *his* comments bear more authority because of his call?

I never passed GCE in English; I did in French. Would my letter have been better understood in French?

Have I now made myself comprehensible to Messrs Slater and Western?

How can I make myself more so?

John Ridd, G8BQX

LICENCES AND PIRATES

Sir—I was interested in G6PUS's letter in your August issue and your comment about any other wrong callsigns issued. I was at the outset issued with the callsign G4PQO, and the RSGB computer accepted this. I went ahead merrily making contacts worldwide, sending QSL cards in every case and waiting for replies which never seemed to come.

Then a friend told me he had heard my callsign being used on the 144MHz and hf bands, but the user's voice was not like mine, and he gave an address not 40 miles away. Before I could do anything about it, I received a phone call from the Home Office which went something like this: "Mr Pursey?"; "Yes, speaking"; "Home Office here, what is your callsign?"; "G4PQO"; "Not so"; "Well that's the callsign I was issued with"; "You must not use that again, your callsign is G4PQD".

Imagine it!—I was the pirate. No apology from Home Office, just a duplicated first page of the licence with the new callsign. I was given the address of G4PQO who amicably sent on my QSL cards, and I must say that I appreciated RSGB's quick response in issuing new membership cards etc. Have had my leg pulled for quite a time as being the only licensed pirate.

Frank Pursey, G4PQD

We were pleased to receive many comments on the original letter. Given the number of licences issued and the manual record-keeping system then in use at the Home Office, perhaps it is surprising that errors of this type are relatively infrequent. The imminent computerization of amateur licensing records by the Post Office should make this type of problem a thing of the past . . . or are they "famous last words"?

REPEATERS AND THE NEW LICENSEE

Sir—I am prompted to write to you as the strains of my local GB2RS news bulletin fade into the distance informing me of the latest callsigns issued by the DTI. Undoubtedly the majority of newly-licensed Class B amateurs will head straight for the 144 or 432MHz bands to be welcomed to the world of amateur radio by a repeater station. These machines which boost your coverage area seem to have been resident on their particular sections of the bands since time began, and many newly-licensed amateurs are unsure of their history. This leads to some commonplace misconceptions which I hope I may dispel.

Although the repeater licences are held by the RSGB, the Society does not directly run, maintain or fund repeaters. This task is performed by local repeater groups around the country whose responsibility it is to ensure that their units remain on the air and performing to specification.

Repeaters will not necessarily always be available—with the current economic climate many groups are finding themselves with increased site rents for their units, and diminishing memberships due to general apathy and other factors. In some extreme cases, lack of funds will undoubtedly mean the closing down of parts of the UK repeater network.

UK repeaters are not only found on 144 and 432MHz—the aims of most repeater groups are not only to provide coverage on the vhf and uhf bands, but also to promote new ideas and techniques in other areas of operation. The Sussex Repeater Group runs a very innovative 1·3GHz repeater which provides weather telemetry data output at 45·5baud rtty, and hopes are high for the release of a licence soon for another local group to provide a 1·25GHz video repeater service for atv use. Other groups around the country are already heavily committed to the higher bands and more complex modes of transmission.

There is a suggestion that the presence of repeaters on 144 and 432MHz promotes poor operating procedure, since it is easier to use a repeater rather than risk a more difficult simplex QSO—witness the carnage on 144MHz repeaters recently under lift conditions! Personally I feel that the primary role of a repeater must be to assist communications between mobile or portable stations which could not otherwise work each other simplex—not to the exclusion of, but in preference to base station working.

So perhaps repeater groups should embark on a process of encouraging newly-licensed amateurs to find out more about their local repeater group. I would suggest to new licensees: ask other repeater users for details of the secretary or treasurer of your local group, or look up the information in the *International FM Guide* or similar publication. Then contact these people and learn more about the service within your area. Above all subscribe to the group, and take an active interest in its affairs. This will ensure the future of what must be one of the best co-ordinated amateur services available to the new licensee.

Andrew J. Clark, G8TJQ,
secretary, Sussex Repeater Group

Fundamentally, repeater stations are there to assist communication between portable and mobile stations, and indeed this is the accepted reason why these unmanned relay stations are licensed in the UK. We hear a good many newly-licensed stations on 144MHz with a "Slim Jim" in the loft and low power, and they often tend to use repeaters to extend their range. However, extending the range of a home station is not the purpose of the repeater network.

The Society is heavily involved with repeaters, and has been from their inception in the UK. Today the RSGB's Repeater Management Group is responsible for setting and monitoring standards, and providing national frequency co-ordination and international frequency co-ordination via the Society's vhf manager. The Society also pays for essential public liability insurance for all repeaters and all repeater licence fees.

SPACE SHUTTLE OPERATION

Sir—Having got up fairly early for a Sunday in anticipation of working W5LFL and having *listened* on 145·55MHz for the first two passes of the shuttle, I felt that I had to put pen to paper.

The number of "amateurs" who don't seem to understand the difference between up-link and down-link frequencies is incredible. I heard hundreds of amateurs trying to call W5LFL on *his* down-link frequency (145·55MHz), and the only conclusion I can come to is that these people (I won't call them amateurs, as they do not deserve the title) made *no effort* to discover the facts before blindly keying up their transmitters.

It cannot be said that the Society was at fault here; the facts were readily available through GB2RS news, Headline news, *Radio Communication*, tv, press etc. I think that the Society has kept us well informed, giving maximum help where necessary.

I only hope that what happened does not give amateur radio, as a whole, a bad name. I am talking about media people who have been reporting on the event.

I think I have said enough, but finally I would like to offer a piece of useful advice to all those people who tried to call W5LFL on 145·55MHz —**"Engage brain *before* pressing ptt"!**

This also applies to any future events of interest.

Laurence James, G8UBV

The Society has received over 20 letters on this subject, all of which say much the same thing.

MORE ON EARLY PHONETICS

Sir—Following a request for details of the very first phonetic alphabet, published in last November's "Mailbag", several interesting replies have been received—all with different answers!

Old timer G2BY put it in a nutshell when he wrote: "There was no system in those days; one just used what came into one's head at the time! To my mind, a better system than that spouted now! On the rare occasions I used phone, I gave my own call in three different

ways—'Calling test dx. This is Two Baker Yoke', 'Two Boston Yesterday', or 'Two Boston Yokohama'."

G5NU wrote that many amateurs used the old British Army phonetics, such as "Ack, Beer, Charlie, Don", and including U-Umpty, I-Iddy and P-Pip. Emma was for M and not E . . .

G3PH also mentioned recalling these phonetics being in regular use, as well as Edward, Freddie, George, Harry, Ink, Johnnie, King, London, Monkey, Nuts, Orange, Pip, Queenie, Robert, Sugar, Toc, Uncle, Vic, William, X-ray, Yorker and Zebra. He added that another code listed in the early RSGB *Handbooks* used the names of towns and countries: such as America, Boston, Canada, Denmark, England, France, Germany, Holland, Italy, Japan, Kentucky, London, Mexico, Norway, Ontario, Portugal, Quebec, Radio, Santiago, Turkey, University, Victoria, Washington, X-ray, Yokohama and Zanzibar. These are still being used today by many Italian, Middle-East and South American amateurs.

G3HJG sent a list of pre-war commercial phonetics used by coast stations and the Merchant Navy, which could well have been used by many of the amateur fraternity. This code was also based on the names of towns and countries, Amsterdam, Baltimore, Casablanca, Denmark, Edison, Florida, Gallipoli, Havana, Italy, Jerusalem, Kilogramme, Liverpool, Madagascar, New York, Oslo, Paris, Quebec, Roma, Santiago, Tripoli, Uppsala, Valencia, Washington, Xanthippe, Yokohama and Zurich. This phonetic alphabet was in use for very many years before the war, and even up to about 1946—but had changed to the "Able Baker" version by 1950 (on the First Class PMG course).

G4NGK sent not one but two pre-war codes in use by the Post Office. The first was the last one quoted, and this was for talking with distant operators and customers on routes with French service language. The other, used on routes with English service language, ran as follows: Alfred, Benjamin, Charles, David, Edward, Frederick, George, Harry, Isaac, Jack, King, London, Mary, Nellie, Oliver, Peter, Queen, Robert, Samuel, Tommy, Uncle, Victor, William, X-ray, Yellow, Zero.

But, after all that, I still prefer the alphabet which commences with "A for osses" . . . .

Douglas Byrne, G3KPO

COMPLEX, YET SIMPLE

Sir—I have been forced to put pen to paper after reading *TT* for December. In "Complex yet simple" I note Dr Barry Kirkwood's puzzlement about the prevalence of amateur constructional articles using discrete devices, when cheap ics are readily available.

I suspect that Dr Kirkwood is professionally involved in electronics. If he were a chartered mechanical engineer, as I am, I think he would have little difficulty in understanding why multitudes of amateurs prefer (nay, are forced) to stay with nice, simple transistors with three or four leads. After all, within reasonably wide limits, most transistors can be persuaded to perform most everyday tasks, and destruction costs only coppers. This is why I retain hundreds of transistors whose characteristics I have been unable to discover, in spite of the fact that I have data on something like 30,000 different types. I need only identify whether an example is npn or pnp to enable me to use it in some way.

The position with ics is quite different. I possess some thousands, and one complete drawer in my storage system is full of devices of which I know nothing. I have been unable to find out anything about the manufacturers of many of them, let alone what they can do! How can an amateur design a circuit round a device having 40 pins, and containing some thousands of transistors and coupling components? I suggest that devices of this complexity are fairly useless unless the manufacturer provides the necessary data. He is virtually the only person who can say what uses a device may be put to, and how to do it. The only thing which makes me retain my stock of "unknowns", when I would probably be wiser to empty the drawer into the dustbin, is my Aberdonian background!

People like me do tend to have recurrent nightmares about a wrongly placed or leaky soldering iron, or reversed supply polarity. The prospect, let alone the actuality, of destroying £40 worth of ic in an unguarded second, makes my eyes water most unpleasantly, and I have been known to delay the switch-on of a new constructional project for three weeks because I could not find the courage to risk disaster!

J. A. Ewen, G3HGM

INTERFERENCE IN EXCLUSIVE AMATEUR BANDS

Sir—From time to time mention has been made in *Radio Communication* of the burbling type of interference that sweeps through some amateur bands. Twenty-metre band users in the mornings will be all too familiar with this phenomenon.

Some of these burblers wander higher in frequency, others lower; few are stable, and the carriers suggest unfiltered, dirty ht supplies. Some are on for short bursts, but the majority is much more persistent. One typical example of the latter was discovered in full spate on 14,110kHz and trundled its way up to 14,160kHz in 12 min. During multi-way contacts between G, SM, EA and VK stations, these burblers are strong enough to obliterate the weaker signals and mar the reception of quite strong ones. Moreover, the interference is copied by all participants, so is widely propagated.

Various suggestions have been made about the origins of these obnoxious noises, but I cannot recall ever having read that anyone actually knows what is responsible. However, surely in our very large membership *someone* must know the answer? I feel we are far too complacent about these matters and much too inclined to assume that, because the amateur service is not a protected one, we must suffer in silence.

What is needed is a concentrated effort by groups of amateurs, on an international basis, to meticulously record these interfering signals, recording the exact times, dates, bands and duration of the signals. Beam headings would be a great help, if available, and a note of whether they wandered up or down in frequency and at how many kHz/min.

I suspect this nuisance is the result of some industrial process in the European area. It tends to diminish towards the end of the working day and is relatively infrequent on Sundays. Mobile operators travelling in industrial areas could be of great assistance in locating the offending apparatus.

It might be very difficult to get such interference stopped or reduced unless existing regulations were being contravened. However, pressure groups are always lobbying MPs, so why should we not adopt this procedure, too? Since numbers are more effective than the odd lone voice, it would be appropriate for all members of clubs and societies, either individually or through a petition, to complain to their MPs. Unless we are more aggressive concerning the ever-increasing interference we suffer, from burblers, computers, tv time-bases, switched-mode power supplies, and so on, the situation will only get worse, to the point where we will be less and less able to enjoy our legitimate hobby.

Norman Fitch, G3FPK

The "burbling" noise described by G3FPK has been heard at RSGB headquarters: its last manifestation was during the shuttle flight when we were trying to listen to the amateur radio station at the Goddard Space Flight Centre. As far as lobbying MPs is concerned, what do we complain about? We do not even know the country of origin, let alone the process involved. The first question is, can any member in any country provide any authoritative information? When we know the "who" and the "where from", the next step is to formulate a plan of action. Any information, please, to the secretary/general manager at headquarters.

Similar problems around 28MHz were proved some years ago to be from industrial electronic equipment, and this was reported in Technical Topics.

EVEN MORE ON CONTESTS

Sir—While I in no way doubt the sincerity of the views expressed by G3LP on the subject of contests, I do feel that he is grossly overstating his case. It is true that most weekends will bring at least one contest, but only a few major events can really be said to produce large numbers of participating stations. Even during such popular contests as CQ WW DX, the activity is, by definition, limited to certain parts of the spectrum, a cw contest leaving the phone end clear, and vice-versa, not to mention the natural grouping of contest exchanges into a relatively narrow band of frequencies. To give an example, during the busiest cw contests on 3·5MHz it is unusual to hear any contest stations calling above about 3,530kHz, which leaves 70kHz of the cw allocation alone free for other users.

As regards the object of a contest, surely that is for each individual to define for himself. Personally, I use them to maintain my cw speed and to work new countries etc, many of which seem only to emerge during such events (just this last weekend I received 5NN from an EA9, an area I had never even heard before) rather than to send in an actual contest entry, although I do not wish to decry those many enthusiasts who do enter to win.

Finally, the tongue-in-cheek part about no actual QSOs taking place and people just sending their callsigns is maybe just a little too near the truth for those who will proudly claim a "contact" with W5LFL in the space shuttle.

Les Allwood, G3VQO

THE MATHEMATICS OF MULTIPLE-CHOICE PASS MARKS

Sir—The letter by Mr Colin Smith which appeared in your November issue raises a number of interesting points regarding the probability distribution of the number of correct answers in a multiple-choice examination paper. As he correctly observes, if each question has four alternative answers, and there are a hundred questions on the paper, the number of correct answers gained by a candidate who is "purely guessing" will have a binomial probability distribution with parameters $n = 100$ and $p = 0{\cdot}25$. The probability that such a candidate will gain a mark of 50 per cent or more is then correctly given by the expression which Mr Smith stated in his letter. However, although this expression is very cumbersome to evaluate numerically, a perfectly adequate simple approximation can be obtained by using the normal approximation of the binomial distribution (with or without a continuity correction) and merely requires the proverbial back of an envelope and set of tables of the normal distribution. (One hardly requires even the computing power of a ZX81!).

Using the above approach, the number of correct answers will have an approximate normal distribution with mean $np = 25$, and standard deviation $\sqrt{(np(1-p))} = 4{\cdot}33$. The probability of a mark of 50 per cent or more is then given by $[1 - \phi"(5{\cdot}77)]$ where ϕ denotes the cumulative distribution function of the standardized normal distribution. The corresponding value of ϕ may be obtained from standard tables, and the required probability turns out to be approximately 10^{-8} (ie 1 in 100 million).

M. B. Priestley, G1BWN

Dr Priestley is professor at the department of mathematics of UoMIST.

THE RSGB AND THE SHUTTLE

THERE IS LITTLE DOUBT that Dr Owen Garriott's operation from the space shuttle *Columbia* aroused more interest among amateurs and the media than any other recent amateur radio event. RSGB recognized well in advance the importance of this operation, and saw its role in two main areas: getting good information to amateurs who wished to hear and work W5LFL, and making sure that we took full advantage of the very positive interest of the media. The following is a brief description of what was done and the results.

Getting information to amateurs

A most important part of the Society's task during the shuttle flight was to ensure that amateurs were kept as fully informed as possible about the times, frequencies and other factors necessary for successful contact with the spacecraft. The initial information was obtained from NASA itself via the ARRL, both of whom the Society wishes to thank for their help throughout the mission. It is worth noting that the Society was instrumental in securing some modifications to W5LFL's proposed operating frequencies: those originally proposed, and available on W5LFL's equipment, were not compatible with the IARU Region 1 band plan. The final outcome was the use of 145·55MHz, Ch S22, as the downlink, with a selection of possible uplink frequencies which were at least workable even if they bore only a passing resemblance to the established Region 1 band plan!

The full planned operating procedure, including frequencies to be used, was given substantial publicity via *Radio Communication*, GB2RS, the Headline News Service, and by letter to those who specifically asked for the information. A final summary was given to members via the *RSGB News Bulletin* which appeared for the first time with the December 1983 issue of *Radio Communication*. The actual times when W5LFL planned to be operating within range of the UK were received too late to be given in written form, and GB2RS and the Headline News Service were used.

In the event, the postponement of the flight, for 28 days, invalidated the times for operation, and NASA had to re-calculate this data based on Dr Garriott's work pattern and the attitude of the spacecraft, so it was a question of starting from scratch again. In this, data from NASA augmented by a real-time computer program supplied by AMSAT-UK, was used to predict the times when the shuttle would be visible from the UK, although whether W5LFL would be actually operational was not and could not be known.

The postponement of the mission also meant that the main method for passing information during the flight had to be via a series of special GB2RS news broadcasts which were transmitted from RSGB HQ at 1700gmt on most evenings of the flight and at 1300gmt on the Sunday. The latter broadcast also included beam headings for each pass and a complete resume of the techniques which would be required to contact W5LFL. The broadcasts initially were made on three frequencies simultaneously: 3,650 and 7,048kHz (lsb), and 145·525MHz (fm); later in the flight a fourth frequency, 144·250MHz (usb), was added.

Producing up-to-date data and broadcasting it on this schedule proved quite demanding, especially with the relatively new HQ station. It is not surprising that there were some minor technical problems which were overcome during the first few days of the flight—in this, the reports and assistance of listeners proved invaluable. From the outset the intention was to make the very latest information available to as many listeners as possible. To judge from the reports received after the transmissions, these aims were largely achieved, within the limits of propagation and QRM. It was noted that the European audience increased dramatically each day: it appears that the RSGB was the only society in Europe which made a concerted effort to keep its members informed at this level. In fact, some eight members of staff were involved with the collection and dissemination of information as well as the operation of GB2RS and computer tracking.

Media coverage

In one way or another, media coverage of the shuttle flight was the most extensive of any event with an amateur radio flavour which has taken place in recent years. It illustrated the contention made in the 1982-3 Annual Review that, while amateur radio is not within itself always particularly newsworthy, it can receive a high degree of media interest when associated with other events. In taking advantage of this, press releases were sent to all broadcasting stations and national newspapers in the UK well in advance.

At the local level, a very deliberate effort was made to involve local amateur clubs and representatives. To this end an information package of press material relevant to the flight was produced and sent to **all** affiliated amateur radio clubs and societies for their own use in conjunction with local newspapers and radio stations. To judge from the volume of press cuttings received at headquarters, and telephone calls with requests for interviews and other material, many clubs and their members became the focal point of provincial newspaper interest, and some lengthy and detailed articles appeared in the press. A few of the many examples are illustrated. In this literature, the Society had made a point of stressing that amateur radio and cb radio were quite different, and it was gratifying to note that many newspapers picked up this point: in a few cases part of the Society's briefing material was reproduced verbatim and, for once, virtually all the published information about the hobby was correct.

It is hoped that the obvious success of this operation will have given clubs the confidence and experience necessary for dealing with the local media, and that they will now feel more able to use their initiative to generate their own material. This certainly was one of the intentions of the exercise.

Headquarters concentrated its efforts on the national radio and television networks, and offered facilities for film (eng) crews and sound recordists to gather material "live" at the new headquarters station, GB3RS, for later use. During the first few days of the shuttle flight, headquarters staff gave live interviews to the two London ilr stations, and telephone interviews to a multitude of other local radio stations: a piece was also recorded for Radio 4's "The World at One". Several of the vernacular language services of the BBC External Service obtained material from headquarters for translation, and the prestigious BBC World Service programmes "Science in Action" and "Outlook" carried an outline of the amateur radio aspects of the flight.

From the television point of view, the coverage was good. The Friday edition of the BBC tv programme "Sixty Minutes" carried a 6min item on the shuttle flight and the RSGB's news service to members, at 6.17pm—prime viewing time—which had been recorded earlier in the day. To judge from the feedback received, this was seen by a large number of people. BBC Television News visited headquarters on the Sunday, in conjunction with BBC Radio 1 and newspaper reporters, and it was hoped that a solid contact with the shuttle might take place during a pass on that day. W5LFL was heard during the pass just after 3pm, and actuality from this was featured on the BBC1 and BBC2 news programmes on the Sunday evening. Unfortunately, there was a certain amount of poor operating and jamming during the pass, and a news story in the next day's *Evening Standard* led with this feature of the shuttle flight instead of the fact that signals from the spacecraft had actually been received. There is no obvious or easy solution to the tiny minority of radio vandals who plague our airwaves. The new Telecommunications Bill may well assist, along with other measures being discussed at present. It is cold comfort to know that the vocal minority made themselves heard around the world. "Sixty Minutes" visited headquarters on the next day, the Monday, and another recorded item was broadcast during the evening of that day. Here again, strong clear signals were received from the spacecraft and, although a firm contact did not take place, the Society was able to publicise its activities to a very wide audience.

The final media interest came from the British Forces Broadcasting Service, and an interview as the guest of the well-known disc-jockey Tommy Vance took place in an edition of their main magazine programme. BFBS conservatively estimate their audience as 20 million worldwide, and the Society was pleased to break this fresh ground. National newspapers also carried the essentials of the story from the amateur radio point of view, although not surprisingly, the contact between RSGB member His Majesty King Hussein I of Jordan, JY1, and W5LFL received most emphasis. In all, the publicity gained for amateur radio and for the Society was considerable and constructive: it is hoped that the credibility and creative potential of the hobby have been made known to a wide public audience as a result. Amateur radio clubs and societies in particular should derive considerable benefit from the shuttle flight.

It is understood that NASA is very pleased with the response to the flight. We hope this means that it will consider repeating the operation, taking advantage of the many lessons learned from the STS9 mission. □

Radio enthusiasts will try to contact space shuttle Columbia

THREE Inverclyde amateur radio e... hoping to...

Greenock Telegraph

Hello Space Shuttle, Retford calling

AMATEUR radio enthusiasts in ... will be glued to ... to contact the American ...ce

Retford & Gainsborough Times

Astronaut's royal chat — 135 miles above Jordan

A SPACE shuttle ... above the Middle ... chatted to King Hussein of Jordan, a

The Yorkshire Post

Astronaut may speak to radio 'hams'

...MATEUR radio ...nthusiasts in Mid-...heshire will be ...ying over the next ...w days to speak ...rectly to the ...ce shuttle ...umbia as it ...ts the earth at a ...ght of 250 ...metres.

the Mid-Cheshire Amateur Radio Society will be able to call him will be on Sunday, December 4.

It will be the first time that an astronaut has been able to speak to "ordinary" people on the ground directly from space.

be the most prestigious entry any local "hams" can enter in their log-books.

Although it will be reasonably easy to hear ... are faced with a ...

featured in the World in January of this year, specialises in satellite communications.

Northwich World

Hams in contact with astronaut

MEMBERS of a North Wales radio ham club felt really spaced out this weekend.

For at least half a dozen made contact with the U.S. space shuttle as it flew over Europe, 250 miles above the earth's surface.

As thousands of radio ham enthusiasts from all over Britain fought to reach astronaut Owen Garriott, the Wrexham contingent had the advantage of the shuttle flying almost directly above the town.

"The lads heard the message from the astronaut saying he was ove... thing calls were going to ...

Liverpool Daily Post

Hams get shuttle timetable

By Maev-Ann Wren

IRISH RADIO amateurs tuned in for news of the ... broadcast by an...

The Irish Times

Hams to try space shuttle link-up

A dozen radio hams i... Shropshire ... the ...

Shrewsbury Chronicle

Suffolk link-up with space shuttle

SCORES of eager Suffolk radio hams have made a ... with the ...

signals," said Mr. Malcolm Appleby chairman of Martlesham Radio ...

earlier messages would be acknowledged, but the crew had probably been amazed by the sheer volume of callers.

... probably ...

answer them when they return home," he said.

The craft will be returning by the end of the week and now the rad... waiting for ...

Evening Star

'This is Colombia calling Loughborough'

LOCAL radio hams will be trying to make contact with the American space sh... sc... earth at the end of next month.

experiment Dr. Garriott will be attempting to make contact with some of the 1.5 million radio amateurs in th... ...bers ...roug... hop... as i... eeds ... at ... l ... ac...

eight minutes and the Falcons are hoping that during that time one of the members' call ...

mission, the amateurs regard this as something of a feather in their cap.

To transmit, the radio hams are ...

Loughborough Echo

Tuning into the Shuttle

THOUSANDS OF radio amateurs throughout South Wales will be hoping to make contact with an extra-terrestrial fellow enthusiast next ...

South Wales Echo

RADIO HAMS HOPING TO CALL COLUMBIA

A GROUP of Tavistock amateur radio operators will be grouped round their set early on Sunday morning hoping to make an historic contact with the American Space Shuttle Columbia.

They are members of Kelly College Amateur Radio Society — call sign G4COF — who will be trying to call astronaut Dr. Owen Garriott.

He is one of the six astronauts aboard Columbia which made a spectacular launch from Cape Canaveral on Monday.

Dr. Owen was given ...

By PAT MURRAY

attempt to contact the space shuttle first on Sunday morning, and again on Monday ...

Tavistock Times

Columbia is loud and clear

ALTHOUGH Loscoe radio ham Keith Waters was able to hear transmission from the US Space Shuttle Columbia yesterday he was unable to talk ...

Dr ...

Derby Evening Telegraph

A simple way to design NARROWBAND INTERDIGITAL FILTERS

by
Ian White
G3SEK*

Ian White is a self-confessed vhf/uhf dxer. There is no known cure for this condition, a side-effect of which is an interest in any related technical aspect of amateur radio. He has been a member of the VHF Contests and VHF committees, and for a time was VHF manager. When the bands are closed and the moon is not up, he enjoys writing (hence this article), being secretary of the Vale of White Horse ARS, and being musician for the Abingdon Traditional Morris Dancers.

HERE IS a simple way to design high-quality bandpass filters for vhf, uhf or microwaves, to your own requirements. Compared with the old-fashioned "high-Q-break" using a single sharply-tuned circuit, filters using multiple tuned circuits have flatter passbands (ie less critical tuning), steeper skirts and better attenuation in the stopband. Filters of this type are reputed to be difficult to design and to build, but this article will show how easily it can be done, using nothing more exotic than a scientific calculator and a drill-press.

Fig 1 shows the layout of an "interdigital" filter using four tuned circuits. The tuned circuits or "resonators" take the form of rods which are almost a quarter-wavelength ($\lambda/4$) long. Alternate resonators are mounted on opposite sides of the box, like interlinked fingers of opposite hands (which is why filters of this type are called "interdigital"). The minimum number of resonators for an interdigital filter is two, and this article gives design data for filters with two, three or four resonators.

Although interdigital filters can be designed with extremely wide and flat passbands, the calculations are difficult and the component dimensions required are very odd; this is why such filters are reputed to be "too hard" for radio amateurs. But for amateur radio purposes we seldom need bandwidths of more than a few per cent of the centre frequency, and we are usually prepared to tolerate some other deviations from theoretical perfection. The design and construction of interdigital filters then becomes quite simple. A few minutes' work with a calculator provides all the dimensions for a filter to your own requirements, and all the components are made from standard sizes of round rod, rectangular bar and flat sheet. No difficult machining is involved: the "special" dimensions which determine the performance of the filter are achieved simply by drilling a few holes in the right places along a straight line.

The design procedure in this article was first described by M. Dishal of ITT Federal Labs in 1965 [1]. Dishal realized that the design of interdigital filters can be simplified if very wide bandwidths are not required and if some lapses from theoretical perfection can be accepted. For amateur radio purposes that is a fair trade-off. This article follows Dishal's method but leaves out his justifications for the simplifications, so it would be advisable to read [1] before departing from the design procedure given here.

Choosing a filter

The whole design procedure is summarized in the box on page 122, and the best way to understand it is to work through an example.

The first step in any design procedure is to decide what you want. This example shows how to design a filter for the output of a 28–432MHz transverter: let us say that the 404MHz local oscillator feedthrough is to be attenuated by an extra 40dB, and the passband must be flat (within about 1dB) across the whole band from 432 to 438MHz. In amateur radio exact specifications such as these are largely a matter of personal choice: for example, you might decide to relax the attenuation specification by a few decibels if the paper design study suggested that the filter might then be easier to build.

The centre frequency of the filter is 435MHz. For this design procedure the bandwidth has to be specified at the −3dB points, so try setting them at ±8MHz, ie at 427 and 443MHz (see later). The fractional bandwidth w is defined as:

$$w = (-3\text{dB bandwidth})/(\text{centre frequency})$$

In this case $w = (2 \times 8\text{MHz})/(435\text{MHz}) = 0{\cdot}0368$. This is about the right order of fractional bandwidth for Dishal's design procedure: the simplifying approximations remain valid for fractional bandwidths up to about 0·1, and the effects of losses and constructional imperfections become very marked at fractional bandwidths less than about 0·01.

The −40dB bandwidth is $2 \times (435-404)\text{MHz} = 62\text{MHz}$, and since the −3dB bandwidth is $2 \times 8\text{MHz} = 16\text{MHz}$, the (−40dB/−3dB) shape factor of the filter is the ratio of the respective bandwidths: 3·875.

Now look at Fig 2, which shows stopband attenuation as a function of shape factor [2]. Fig 2 is for perfect Butterworth [3] filters with no component losses, and shows that filters with more resonators give better stopband attenuation (although of course they involve more mechanical work). In the present worked example a filter with only two or three resonators cannot meet the shape/attenuation specification of 3·875 at −40dB, but four resonators can.

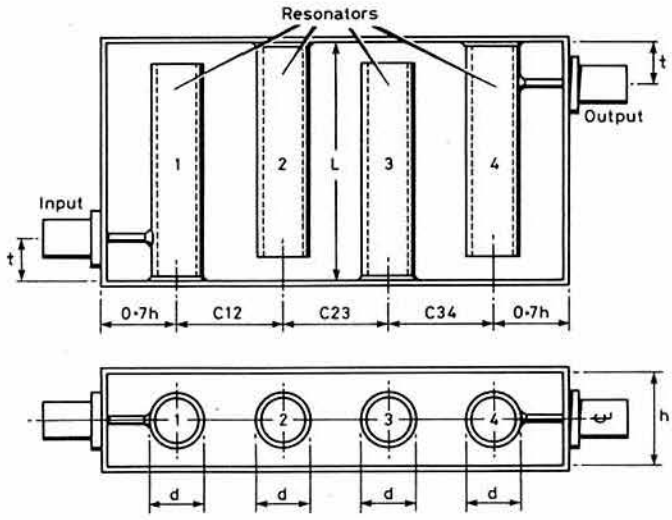


Fig 1. Four-resonator interdigital filter

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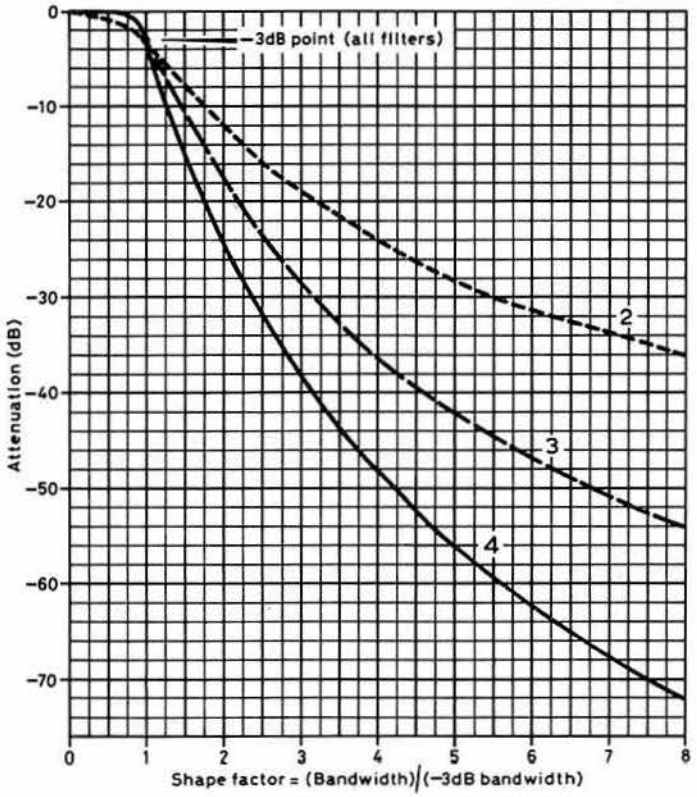


Fig. 2. Responses of lossless Butterworth filters with 2, 3 and 4 resonators

Fig 2 is for perfect filters, and a real filter will have poorer stopband attenuation, greater inband insertion loss, and more rounded shoulders to its passband. How closely the finished filter will approach theoretical perfection depends very much on the care taken in construction; and if any of the above factors is critical in your particular application, now is the time to review the tentative specifications of bandwidth and shape factor. For example, a flatter passband could be achieved by widening the design bandwidth, though only at the expense of stopband attenuation. This in turn could be improved by using more resonators, but then the insertion loss would increase. Thus it is important to have a clear idea of what you really need from the filter, and be prepared to compromise on the less essential features.

Ks and Qs

The four resonators are arranged as shown in Fig 1, and are numbered 1-4. The desired frequency response will be created by controlling the coupling coefficients between adjacent resonators (K12 between resonators 1 and 2; K23; and K34), and by controlling the loaded Qs of resonators 1 and 4.

Table 1 gives the coupling coefficients and resonator Qs for two-, three- and four-resonator filters [2]. There are three things to note about the values in Table 1. First, all the filters are symmetrical: values for the first resonator are the same as those for the last, and so on. Second, only the first and last resonators have loaded Qs less than infinity. Finally, Table 1 does not directly give values for Ks and Qs, for these will depend on the selected fractional bandwidth w; instead Table 1 gives "universal" values called "k" and "q". To obtain the required values of the Ks and Qs, multiply the k values by w, and divide the qs by w. In this example:

K12 = K34 = 0·840 × 0·0368 = 0·0309
K23 = 0·542 × 0·0368 = 0·0199
Q1 = Q4 = 0·766/0·0368 = 20·82
Q2 = Q3 = infinity

Dimensions

Leaving the calculator aside for a moment, think ahead to the construction stage. The filter consists of the resonators and the containing box. Brass or copper are the best materials, and you can design the filter to be made from stock sizes of rod and bar. All the resonators are made from plain round rod of the same diameter d (Fig 1). The side and end walls of the box are made from rectangular bar, the width of which determines the internal

Table 1. Design data for filters with two, three and four resonators

No of resonators	Two	Three	Four
q1	1·414	1·000	0·766
q2	1·414	Infinity	Infinity
q3	—	1·000	Infinity
q4	—	—	0·766
k12	0·707	0·707	0·840
k23	—	0·707	0·542
k34	—	—	0·840

height h of the box. Within reasonably wide limits the actual values of d and h do not matter: the important thing is the ratio between the two. Rods of 9·52mm (0·375in) diameter and 19·5mm (0·75in) wide bar are often convenient sizes, and will be used in this example. The ratio d/h (Fig 1) is thus 0·50.

Remember that you are not restricted to having to use those particular dimensions, or even that d/h ratio. The beauty of Dishal's design procedure is that you can build a filter to the same performance specification from a wide range of material sizes, because the formulas below let you work out the dimensions according to the performance you want and the materials you wish to use.

Spacings

The spacing c required to achieve a coupling coefficient K between two round resonators in an interdigital filter is given by the formula:

$$c = [0{\cdot}91\ (d/h) - \log K - 0{\cdot}048]h/1{\cdot}37$$

which is easy enough to work out on a scientific calculator. In this example, c12 = c34 = 26·7mm, and c23 = 29·4mm.

Unlike some types of interdigital filter, this design has to have end walls, and the spacing from the centres of resonators 1 and 4 to the end walls must be 0·7h; in this case 13·4mm. The total length of each side bar is thus:

$$0{\cdot}70h + c12 + c23 + c34 + 0{\cdot}70h = 109{\cdot}5\text{mm}.$$

Mark out all the resonator locations and the total length along the *centre-line* of one bar, as accurately as you can. Clamp the two bars together and drill pilot holes square through all the locations in both bars. Face off the ends of the bars to make an identical pair, and open out the holes to appropriate sizes for resonator retaining screws or for tuning screws.

Rods and tuning screws

The inside width of the box is approximately λ/4 at the centre frequency, ie 172mm at 435MHz, although this is not a critical dimension. In many designs the resonators are themselves almost λ/4 long and are fixed-tuned by their capacitance to the opposite sidewall. This makes it difficult to estimate the correct lengths, and for one-off filters it is easier to deliberately cut the resonators a little short and adjust them to resonance using capacitive tuning screws. At microwave frequencies the resonators can be as short as 0·90 (λ/4), but at uhf the tuning range of a screw is limited so the 435MHz resonators should be cut to 0·95 (λ/4), ie 164mm. Minor errors in resonator lengths can be "tuned out" by the screws, and the whole response of the filter can be shifted several megahertz if necessary.

End walls and matching

The presence of the end walls makes resonators 1 and 4 look like "trough-lines" whose impedance Z is given by:

$$Z = 138 \log(1{\cdot}25h/d)$$

For a d/h ratio of 0·5, Z is 55Ω. Input/output matching is a simple matter of tapping up the line at the right place. The height t of the input and output taps on resonators 1 and 4 (Fig 1) depends on the impedance R of the external system (usually 50Ω) and the loaded Q already calculated from Table 1. t is given by the formula:

$$t = (L/90)\arcsin\sqrt{R\pi/4ZQ}$$

assuming your calculator works in degrees and not radians. The length L in this formula should be the electrical rather than the mechanical length of the resonators, ie λ/4. Substituting the figures for the design example into the formula gives:

$$t = (172/90)\arcsin\sqrt{50\pi/(4 \times 55 \times 20{\cdot}83)} = 20{\cdot}4\text{mm}$$

Final assembly

So now you have all the dimensions and can start assembling the filter. Fig 3 gives some suggestions for constructional methods. The top and bottom covers should be flat and rigid, and can be made of sheet brass or copper, or even copper-clad printed-circuit board with external stiffening. *Make sure that everything goes together symmetrical, square and parallel* because this affects the Qs of the resonators and the overall performance of the filter. At lower frequencies (including 435MHz) the resonators may need

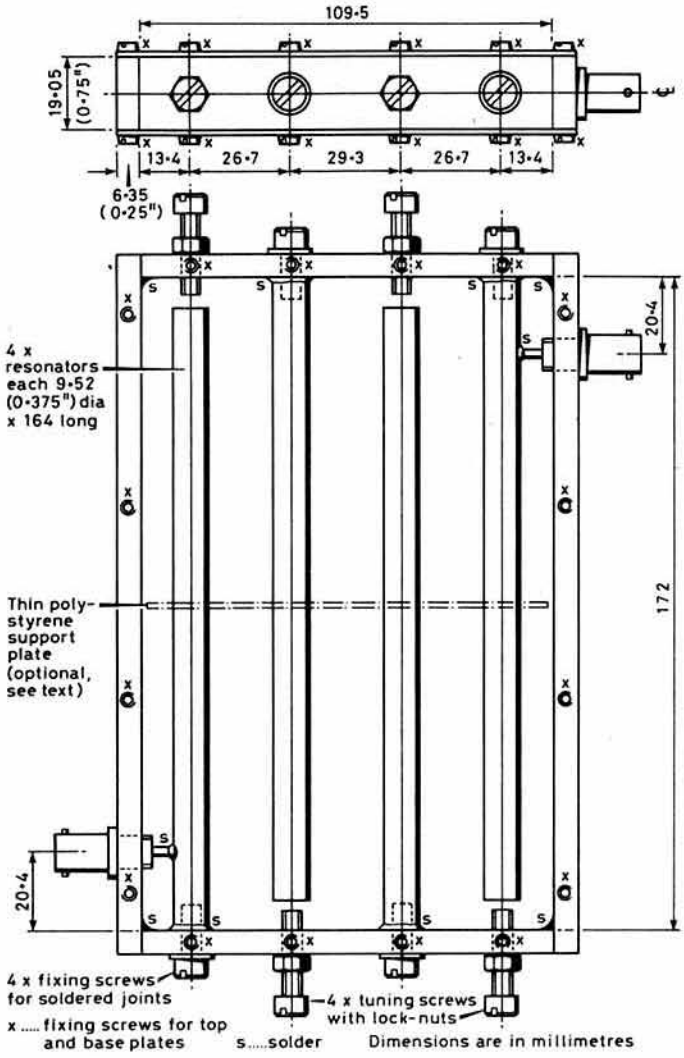


Fig 3. Final dimensions and suggestions for construction of the filter in the worked example

some additional support; this can be provided by a thin plate of low-loss material such as polystyrene, accurately drilled for pilot holes at the same time as the two side bars. The plate should be at the mid-points of the resonators (Fig 3) and not at the free ends where dielectric losses would be greater.

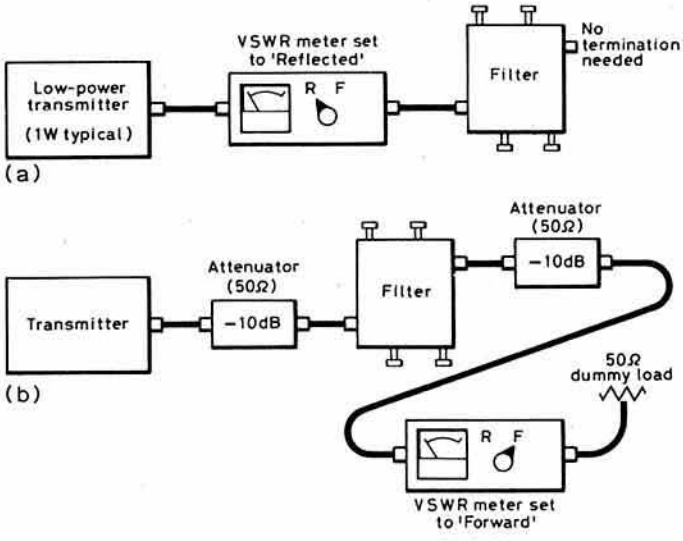


Fig 4. (a) Preliminary alignment. (b) Final alignment

SUMMARY OF DESIGN PROCEDURE

1. Choose the centre frequency and −3dB frequencies, and calculate the fractional bandwidth w.
2. Choose the required stopband performance (attenuation versus frequency).
3. Find the number of resonators required, using Fig 2. If necessary, repeat steps 1 and 2.
4. Look up the ks and qs in Table 1, and calculate the Ks and Qs.
5. Choose the rod diameter d and wall height h.
6. Calculate all spacings c along the side bars.
7. Length L is λ/4. Choose the resonator length in the range 0·95L (uhf) to 0·90L (microwaves).
8. Calculate the position t of the input and output tapping points.
9. Build the filter and tune it up.

The joints between the resonators and the side bars *must* be square and solid. A lathe would be useful to face-off the end of each rod and to drill and tap it for a retaining screw, but the job can be done by hand. RF currents flow across the joints between the rods and the side bars, and any losses here can seriously degrade the Qs of the resonators, so tighten each rod squarely against the bar. Ideally the joints should be silver-soldered for the lowest losses; possibly the next best alternative is to make the ends of the resonators slightly concave, leaving a sharp outer ring which bites into the side bars when the joint is drawn up tight. Otherwise the joint can be soft-soldered, but on no account should it be left as a plain butt joint. It is also important to use plenty of screws for the top and bottom covers, especially above and below the fixing points for the resonators, and 6·35mm (0·25in) is a convenient thickness for ease of drilling and tapping the side and end bars. When you are completely happy [4] with the filter you could silver-plate and polish it for a closer approach to theoretical perfection.

Tune-up

If you connect the newly-built selective filter into circuit and feed a signal into it at the passband frequency, the chances of seeing any output at the other side are zero! All the tuning screws must be quite close to their final settings before you can see enough output to peak everything up. Dishal offers a clever way of completely aligning the filter using a slotted line (or nowadays a network analyser), so if you have access to such equipment then read [1] and go to it.

Lacking a slotted line or a network analyser, the filter can still be aligned quite well with the aid of an ordinary vswr meter. Connect the meter as shown in Fig 4(a), and short all resonators except No 1 by running their tuning screws fully in. With the vswr meter set to "reflected", carefully adjust tuning screw No 1 until the meter needle flickers, and lock the screw at that point. Now do the same with tuning screw No 2. At this stage you can either proceed through to Nos 3 and 4, or reverse the filter and tune 4 followed by 3. The entire filter is now close to resonance, and you should be able to detect a signal through it.

Place the filter between 50Ω attenuator pads (Fig 4(b)) to establish the correct source and load impedances, and complete the alignment. Being a symmetrical Butterworth design, the filter should have the correct response when simply peaked at the centre frequency, and should also have a low in-band insertion swr. It is hard to avoid the temptation to re-peak the filter after installation, but if excessive retuning is required the fault may lie in incorrect source and terminating impedances elsewhere in the system.

Having followed this design procedure, you should now have an interdigital filter with passband and stopband characteristics close to those *you* wanted.

References and notes

[1] "A simple design procedure for small percentage bandwidth round-rod interdigital filters." M. Dishal, *IEEE Trans*, vol MTT-13, September 1965, pp696–8.

[2] *Reference Data for Radio Engineers.* ITT/Sams, various editions. ISBN 0-672-21218-8.

[3] Fig 2 and Table 1 are for Butterworth filters because these are the easiest to align using minimal test equipment. The insertion loss and vswr of the Butterworth filter are always lowest in the middle of the passband, so simply peaking the response at that frequency should ensure nearly correct alignment.

[4] Of course, a real experimenter is never completely happy with *anything* he builds. Like all true works of art, his projects are never finished, but merely abandoned or re-used. And that is why there is no photograph of the completed filter: it was designed and built, did its job while it was needed, and then was re-absorbed into the junk box! □

Computing the beam patterns from phased vertical antennas

by A. R. Churchley, G4EAQ*

A. R. Churchley, BSc, PhD, MinstE, MIInfSc, FSaRS, FIDiagE, CEng, G4EAQ

Andrew Churchley graduated in fuel technology and chemical engineering at Sheffield University in 1967, and went on to research into oscillating combustion in cylindrical cavities. He is at present the manager of Safety Availability and Reliability Assessments (SARA) Ltd. His profession takes him into diverse fields: the nuclear, offshore, electrical, chemical, mining and avionics industries.

He enjoys working the hf bands, and antenna experimentation. He is married with two sons.

OVER THE DECADES there has been a small but steady stream of amateur radio literature on phased vertical arrays, particular interest being centred in placing nulls on a source of noise to enable reception of a wanted signal coming from another direction. Used in this way, the phased vertical array can be extremely effective, even though its performance as a beam-forming transmitting antenna might be considered poor (there can be many side lobes, coupled with a poor front-to-back ratio if only a few elements are used).

Ways to visualize the beams produced by vertical antennas include the ripple tank with stroboscopic illumination, and the tedious hand-plotting of many regularly-spaced concentric circles. Mathematical methods can be used, but just in case this is not your cup of tea, you may like to plot out the beam patterns on the home computer; it is really rather easy.

The program is written for the ZX81 and also works on the ZX80 with 8k Basic rom. The 16k ram pack is used. With this equipment, a wide range of beam patterns can be plotted on the tv screen, and if you have the ZX printer (not essential to use the program) a permanent record can be made.

How the program works

The program is intended to show a plan view of the wavefronts radiating outwards from one or more vertical antennas, frozen in an instant of time. the first response required by the computer program (Fig 1) is how many antennas are to be plotted (A). The separation of the antennas expressed in quarter wavelengths is next requested (Q). If the antennas are fed in phase, the program skips to line 600 and sets the phase constant for each antenna (P1, P2, P3 etc) to unity.

If the response to line 70 is "N" for no, then the antennas are not fed in phase, and program control passes to line 150. Line 140 is a "mug trap" which causes the question (line 70) to be repeated if anything other than "Y" or "N" is input. Continuing from line 150, the phasing of each feed is requested (P1, P2, P3 etc). This is given in multiples of λ/4, a rather coarse scale, chosen because of the comparitively low definition of the PLOT function of the ZX81.

From line 300 to 350 the computer plots the centres of the antennas in a straight line in the middle of the screen. (These centres will be overwritten subsequently, but can be used as a check that the program is working correctly when in SLOW mode.)

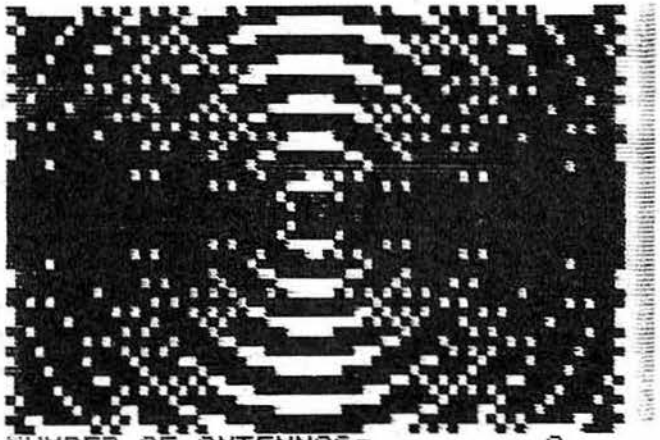
At line 400 the core of the program starts. Subroutine 1000 plots circles around the centres of the antennas and is called A times. The first circle plotted by subroutine 1000 is at the phase radius and is plotted twice. This double plotting thickens the wavefront so that a complete cycle contains two white and two black circles—giving a bold effect and a wavelength of four PLOT pixels. The M variable is used to achieve this effect.

After the first double circle is plotted, the radius R is increased in steps

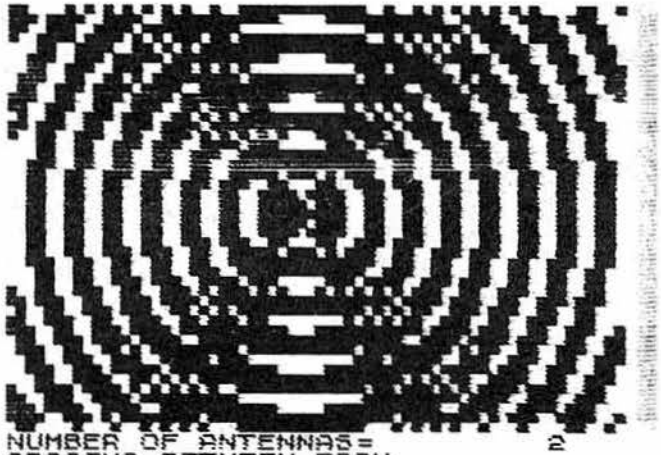
*46 Birchdale Road, Appleton, Warrington, Cheshire.

```
  10 PRINT "HOW MANY ANTENNAS?
       ";
  20 INPUT A
  30 PRINT A
  40 PRINT ,,"STATE ANTENNA SEPA
RATION IN     QUARTER WAVELENGTH
S          ";
  50 INPUT Q
  60 PRINT Q
  70 PRINT ,,"ARE ALL ANTENNAS F
ED IN PHASE?  (ANSWER Y OR N)
          ";
  80 INPUT X$
  90 PRINT X$
 100 DIM P(A)
 110 PAUSE 50
 120 CLS
 130 IF X$="Y" THEN GOTO 500
 140 IF X$<>"N" THEN GOTO 70
 150 REM ■■■■INPUT PHASES■■■■
 160 FOR N=1 TO A
 170 PRINT ,,"INPUT THE PHASE AT
 ANTENNA ";N;" IN TERMS OF A WHO
LE NUMBER OF      QUARTER WAVELE
NGTHS"
 180 INPUT P(N)
 190 CLS
 200 NEXT N
 300 REM ■■■ ANTENNA CENTRES ■■■
 310 DIM X(A)
 320 FOR N=1 TO A
 330 LET X(N)=INT (32-A*Q/2)+Q*(
N-1)
 340 PLOT X(N),22
 350 NEXT N
 400 REM ■PLOT AND DATA CONTROL■
 410 FOR N=1 TO A
 420 GOSUB 1000
 430 NEXT N
 440 COPY
 450 INPUT A$
 460 CLS
 470 PRINT "NUMBER OF ANTENNAS="
;TAB 28;A;TAB 32;"SPACING BETWEE
N EACH";TAB 32;"IN QUARTER WAVEL
ENGTHS=";TAB 26;Q;TAB 32
 480 PRINT "PHASE RELATIONSHIPS ;
";TAB 32
 490 FOR N=1 TO A
 500 PRINT "PHASE AT ANTENNA ";N
;" = ";P(N)
 510 NEXT N
 520 COPY
 530 STOP
 600 REM ■■ ANTENNAS IN PHASE ■■
 610 FOR N=1 TO A
 620 LET P(N)=1
 630 NEXT N
 640 GOTO 300
1000 REM ■■■ CIRCLE PLOTTER ■■■
1010 LET XN=X(N)
1020 FOR M=P(N) TO 40 STEP 4
1030 FOR R=M TO M+1
1040 FOR T=0 TO 6*R
1050 LET T2=PI*T/(3*R)
1060 LET X=XN+R*COS T2
1070 IF X<0 OR X>53 THEN GOTO 11
00
1080 LET Y=22+R*SIN T2
1090 IF Y>=0 AND Y<=43 THEN PLOT
 X,Y
1100 NEXT T
1110 NEXT R
1120 NEXT N
1130 RETURN
```

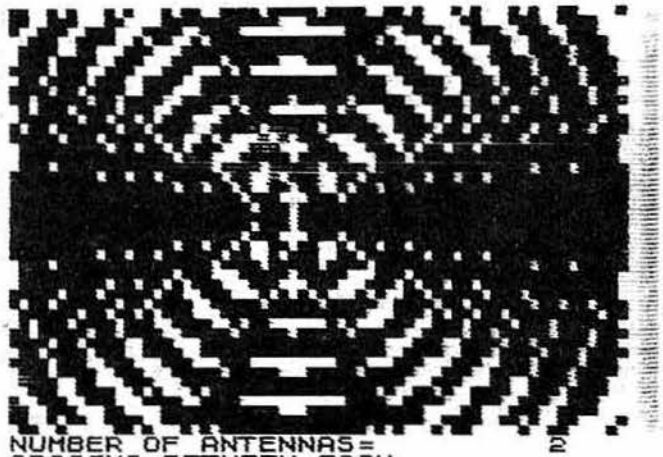
Fig 1. The computer program



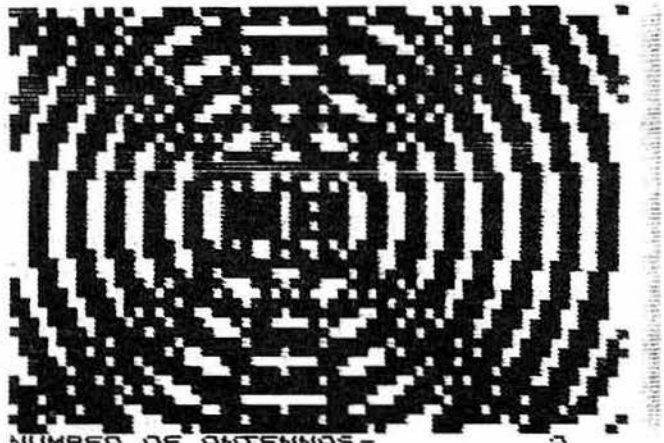
(a)



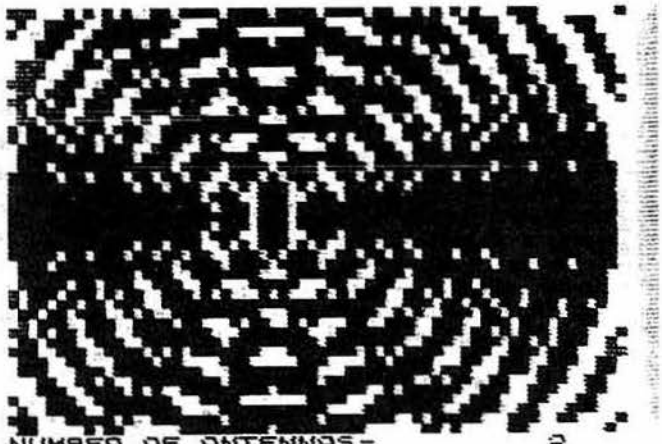
(b)



(c)



(d)



(e)

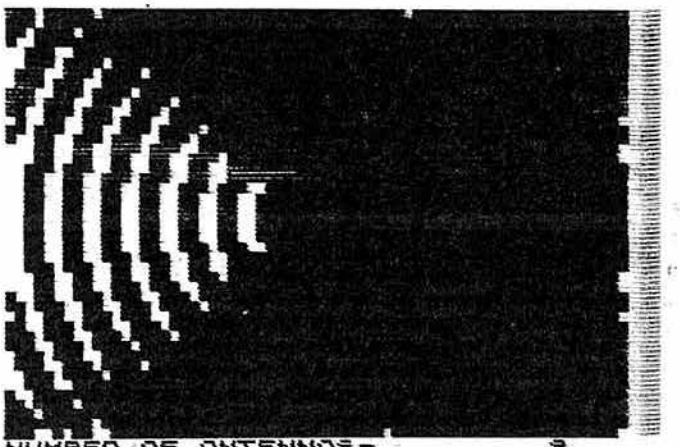
Fig 2. Patterns produced by a pair of vertical monopoles, fed in phase, with spacings of 0·5, 1, 1·5, 2 and 2·5 wavelengths, (a) to (e), between the antennas

of four units (line 1020), corresponding to one wavelength, and further circles are plotted. The outer circles would plot , at least over some of their circumference "off the the screen". Lines 1070 and 1090 detect the excessive X or Y values when they occur, and cause an unconditional jump to 1100 which sets the next "angle" parameter (T = theta). This speeds up the program somewhat.

Line 1040 is worthy of mention; it causes the radius vector to sweep through a total number of points which is numerically equal to six times the radius of each wavefront. This economises in the number of points calculated for smaller circles, while ensuring a good density of points around the largest circle. When all circles are plotted (and it will take a long time if you use the computer in SLOW mode) control is returned to line 440 which copies the screen to the ZX printer. If you don't have a printer you might like to try photographing the screen with a close-up lens and, possibly, an old camera if you possess one, using a slow shutter speed. The program will halt at line 450. Pressing any key erases the screen and prints out a record of the number, phase and spacing of the antennas. Some results obtained are now discussed.

Results from the beam patterns plotted

Fig 2 shows the patterns produced by a pair of vertical monopoles, fed in phase, with various spacings between the antennas. The beam patterns for Figs 2(a) to (e) are the result of spacings of 0·5, 1, 1·5, 2 and 2·5 wavelengths.

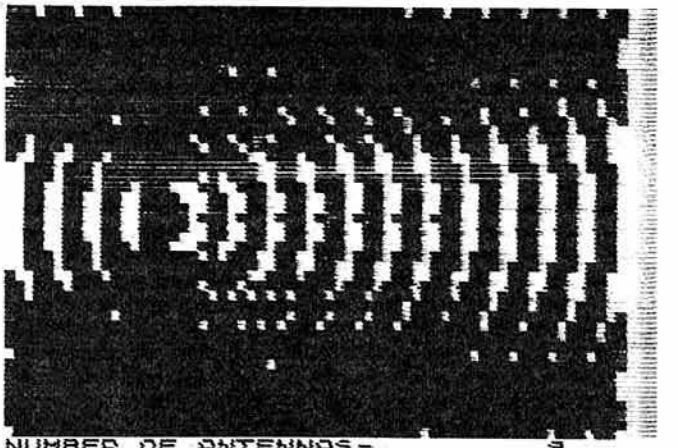


```
NUMBER OF ANTENNAS=          8
SPACING BETWEEN EACH
IN QUARTER WAVELENGTHS=      1

PHASE RELATIONSHIPS:

PHASE AT ANTENNA 1 = 1
PHASE AT ANTENNA 2 = 2
PHASE AT ANTENNA 3 = 3
PHASE AT ANTENNA 4 = 4
PHASE AT ANTENNA 5 = 5
PHASE AT ANTENNA 6 = 6
PHASE AT ANTENNA 7 = 7
PHASE AT ANTENNA 8 = 8
```

(a)



```
NUMBER OF ANTENNAS=          8
SPACING BETWEEN EACH
IN QUARTER WAVELENGTHS=      4

PHASE RELATIONSHIPS:

PHASE AT ANTENNA 1 = 1
PHASE AT ANTENNA 2 = 5
PHASE AT ANTENNA 3 = 9
PHASE AT ANTENNA 4 = 13
PHASE AT ANTENNA 5 = 17
PHASE AT ANTENNA 6 = 21
PHASE AT ANTENNA 7 = 25
PHASE AT ANTENNA 8 = 29
```

(b)

Fig 3. The result of experimenting with phase relationships; see text

The darker shadows correspond to the nulls, whereas the bold zebra striped regions show constructive interference, or reinforcement of the beams.

These patterns suffer somewhat from the coarse definition, and actually improve on being photo-reduced. On a 14in television screen it pays to stand well back and half close the eyes! This causes the "confused" regions to merge into dark, shadowy nulls.

Where more than two monopoles are used, the dark areas will contain regions of less than maximum radiation. It is not easy to show these correctly with the ZX81 because of the "all or nothing" nature of the ZX81 graphics—a block is either on or off—grey scale graphics would be needed to do it properly. Perhaps owners of more sophisticated machines will be tempted to plot the beam patterns using colours to indicate field strength—a most attractive diagram should result.

Table 1. Summary of variables

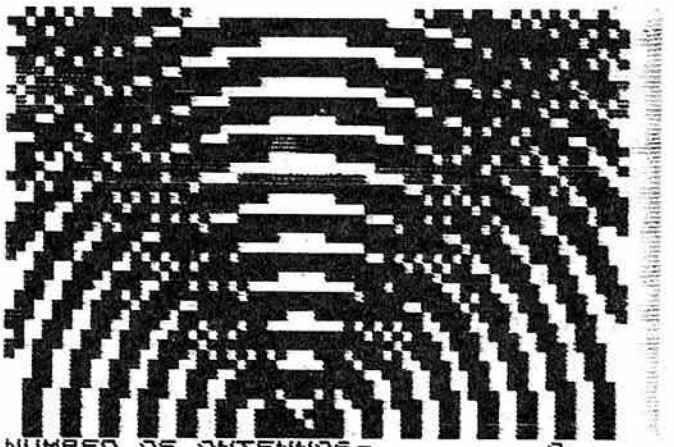
(Useful especially if you wish to experiment, for example, with circular arrays of antennas or other configurations)

A	Number of antennas
Q	Antenna separation in quarter wavelengths
X$	Response "Y" or "N" to the question—are the antennas in phase?
P(N)	P(1)...P(A)—one dimensional array containing the phases of feeds to each antenna
N	Number of antennas (or phase at the antenna) under consideration
A$	Dummy variable, input merely to prevent erasure of the screen before printing out the data for each beam pattern
X	X co-ordinate of plotted point
Y	Y co-ordinate of plotted point
X(N)	X(1), X(2), X(3)...X(A) the centres of the antennas as X co-ordinates
XN	Substitutes for X(N), used in subroutine 1000
R, T	The R, theta parameters (radius and angle) used in plotting the circles
M	Variable used to "thicken" the wavefronts and improve the contrast

Fig 3 is the result of experimenting with phase relationships. At Fig 3(a), the antenna spacing is $\lambda/4$ between each of eight elements, each fed with a progressively increasing phase difference of $\lambda/4$ per element. Fig 3(b) shows elements spaced by one wavelength, and fed with phases increasing by one wavelength/element, producing a more compact beam pattern.

Scope for experimentation

It is a simple matter to alter the parameters of the program and experiment with antennas in the computer. Fig 4, for example, gives us rather more of the "far field" of the system shown in Fig 2(b). This is obtained by shifting the Y axis (the value 22 in lines 340 and 1080).



```
NUMBER OF ANTENNAS=          2
SPACING BETWEEN EACH
IN QUARTER WAVELENGTHS=      4

PHASE RELATIONSHIPS:

PHASE AT ANTENNA 1 = 1
PHASE AT ANTENNA 2 = 1
```

Fig 4. Rather more of the "far field" system shown in Fig 2(b)

Some amateurs may be interested in the possibility of arrays in shapes other than straight lines. Most of us have gardens which are not entirely regular—how about an "irregular" array phased to emit directed beams? For some this could be the first step into the interesting (and to date largely military) world of electronically steerable beams. These are used at hf on the grand scale by the military, and also at microwave frequencies on motionless radar scanners. It is perhaps worth noting that causing deliberate constructive and destructive interference at a plane verges on the science of holography.

It is to be hoped those readers with access to computers allowing very high definition plotting (perhaps in colour) will speedily improve on the author's effort. I am looking forward to seeing a really good, high-definition plot for an accurately-modelled Yagi antenna, for example. Manipulating antennas on the computer screen is fairly compelling, and certainly more comfortable, safer and faster than climbing up trees and buildings to fix antennas that may or may not perform as expected. It does lack some of the courage and pioneering spirit required, however! □

The SWR METER- AN ALTERNATIVE VIEW

BY J. K. TODD, G2KV*

After constructing an O-V-2 set in 1928, and later derivatives, the author joined the RSGB as BRS891, then got AA licence 2BKR and finally full licence G2KV in 1933. Went QRT in 1937 when he joined a nationally known company, and resigned in 1939 when he joined the RNVR. After the war he moved about in wireless, radar, line communication, electronically controlled steel and paper mills etc, induction and hf heating and so on.

He kept up his GPO licence all the time, and when retirement was on the horizon he came back to amateur radio in 1971.

THERE HAVE BEEN so many articles and comments about the importance of the swr meter reading, that it would seem reasonable to discuss what it really means. This may help the user to make allowances for the conditions necessary to make the reading mean something. The title of this article uses the words "an alternative view", and it is important to discuss to what it is an alternative. It would seem that some amateurs expect the meter to read the voltage standing wave ratio in the feeder under all conditions of circuit and system; while others know very well that this is only true when the feeder is of 50Ω impedance.

It is always useful to know how a meter (or anything else) really works, it then becomes easier to evaluate the conditions necessary for correct usage. For instance, the usual type of ammeter does not measure current; it measures the force on a wire carrying current in a magnetic field by balancing this against a spiral spring.

So how does the swr meter really work? This little box—maybe only 10cm long—purports to measure the ratio of the maximum to minimum voltage in the feeder when they may be separated by 4,000cm. There have been many suggestions that the swr meter measures the forward and backward power, and somehow divides them and takes the square root. Where is the directional ability hidden? How does it measure the voltage, the current and the cosine of the phase angle between them and then multiply them all together? One must think again.

A useful ploy is to reduce the problem to workbench size. Fig 1 shows a load being fed through meters from a transmitter. Different kinds of meter can be used, and in one experiment one each of the types shown later in Figs 4(a) and 5 were used. Loads of 50, 125 and 250Ω were made up, in one case by wiring eight equal resistors in parallel around and across an SO239 socket. It was found that both meters had roughly the same reading, and gave a value of about R/50 irrespective of the feeder (1m or so), whether it was of 50 or 70Ω impedance, or just two random wires. Where was the reflection, and where did the ubiquitous 50 come from in the formula: swr = R/50 (50/R if R less than 50Ω)?

Many articles on swr meters start by describing bridges—Wheatstone, Maxwell etc—but their application in modern circuits is not well explained. Most bridges are voltage comparators in at least part of the circuitry, and this can be seen by redrawing the usual circuits—for instance, Wheatstones are usually drawn as in Fig 2(a). But if it is redrawn as in Fig 2(b) its close relationship to a voltage comparator can easily be seen. The Maxwell is shown in Fig 2(c), and the reactances are necessary for balancing if there is one in the unknown load. The unknown inductance is balanced by the known capacitance, and this brings the voltages across the indicator into phase as well as giving equal magnitude.

Fig 1. Block diagram of experimental set-up for bench tests on swr meters

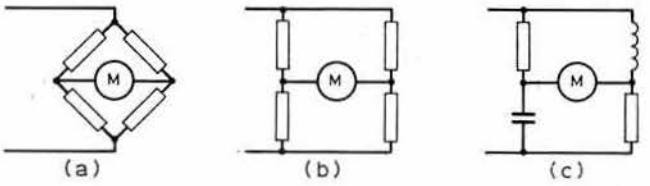


Fig 2. Wheatstone and Maxwell bridges, showing similarity to voltage comparators

Fig 3(a) shows the beginning of modern meters, which introduce an indicator across the line. This means that the input voltage can be kept constant, and any reading on the other indicator is a function *only* of the degree of unbalance, and not of the line voltage as well. Fig 3(b) shows one more small step to modern circuitry by moving towards the Carey Foster bridge circuit. Remember that mutual inductance is only a measure of the coupling and not of series reactance; this latter is shown by leakage reactance and seems to be negligible when compared to the resistors in the circuit. Notice that the voltage for the right-hand side of the balance indicator comes from the current in the feeder line and not at all from the voltage across it. The voltage on the left-hand side comes from the line voltage and not from the current. If the turns ratio and the three resistors are juggled, the two voltages can obviously be made equal and the bridge will appear balanced. Suppose the two voltages are V(i) and V(v), and that they are obtained from a 50Ω feeder properly matched so that the V(i) obtained from 1A (or a fraction thereof) and the V(v) obtained from 50V (or the same fraction thereof) are equal; then the bridge is balanced for a 50Ω feeder, and any unbalance from an impedance of any other value will be indicated on the meter. If the feeder is of 70Ω and is properly terminated, then V(i) from 1A line current will be accompanied by V(v) from 70V—thus giving a meter reading. So any mismatch from a load at the end of a 50Ω feeder will cause modifications in one or both of V(i) and V(v) and create a reading. This clearly applies even if the load is 50Ω but has a reactive component—say, 40Ω resistive in series with 30Ω reactive. The phase angle between V(i) and V(v) will unbalance the bridge. This can be checked in the Fig 1 experiment by connecting a capacitor across or in series with the resistive load. By using a calibrated variable capacitor many checks can confirm this basic fact.

Fig 4(a) shows one more step towards modern meters. The centre of the coupling coil is raised by V(v) volts so that the two ends of the coil show V(v)

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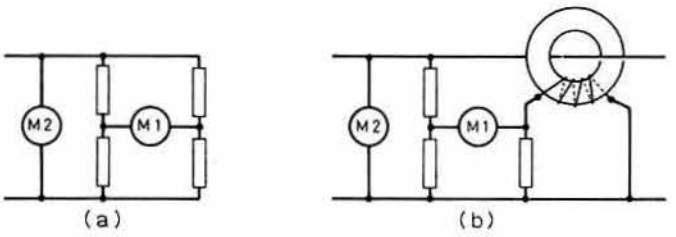

Fig 3. Bridges with input control; (b) is similar to the Carey-Foster bridge

+ V(i) and V(v) − V(i). The effective centre of the coil can be reached by a centre tap, or by connecting two equal resistors or capacitors in series and connecting V(v) to their junction.

From Fig 4(a) we can take the case of the centre-tapped coil and wind two separate coils as in Fig 4(b); clearly they are the same in principle. Then in Fig 5 two coupling strips or lines have been substituted for the two coils; these behave like two parallel-wire transmission lines, each coupling to the centre line; they have mutual distributed inductance and capacitance to the centre line. So again we can obtain V(v) + V(i) and V(v) − V(i) from the two outer strips as argued for Fig 4(a). The relative pick-up between V(v) and V(i) is tied up with the geometry, so dimensions must be carefully followed.

In all the above circuits many resistors, capacitors and diodes etc have purposely been omitted so that the basic circuit can be seen. Full circuits can be seen in [1] and in [2]. One such circuit is shown in Fig 6.

After many years puzzling over swr meters, directional wattmeters etc, and a couple of years mulling over voltage comparators, at least one amateur feels that the latter explanation is the true one. It has the great advantage of making the user aware of the problems of how to use an swr meter. Where does this new concept lead us?

These meters are commonly used in two different ways, as shown in Figs 7(a) and (b). The former really does indicate the swr in the feeder—that part between the shack and the antenna feedpoint. But there are problems in its usage—the meter could show an swr of 1·0 when in fact there is a real swr of, say, 1·4, and vice versa. Suppose a horizontal dipole is 0·38 wavelength high. The curves ([3] p102) show that its resistance seems to be 100Ω. Suppose this is connected to the swr meter with a λ/4 of 70Ω feeder, then it seems to be 49Ω at the meter (by the λ/4 feeder formula) and it will be resistive. So the meter reads about 1·0. But the real swr is 1·4. Again, if the dipole is 0·24 wavelengths high it looks like 70Ω. Connect it with 70Ω feeder to the swr meter and it will read 1·4, though it is really 1·0. It follows that for a real swr of 1·0 to be properly read by the meter, three conditions must be satisfied:

1. The antenna must be 50Ω and resonant.
2. The feeder must be 50Ω.
3. The swr meter must be balanced for 50Ω.

If not 50Ω, any other figure will do as long as all three values are the same. Some meters are not marked with their balancing impedance, some do not even mention it in the book of instructions, but it can easily be measured by setting up the circuit of Fig 1.

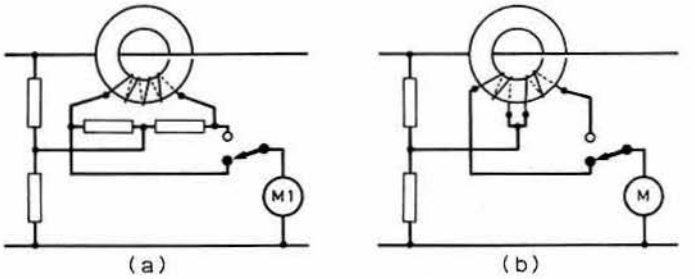

Fig 4. Modifications to Fig 3(b) towards swr bridges

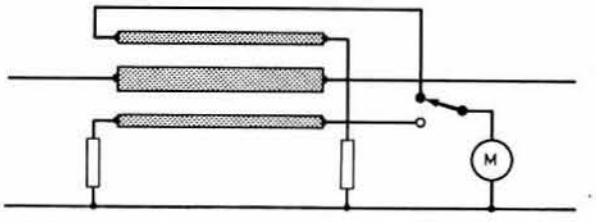

Fig 5. Modifications to Fig 4 using distributed coupling with strip lines

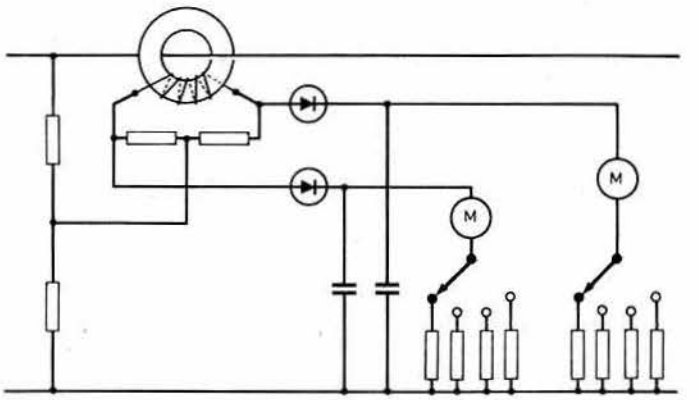

Fig 6. Circuit diagram of a complete modern swr and power meter

Fig 7(b) shows an swr meter used in a different way, but it does *not* measure the swr in the feeder. When the atu is adjusted to give an "swr" of 1·0 it means that the meter is looking into 50Ω resistive, that is all. In this condition a transmitter which requires such a load can safely be run-up to full power. Most atu circuits will give such a reading only for one particular value of the inductors or capacitors, and, unless they are all "infinitely" variable, it may not be possible to balance perfectly to swr = 1·0—eg if the inductor is switch-tapped, adjacent taps might give swrs of 1·3 and 1·4, and this means that the resistance changes could be from 40Ω (50 ÷ 1·3) to 70Ω (50 × 1·4). It is important to realize that the same reading can mean resistances both above or below the meter balancing value. There is a case for making the meter balance at 70Ω so that a reading under 1·4 would mean a resistance between 50 and 100Ω under all conditions. This figure seems acceptable to most transmitters.

Another use of the meter in the Fig 7(b) configuration is as a wattmeter. Having adjusted the atu so that the swr reading is 1·0, it has been shown that the load would be 50Ω resistive. Then use the other (non-balancing) position of the meter, which then acts like an hf voltmeter (reading V(v) + V(i), and these are equal), to read the voltage across the pure resistance of 50Ω, so with proper calibration and scale (square root) the power can be read [2].

Fig 7(c) shows a system with two swr meters, one for indicating the swr in the feeder (where the atu will have a negligible effect), and the other to indicate what load the transmitter is looking into, which can be used to measure the power from the transmitter.

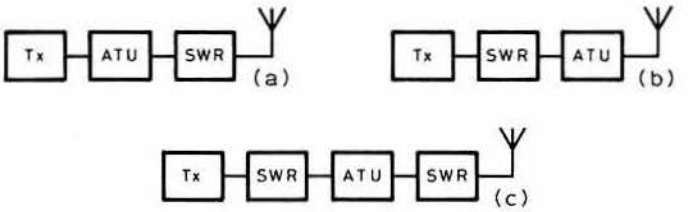

Fig 7. Different ways of using swr meters

The swr meter is often regarded as directional. It can be directional in that it measures forward power only when many adjustments have been made. It can also indicate reverse power, but fundamentally it indicates a change of effective impedance caused by reflections, and account must be taken of the phase angle between the forward and reverse currents etc. This is comparable to the change of effective input impedance of certain cathode and emitter follower circuits when the line voltage is switched on; and to the input to a motor when it starts to revolve.

Conclusion

It is hoped that this article will help the amateur to think out the conditions before accepting any meter reading. It may be useful to browse through some relevant reading which covers the area in more detail, especially to get the hang of Smith charts introduced in [3] p56. They are a very easy way of seeing what is happening in balanced and unbalanced feeders, and are a very powerful tool to escape from the tedious mathematics.

References

[1] *Radio Communication Handbook*, 5th edn, Chapter 18.
[2] *Test Equipment for the Radio Amateur*, Gibson, 2nd edn, p46.
[3] *HF Antennas for All Locations*, Moxon, p32.

Studies of an extensive anticyclonic propagation event and of some short-term enhancements observed at vhf and uhf

by R. G. FLAVELL, G3LTP*

Ray Flavell has been professionally engaged in many forms of propagation, including hf, vhf, meteor scatter, satellite etc, and has first-hand experience of operating ionosondes and balloon-borne radiosonde equipment. All propagation research for the Society has been on a strictly amateur basis, and he has been chairman of the Propagation Studies Committee since 1979. As GM3LTP he set up the 28,70 and 144MHz exerimental stations, GB3LER, as "Project Lerwick", the Society's main IQSY activity. He is the author of the "Propagation" chapters of *Radio Communication Handbook* and *VHF-UHF Manual*. He was elected a vice-President of the Society in December 1982.

This paper by the chairman of the Society's Propagation Studies Committee was presented at the Third International Conference on Antennas and Propagation held at the University of East Anglia, Norwich, in April 1983.

It is reproduced here as an example of an amateur radio contribution to a "professional" conference.

Introduction

The paper begins by presenting a geographical analysis of 102 long-range 144MHz amateur contacts, all verified, along distances of between 1,100 and 2,944km, made during a 24h period, 5/6 September 1981. Then follows examples of techniques which may be used to provide refractive index analyses of short-term enhancements of signal associated with weather fronts, structures of narrow horizontal extent which cannot be studied in detail using conventional cross-sectional methods. The examples described reveal interesting details of the form of the features concerned.

The active region within an anticyclone

In a previous contribution [1] it was shown how random networks of amateur stations could be used to disclose the active region within an anticyclone, meaning, in this context, the region within which abnormally-long signal paths were possible at vhf and uhf. A series of maps outlined the day-to-day changes over an eight-day period in relation to movements of the centre of the high pressure system, and it was shown that the size of the active areas at both 144MHz and 432MHz were very similar, but that the length of individual signal paths within those areas tended to be about half as far again at 144MHz as compared to paths at 432MHz.

At that time only the long-range signal reports had been studied and it might be argued that there was no evidence to show that the edge of the active area had been reached. To counter this criticism a more extensive study has been carried out, using information gained as a result of an analysis of some 1,300 signal logs returned to the Deutscher Amateur-Radio-Club in connection with the International Amateur Radio Union Region 1 VHF Contest, held between 1200gmt 5 September and 1200gmt 6 September 1980.

During this 144MHz event, 102 contacts in excess of 1,100km occurred, and their geographical distribution was as shown in Fig 1. For the purpose of this analysis the participating stations have been grouped within "squares" of dimensions 1° latitude by 2° longitude, the centres of which are marked by circles when they contain terminals of any of the qualifying long-range paths.

It will be seen that the paths tend to separate into two clusters, each associated with a centre of high pressure, marked "H" on the map. The alignment of the two long-path axes with respect to their associated system centres bears out the findings of the earlier paper, namely that they stretch chordally across the encircling isobars (not shown on the map in the interests of clarity) to one side only of the anticyclone.

If this pattern of paths is compared with a similar map showing the positions of all the stations participating in the contest (Fig 2) it will be seen that in all directions relative to the active area over Europe there were

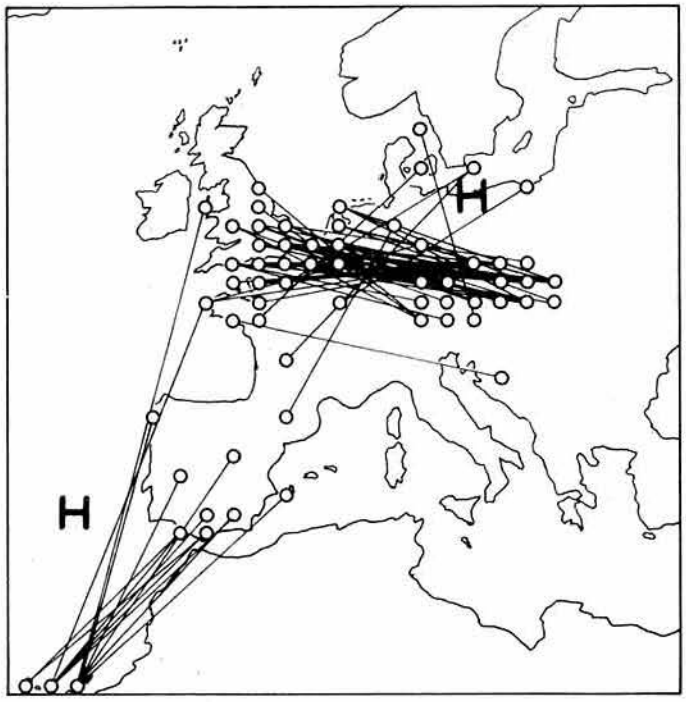

Fig 1. Signal paths exceeding 1,100km worked by amateurs during 24h, 5/6 September 1981. H, H indicate centres of anticyclones

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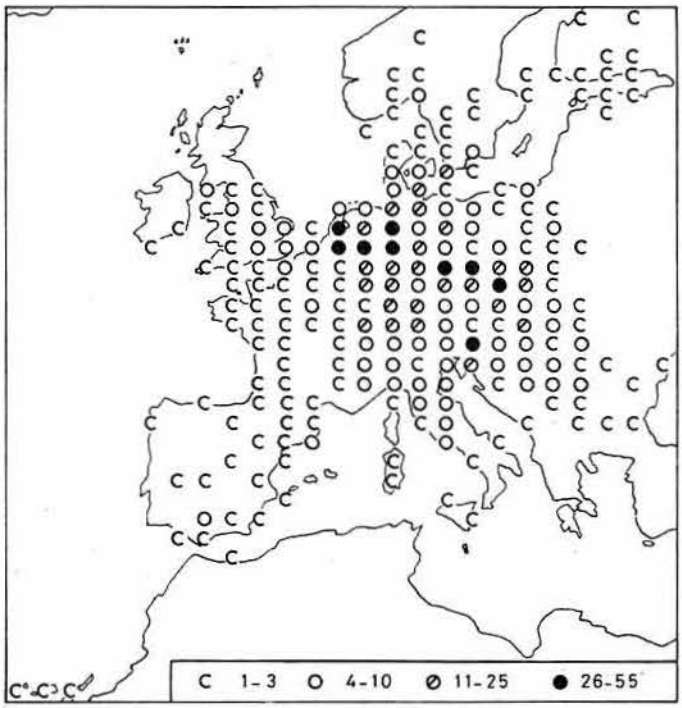

Fig 2. Distribution of participating amateurs per "square" of 1° lat × 1° long. About 1,300 stations submitted logs

stations that had been unable to achieve ranges of greater than 1,100km although, by the nature of the aims of the contest, their operators will have been trying very hard to do so. It is also of interest to note that Fig 1 shows that several squares in NW Germany failed to break the 1,100km barrier, although, as Fig 2 shows, they contained some very high numbers of participating amateurs. The lack of activity from Scotland is puzzling at first, but it was found that a cold front lay across Great Britain along the border country for the whole duration of the contest and this would have effectively isolated Scotland from the rest of Europe.

Two further points are worthy of mention: first, the extremely long path, entirely over sea, linking Anglesey and the Canary Islands, 2,944km, which has clearly received benefit from both anticyclones, and, second, the long overland path from Brittany to Yugoslavia, 1,530km, passing over what must surely have been very difficult terrain.

An enormous benefit to this study has been the knowledge that all the log sheets have been very carefully scrutinized by the contest organizers, who have verified in each case that stations in contact have correctly recorded an exchange of sequence numbers, which must fall correctly into place at the time recorded in the two logs concerned.

Ridge enhancements

Studies of anomalous propagation associated with persistent anticyclones, such as the one just described, generally reveal that the longest signal paths lie to one side of the centre of the high pressure system, such that there is a more or less symmetrical rise and fall of pressure along the line of the transmission path, as in Fig 3(a).

Short-term enhancements often follow a similar pattern, brought about by the passage of ridges of high pressure separating successive depressions.

If a pen recording is made of signals received from an over-the-horizon transmitter as a ridge approaches the line of the path, signal strength will be found to rise, and fading rate decrease until a position of symmetry with respect to the isobars is reached, Fig 3(b), after which the normal signal characteristics gradually return. Similar effects may be seen on fixed shf paths as well as at uhf and vhf.

Frontal enhancements

A number of amateurs have reported the existence of short-lived long-range signal paths connected in some way with approaching weather fronts. One operator in the Isle of Man has come to recognize certain warm fronts which enable him to work consistently into northern France for a very limited time.

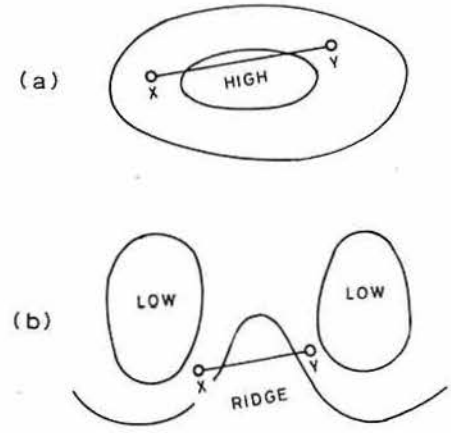

Fig 3. The longest ranges tend to lie symmetrically across one side of a high. Ridges are most effective at the path centre

It is very difficult to study such frontal enhancements in terms of refractive index because the fronts themselves are of such limited horizontal extent that they often fail to appear at all on conventional cross sections, on account of not being sufficiently close to a radiosonde station at ascent time. When a front is suitably placed, however, it is possible to overcome the difficulties produced by the wide spacing of the upper-air stations—to a certain extent, at least—by adopting one or other of the two techniques to be described.

The cold front of 31 January/1 February 1960

A 144MHz cw contest was held on 31 January 1960, when several long-distance paths opened for short periods, among them Moretonhampstead, Devon, to the Channel Islands and, late evening after a poor afternoon, Hythe, Kent, to well into France.

The value of sectional studies in terms of potential refractive index, K, in radio-meteorological analyses has been described elsewhere (2). In the

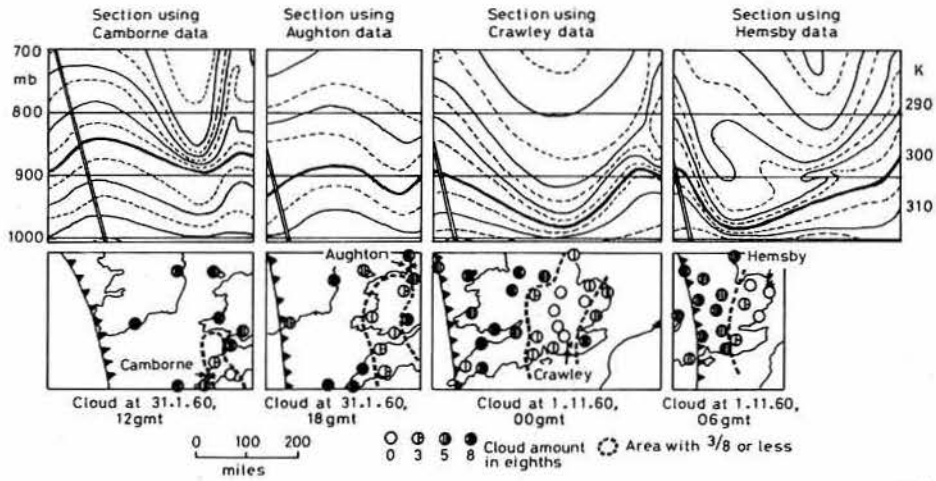

Fig 4. Potential refractive index sections and corresponding low cloud amounts related to a cold frontal enhancement

present instance a series of sections (Fig 4) has revealed, by the downward "flow" of the isopleths (potential refractive index values remain constant during adiabatic changes in the atmosphere), that a volume of descending air had preceded the front in its passage across southern England, widening as it progressed slowly eastward. This was borne out in three of the maps, which have been drawn to the same horizontal scale as the sections immediately above, and show the amounts of low cloud in various parts of the country. Subsiding air warms and dries and these qualities have led to the disappearance of low cloud over an area which clearly expands in concert with the broadening mass of descending air. The low cloud amounts have been plotted from tabulated observations in the Daily Weather Report [3] and potential refractive index values have been calculated from upper-air data published in the Daily Aerological Record [4].

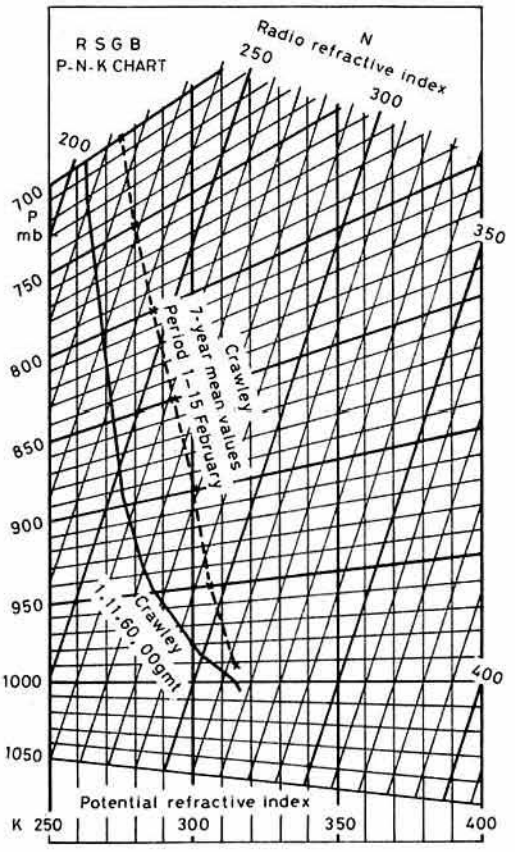

Fig 5. Comparison between the refractive index profile for Crawley, 0000gmt 1 February 1960, and the mean vertical distribution, 1-15 February

The map for 31 January, at 1800gmt shows that the cloud clearance did not reach Aughton, supported by the section immediately above, which shows no more than a hint of the growing feature capable of dissolving clouds, which is crossing the country further south.

The comparison of the Crawley refractive index profile with the seven-year mean curve for the corresponding time of year (obtained from tables in [2]) confirms that large downward displacements of air have taken place (Fig 5).

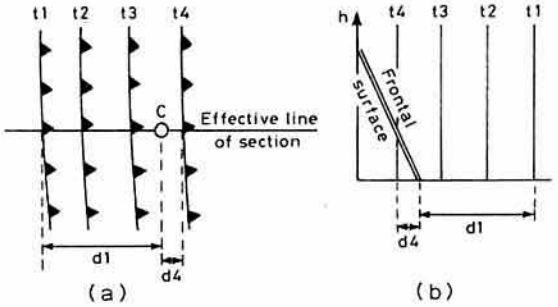

Fig 6. Showing, at (a), how the movement of the cold front passed the station, C, is related to one of the vertical sections, (b)

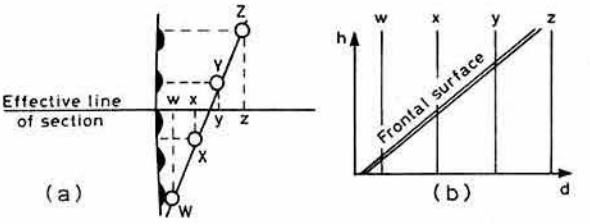

Fig 7. Showing, at (a), how data from met stations diverging from a warm front relate to a vertical section (b), as seen in Fig 8

The potential refractive index, K, plots are not true cross sections but simulated ones, based on successive ascents made at times t1 to t4 from a single radiosonde station, C, (Fig 6(a)), while the front is distant d1 to d4. The respective vertical distributions of K are plotted on the section at correspondingly scaled distances from the base of a sloping line representing the position of the front, as in Fig 6(b).

The warm front of 4 October 1980

This was an occasion on which some very long paths from southern England to Scandinavia had opened up during the final hours of a ridge of high pressure, which, earlier, had produced some interesting contacts with the near Continent across the North Sea.

The technique adopted in this potential refractive index study was to select a series of upper-air stations (W, X, Y, Z, in Fig 7(a)) such that they lay along a line which began very close to the front in the south and then diverged until it was about 500km distant in the north. If it could be assumed that the refractive index structure across the front remained fairly constant along the length of the section—and the results suggest that that was a reasonable assumption on this occasion—then the effect is as though the wide spacing of the stations had been reduced to their projected equivalents along a line normal to the advancing front (w, x, y, z in Figs 7(a) and 7(b)).

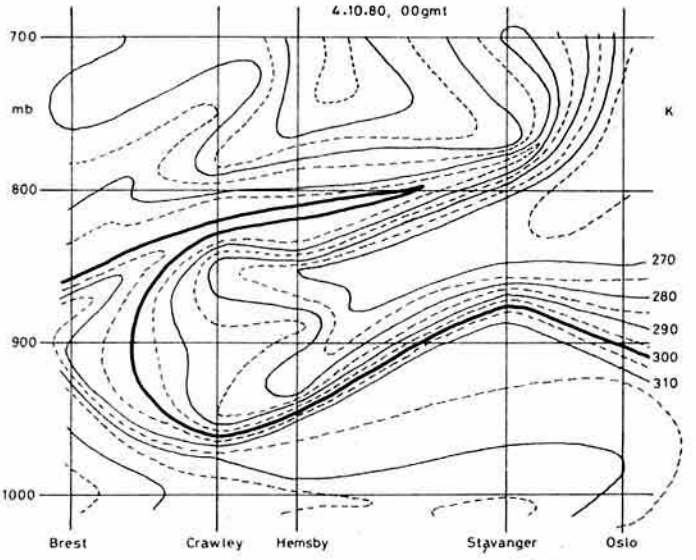

Fig 8. Potential refractive index cross section, Brest-Oslo, 0000gmt 4 October 1980, showing the low-level layer leading to the appearance of long-range signal paths and, effectively, details of the frontal surface

The outcome is particularly rewarding (Fig 8). Ascending air, to the left of the section between 900 and 800mb is clearly revealed as it rises over the boundary separating it from the large volume of warm, dry air of low refractive index, which has been brought down from aloft by the processes which act within a ridge of high pressure. The layering in the lower part of the section is the feature which has been responsible for the anomalous propagation conditions which had been the subject of the investigation.

These potential refractive index values were calculated from temperature and dewpoint values read from graphical data which appeared in the appropriate issue of the European Meteorological Bulletin, published daily by the Deutscher Wetterdienst, Offenbach am Main, Germany. The methods by which the basic data are turned into potential refractive index values and then into sections such as this one are described in detail in [2]. Because the basic met data are readily available the validity of Fig 5 is easy

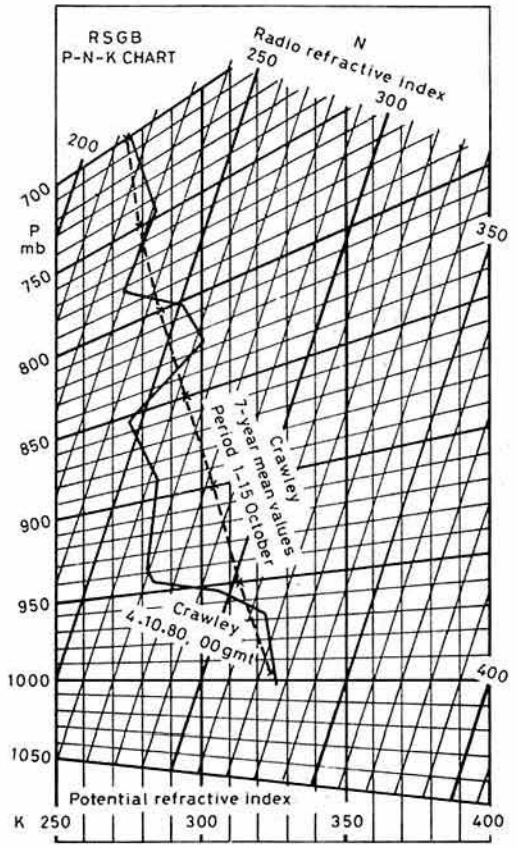

Fig 9. Comparison between the refractive index profile for Crawley, 0000gmt 4 October 1980, and the mean vertical distribution 1-15 October

to check, so it may be confirmed that all the detail has been obtained by a process of strict linear interpolation between the calculated values.

Finally, in Fig 9, the comparison has been made between the Crawley refractive index profile used in the section and the seven-year mean curve for the corresponding time of the year. It should be noted that the use of this form of diagram allows the profile, once plotted, to be read off in terms of either potential refractive index, K, or conventional radio refractive index, N, a remark which applies equally well to Fig 5.

This comparison supports the contention that the relative vertical motions within the section is as suggested by the direction of "flow" of the isopleths, namely ascending air at 700–760mb and 795–835mb, descending air at 760–795mb and 835–960mb.

The consistency of potential refractive index values within the lower steep-lapse layer through four radiosonde stations, two of them Norwegian and two British, seems to suggest that present-day radiosondes are adequate for radiometeorological studies such as these, despite the fact that many workers regard the humidity measurements as being totally inadequate for the purpose. Other examples of a similar nature may be seen in works already cited [1] and [2] and in other papers to which reference is made therein.

Acknowledgements

About 1,300 radio amateurs from all parts of Europe have provided the basic material for the signal path study. The assistance of DARC, the German national amateur radio society, in collecting and making available the basic material is gratefully acknowledged. The sources of meteorological data have been noted in the main text. The Daily Weather Report and the Daily Aerological Record (sadly now defunct) were publications covered by Crown Copyright and the data have been used with the permission of the Controller, Her Majesty's Stationery Office.

References

1. Flavell, R. G., 1981, *IEE Conf Pub 195,* 163–7
2. Flavell, R. G., 1983, *VHF-UHF Manual* (4th edition), Ch 2 (Propagation)
3. Meteorological Office, 1960, *Daily Weather Report,* 1 Feb, (HMSO)
4. Meteorological Office, 1960, *Daily Aerological Record,* 31 Jan, 1 Feb, (HMSO) □

Automated spectrum monitoring using the Tandy programmable scanning receiver

Part 2, interfacing to a microcomputer

by R. C. V. MACARIO, GW8SRW*, and M. G. B. HATHERHILL

Recap

An earlier article (1) described the principle of spectrum monitoring and spectrum occupancy, and illustrated how permanent records could readily be set up on an XY pen-recorder by means of some fairly simple interface circuitry. This article extends the earlier description so that the Tandy programmable receiver can be inputted directly into the interface (VIA) port of most generally-available microcomputers. Provided the microcomputer has sufficient memory storage, which is best organized by having either external disc or tape storage, and a printer is available, then the concepts described in the earlier article can be extended to more frequencies or very long periods of time, ie one week, or both.

Once the data from the receiver has got into the microcomputer, the whole process then becomes a software, or programming activity. In this short article we do not intend to describe programming, because it has so many possible variations and alternatives, and any program could, for example, be distributed by tape etc. Therefore, we just show the very simple interface circuit and a few examples of how spectrum occupancy data can be useful in planning or other exercises.

*2 Valley View, Derwen Fawr, Swansea SA2 8BG.

The interface circuit

The earlier article described which signals one can use, and has ready access to, from the Tandy receiver. This information is assumed here. The two signals are the CLOCK PULSES and the SQUELCH SIGNAL, and their points of availability in the Tandy receiver were described. They are shown as waveforms (a) and (c) in Fig 1. They are used to generate a FREQUENCY INCREMENT signal, waveform (b), and a FREQUENCY PRESENT signal, waveform (d), by means of the straightforward dual CMOS monostable circuit shown in Fig 2. The monostables should be set to the times indicated in Fig 1.

The microcomputer interface port

The two signals just described are inputted to the microcomputer via its VIA port. Fig 3 shows the port connections for the standard VIA (6522) nomenclature as well as the nomenclature used for a Pet machine.

The FREQUENCY INCREMENT signal timing actually sets the maximum processing time (t_s) for the software, ie over one frequency or channel interval. This is usually well inside the frequency step rate of the receiver scan.

The FREQUENCY PRESENT signal (which only registers when channel occupancy is noted), must be arranged such that $t_s < t_p < 140$ms.

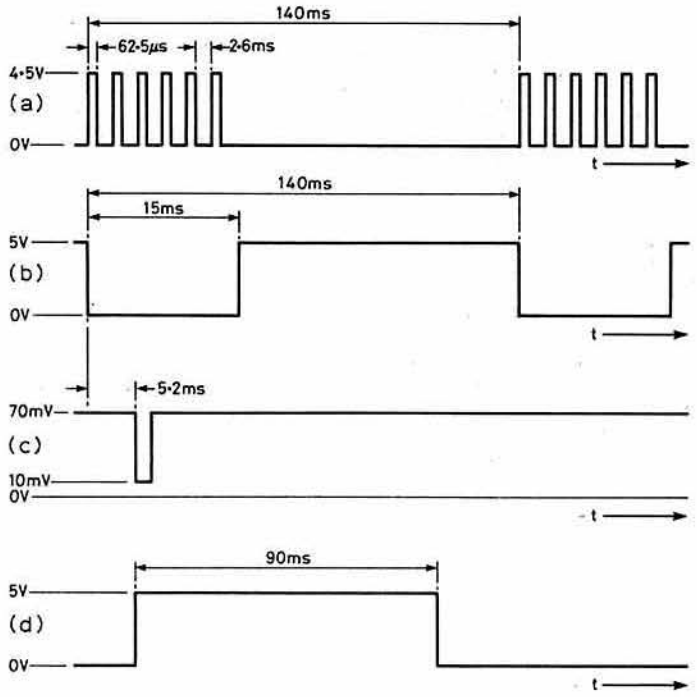

Fig 1. Timing diagram. (a) Clock pulses from shift registers. (b) Frequency increment signal from interface. (c) Signal from squelch circuit. (d) Frequency present signal from interface

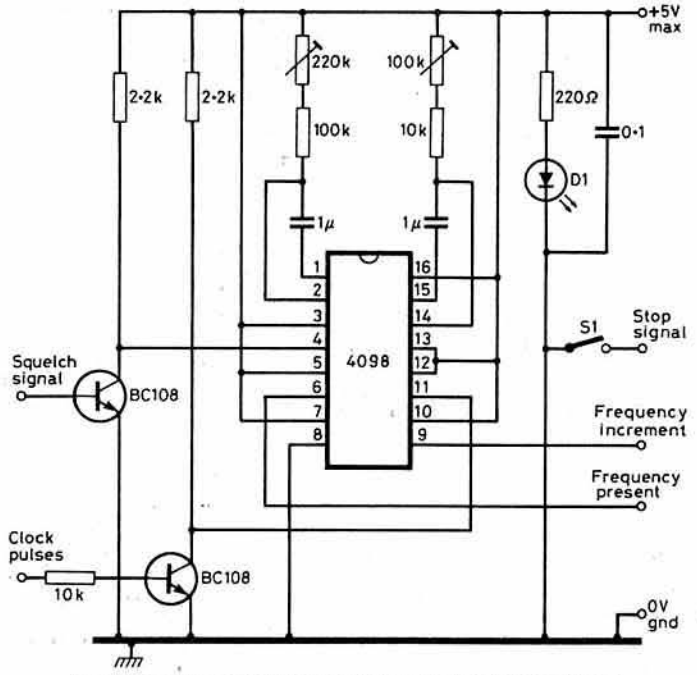

Fig 2. Interface circuit for generating the waveforms of Fig 1

Interface box	Micro-computer PET* Nomenclature	VIA port 6522 Nomenclature
Frequency increment	B	CA1
Frequency prevent	K	PA6
Stop signal	L	PA7

* A,N = Ground

Fig 3. VIA port connection

AUTOMATIC SPECTRUM SURVEILLANCE SOFTWARE

AREA: SWANSEA 2ND MARCH 1983

FREQUENCY (MHZ)	TIME (HRS : MINS : SECS)
145.5	10 : 49 : 10
	12 : 13 : 50
	12 : 38 : 30
	12 : 39 : 50
	12 : 53 : 20
	12 : 54 : 20
	13 : 52 : 20
	14 : 17 : 0
	14 : 36 : 30
	14 : 45 : 0
	14 : 5 : 50
	15 : 5 : 50
	15 : 8 : 10
	17 : 0 : 10
	17 : 15 : 0
	17 : 23 : 30
	18 : 8 : 0
	18 : 43 : 0
	18 : 43 : 20
	19 : 2 : 0
	19 : 26 : 10
	19 : 38 : 10
	19 : 38 : 40
	20 : 26 : 40
	20 : 35 : 50
	20 : 36 : 20
	21 : 1 : 50
	22 : 0 : 0
	22 : 19 : 30
	22 : 21 : 20
	22 : 43 : 40
	23 : 29 : 40
	23 : 56 : 10
	0 : 15 : 20
	0 : 33 : 50
	0 : 34 : 20
	7 : 21 : 30
	9 : 15 : 50
	9 : 39 : 0
	9 : 50 : 10

Fig 4. Time marked occupancy of channel S20 on a particular day

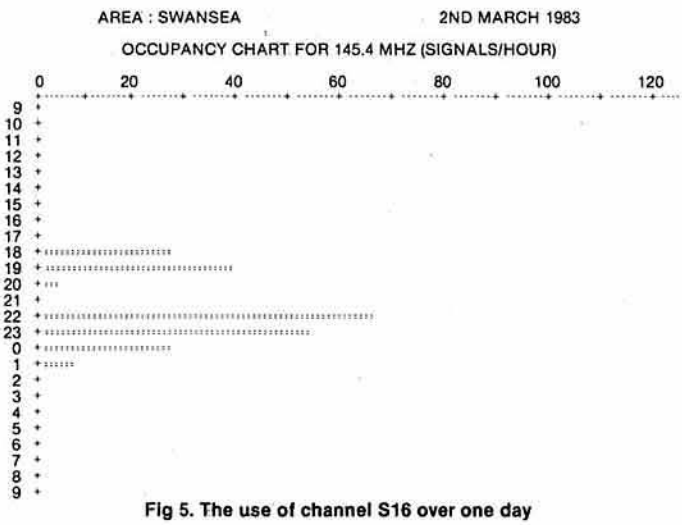

Fig 5. The use of channel S16 over one day

For a Pet program, t_s was 60ms; therefore t_p was adjusted to 90ms as shown in Fig 1(d).

The STOP SIGNAL is an optional extra which from Fig 2 can be seen to be a very simple method of stopping the program without keying the receiver or the microcomputer.

Illustrative results

The particular microcomputer we had available consisted of the following items: a Pet microcomputer, a Commodore cassette unit, a Commodore twin-disc drive unit, and an Epson MX80/FT printer.

Since the microcomputer has its own clock, a time mark can be put onto any input (signal present) data. Thus Fig 4 shows a possible print-out of one monitored channel, namely channel S20 in the Swansea area. The time is local 24h time in h, mins, secs of a signal presence noted.

Alternatively, Fig 5 shows data for channel S16 arranged on the number of calls per hour over a 24h period. The time of each call is held in the computer store, but in this example is not displayed.

Fig 6 shows the interesting contrast that can occur in channel occupancy when viewed on the last basis. This data is for the repeater channel R7,

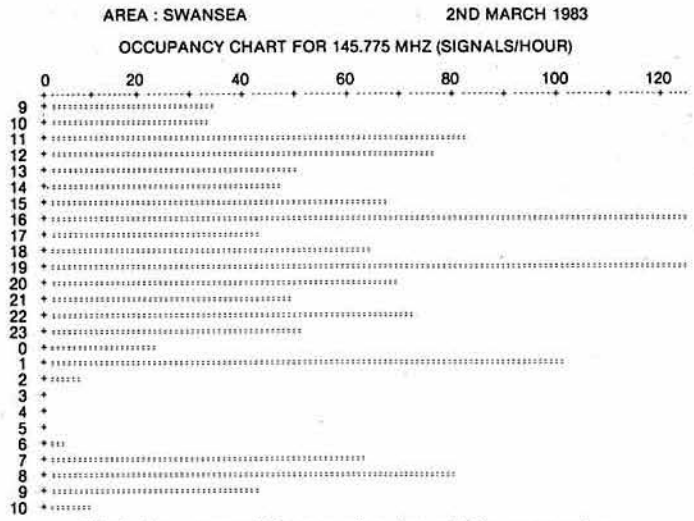

Fig 6. Occupancy of the repeater channel R7 over one day

which one can see is heavily used all the time operators are about; which seems to be all but three hours of the day.

Reference

(1) *Rad Com* May 1983, p421. □

EPHEMERIS

Satellite news and views

*by R. O. Phillips, G4IQQ**

THOSE WHO FOLLOWED the flight of *Columbia* and hoped to have a normal QSO with W5LFL will have been somewhat disappointed. The main problem seems to have been the lack of information in many countries concerning transmitting and receiving frequencies, as well as operating procedures. The event certainly attracted a great deal of publicity, particularly as the result of one pre-arranged contact. What is less certain is the impression that has been left with the many non-satellite operators whose first efforts in this area may have been directed at the space shuttle flight. To these readers I can only say that operation through satellites is considerably more successful and can probably be achieved with much less effort.

Satellite status reports

UOSAT

The orbit of UOSAT Oscar 9 has remained quite stable in recent months, with its near circular orbit at around 500km altitude and orbital inclination of 97·5°. By the beginning of February the satellite will have completed over 12,850 orbits, and there is a very good chance that operation beyond its third anniversary in October will be achieved. QSL cards have been produced by the University of Surrey to acknowledge reception reports during the two years of operation. A very large number of reports have been sent in during the period, so it will take some time to fill-in and mail the backlog of cards. Anyone in a pressing hurry to receive their card can speed up the process by sending to the university a stamped, addressed envelope or an irc.

RS

The robot transponders on RS5 and RS7 are still active, but there have been some unexplained switching sequences to the transponders in both RS6 and RS8. There do not appear to be any problems with either of the satellites and, when active, their performance remains much as before, ie excellent.

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AMSAT Oscar 10

While it would not be true to say that the initial attractions of this superb satellite have diminished, it is quite noticeable that during the weekdays there are many periods when traffic through the satellite is at quite low levels. Having said that the weekends are very busy and finding a few kilohertz is a major problem, this probably accounts for the high ratio of cw to ssb contacts.

One characteristic of the transmission path which occurs when the satellite is at low elevation is the rapid fading on signals. The effect, referred to as spin modulation, is caused by the rotation of the satellite around its earth-pointing axis. The satellite is spinning at a rate of 50rpm in order to stabilize its orientation with respect to the earth. Regular corrections are also required to take out the longer term drifts away from earth pointing. If these corrections are not carried out, the spacecraft pointing error increases and causes a significant degradation in the radiation patterns of the onboard antennas. There is little that can be done to combat this problem (except more frequent attitude manoeuvres) and stations equipped with circularly-polarized antennas suffer equally.

Operating reports

What is claimed to have been the first mobile contact through Oscar 10 took place on 24 November 1983 when Dave Whitbread, G6EQM, contacted HB9BHX through the Mode B transponder. Dave's equipment would be the envy of many a fixed station, and if anyone doubts the authenticity of the claim he has photographed the mobile station as evidence. On the transmit side, a Yaesu FT780R was used with a 70W linear and 18-element Yagi; the receiving equipment comprised a 16-element Yagi, Mutek pre-amplifier and an FT480R. To facilitate ease of operation the digital vfos of both the transmitter and receiver are linked by an interface, thus allowing very simple netting on to stations. Doppler calibration, which is required only infrequently, is carried out in a quiet part of the passband. For the future, Dave plans to reduce the size of the antenna system so that a full azimuth/elevation system can be included operating under the control of a ZX81 computer. The problems of driving up and down hills would be overcome by using a gravity-stabilized mount in the form of a large pendulum. All I can say is good luck and steer clear of low bridges and multi-storey car parks.

After many years of regular operation on what he refers to as "the low flying birds", Bob Holmes, G6RH, has received from ARRL confirmation that he has been awarded the DXCC certificate for satellite communication. Bob has actually had QSOs with 103 countries, but it has taken several years to obtain the necessary QSL cards to take him to the 100th confirmed country. This is thought to be only the second such award to a European station, and of course does not include operation through Oscar 10. Bob's equipment for operation through the Mode A transponders comprises a homebrew 12W solidstate transmitter with ssb and cw, and an eight-element Yagi. A homebrew two-element shortened beam into an FT101ZD is used for reception. Best dx on RS6/RS8 includes K5, K7, UA, UI, UK, UL and UM.

Bob is also active on Oscar 10 Mode B, again using quite simple equipment. A vxo-controlled transmitter permits cw operation over about 70kHz of the passband with 25W into a 19-element Yagi mounted horizontally. An eight-element Yagi feeds the FT101ZD through a 145MHz converter. The list of dx on the satellite includes all JA districts, VK3, VK5, VK8, W5, W6, W7, ZS, PY, LU and KH6—all on cw.

Other news

A space symposium was held concurrently with the annual meeting of AMSAT on 12 November 1983 at the Johns Hopkins University near Washington DC. Around 200 attended the event, which included a number of talks on Oscar 10 and other subjects related to amateur space programmes. With the surge in interest in amateur satellites in the UK, perhaps a similar event could be organized over here.

A fully-revised edition of the *Guide to OSCAR Operating* has been produced by AMSAT-UK and should be available from the beginning of February. The guide includes full operating details of all existing amateur satellites, and in particular describes how to get the best out of Oscar 10. It is available from AMSAT-UK, London E12 5EQ, for £1 including postage to any UK mainland address—add extra for overseas mail.

As I have mentioned before in this column, AMSAT-UK publishes bimonthly orbital calendars for all operational amateur satellites. From February this service will be made available in a different form—the information will be included in the organization's publication *Oscar News*. There will be no additional charge to AMSAT-UK members, though they will be invited to "add a few pennies" to their annual donation, according to secretary/treasurer Ron Broadbent. □

Technical Topics

by Pat Hawker, G3VA

IN A RECENT *QST* editorial, David Summer, K1ZZ, general manager of ARRL, rebuts the common complaint that in today's amateur radio there is no place for a youngster whose parents are not well-heeled and inclined to buy expensive gadgets for their family—or alternatively unless other members of the family already have a rig. He points out that ever since the large-scale introduction of factory-built amateur radio equipment it has always been that way for top-of-the-line gear in factory-fresh cartons.

The answer, he believes, is that thousands of amateurs still get great satisfaction and contribute to the hobby with only a modest investment in secondhand or simple homebuilt equipment: "Digital readout, memories, instant bandswitching, linear amplifiers, towers, beams and computer interfaces are all nice to have, but no more necessary for a beginner than is a Maserati for a student driver (or even an old-timer—*G3VA*) . . . We have to call more attention to the fact that at the receiving end of a radio circuit, it doesn't make the slightest difference how expensive or fancy is the rig at the transmitting end. A watt is a watt, whether it is generated by a rig that is older than the operator or the latest marvel of solidstate technology."

K1ZZ echoes earlier comments in *TT* in not recommending for the rank beginner on hf the use of micro-power QRP (which he defines as under 10W input). "Your first antenna is likely to be a simple affair . . . and this, combined with a lack of experience, is going to provide enough of a challenge."

Bringing my thoughts back from the USA and glancing through recent pages of my station log, I note pleasant and interesting 7MHz cw contacts with a PA0 station running 30W to an 807 power amplifier and a BC348 receiver; a well-known GW with pre-war valve types 59 co and 6L6 pa, running 10W to a W3EDP antenna; another GW with a co-pa transmitter using the one-time ubiquitous 807; a G6 with 12W input to a single-valve co transmitter. None was ear-straining QRP. All had signals hardly distinguishable from those stemming from the many FT, TS and IC rigs on the band. Nor did I have the impression that any of these, mostly old-timer, operators were suffering from any acute sense of deprivation. But then, to work them, I was still using equipment roughly 15, 25 and nearly 40 years' old, a morse key almost 70 years' old, and a no-cost long-wire antenna using some discarded telephone-extension multicore wire—none of which had arrived in factory-fresh cartons!

THIS MONTH

Baluns to you, too!

Walter Maxwell, W2DU, in "Some aspects of the balun problem", *QST* March 1983, pp38-40, avers that the question of whether or not to use a balun is "one of today's hottest topics in amateur radio". He provides information on a novel form of rf choke balun, but also adds fuel to the flames of controversy by denigrating the transformer type of balun. A balun is essentially a device for interposing between an unbalanced output and a balanced input. W2DU believes that because many commercial baluns embody some form of impedance transformation, many of us tend to think of baluns as matching devices rather than for the *primary* function of providing proper current paths between balanced and unbalanced configurations.

W2DU bases his dislike of transformer-type baluns partly on the inaccuracy in impedance ratios that he has measured on nominal 1:1 and 4:1 baluns. The actual impedance transfer ratio, he notes, is affected by losses, leakage reactance and less-than-optimum coupling. Additionally, when transmitter frequency differs from the resonant frequency of the antenna element, the impedance transfer is further degraded by the reactive element of the antenna feed impedance; W2DU is careful to point out that this degradation poses no serious *operational* problems, though it may affect attempts to plot swr curves.

Before describing W2DU's preferred form of rf choke balun, it seems only fair to point out that in *HF Antennas for all Locations*, Les Moxon, G6XN, while recognizing the need for applying guidelines to the design of transformer-type baluns, does emphasize that, if these are followed, trifilar- and bifilar-wound autotransformers form highly efficient baluns (Fig 1), and are simple both in theory and practice—although, in turn, he is less than complimentary about balun designs claimed to involve "transmission line" principles.

It may be difficult, in these circumstances, to explain why many thousands of words continue to be expended each year on the subject of baluns; why they do not always prove simple or effective in practice; why they sometimes introduce considerable loss of rf output by transforming it into heat; and, indeed, whether they are even necessary at all. It is also possible to find conflicting views on whether it is better to transform the unbalanced output that comes from almost every transmitter to balanced form by means of a suitable atu at the transmitter end, and then use balanced feeders, or to have coaxial-cable feeder with a balun at the antenna end.

G6XN reduces balun design to "take two (4:1) or three (1:1) lengths of enamelled copper wire about 10in (25cm) long, twist or bind them *very tightly* together (this is the vital part of the process), wind them on to any odd bit of *ferrite rod* that happens to be lying around, and connect them as shown in Figs 1 and 2".

However, for those who feel this may be an altogether too casual approach, he does add guidelines which show that he is well aware of the fact that not all transformer-type baluns are efficient. For example:

"For a 3-30MHz balun, theory states that the inductance must be large enough not to shunt the line significantly at 3MHz, and the *leakage reactance* which appears in series with the output must be negligible at 30MHz. This is a very small amount, and failure to realize the crucial nature of this requirement may be responsible for the difficulties which have frequently been reported." He adds that it is important to realize that the core plays no role except at the low-frequency end while using the smallest

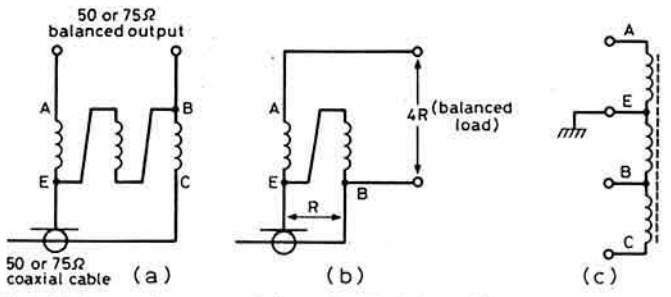


Fig 1. Basic transformer-type baluns: (a) trifilar balun with 1:1 impedance ratio (it can also provide 1:9 ratio (balanced or unbalanced) or 4:9 unbalanced on both sides; (b) bifilar balun with 4:1 impedance ratio. How these windings form an autotransformer is shown in (c), but note that the coupling between the wires *must* be as tight as possible, although individual turns may be spaced along the core as shown in Fig 2. (from *HF Antennas for all Locations*)

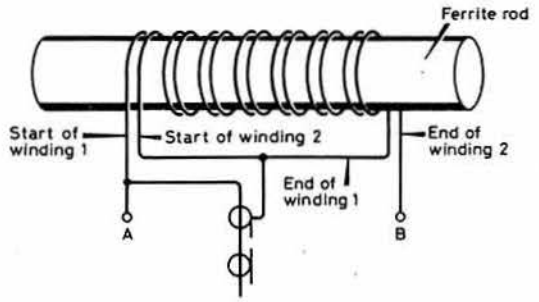


Fig 2. G6XN's recommended form of construction of bifilar (4:1) balun. Although wires should be bound tightly together, the spacing between turns is not critical unless impedances are very low, in which case total length of the leads must be as short as possible. Terminals AB provide a balanced output of 200 to 300Ω

possible length of wire. Ferrite and powder-type toroid rings, he believes, have fewer advantages than a ferrite rod, being less convenient and leading to the possibility of cross-modulation due to saturation of the core. New enamel wire, free of chipped insulation, should be used. Plastic containers can provide weather protection.

RF choke baluns

W2DU emphasizes that from an operational viewpoint the leakage current on the *outside* of coaxial-cable braiding (I3 of Fig 3) to earth in the absence of an effective braiding is usually *not* detrimental to the performance of simple dipoles; nor does I3 alone cause tvi; but I3 radiation *can* cause severe distortion in the radiation pattern of directive antennas, such as Yagis and quads. All *beam* antennas with balanced input terminals, in his opinion, require a balun if the optimum performance of the antenna system is to be achieved with a coaxial feeder. For example, when a balun is not employed the feedline and the tower together become a separate non-directional antenna. This produces unwanted vertically-polarized radiation that fills in the rearward null in the beam, so destroying the front-to-back ratio.

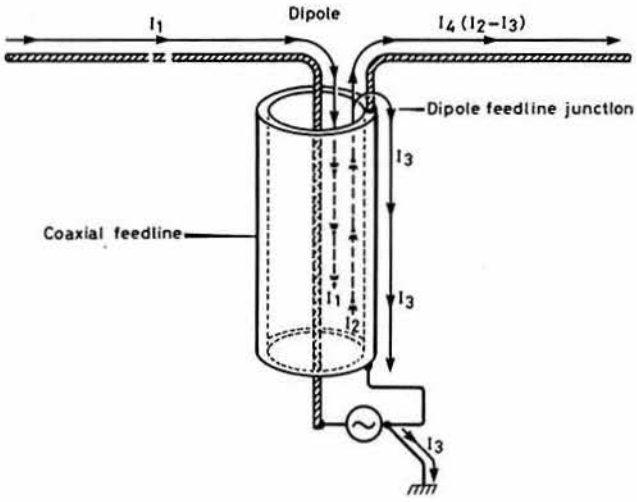


Fig 3 The various current paths when a coaxial feeder is connected to a dipole element. Lack of symmetry in the dipole's environment is one of the main causes of excessive I3 current on the outer braid of the cable, representing leakage to earth

W2DU discusses an alternative to transformer-type baluns: the *choke balun*, consisting simply of an rf choke in the outer conductor of the coaxial cable feeder. In its simplest form this can be done by coiling into a few turns the final length of the coaxial feeder (for 14 to 30MHz, several turns of wire of about 8in diameter should suffice). The frequency range can be extended downwards by using a core of high-permeability ferrite.

However, he introduces a novel form of choke balun. This is obtained by placing numbers of ferrite beads or sleeves around the final length of coaxial feedline. By using an added length of small-diameter coaxial cable of the same impedance as the main feeder, numbers of ferrite beads having an inner diameter of 0·197in and length of 0·190in can be threaded on to the extra cable to produce "a superb, compact wide-band balun". Note that such a balun does not transform the impedance and so may not be directly substituted for a 4:1 ratio balun.

To construct a 1·8 to 30MHz choke balun, only 12in long including connector, he recommends 50 No 73 ferrite beads (Amidon FB-73-2401 or Fair-Rite 2673002401-0, $\mu = 2{,}500$ to 4,000) over 50Ω teflon-dielectric RG303/U cable (or RG-141/U with the fabric covering removed). For 30 to 250MHz, use 25 No 43 beads (Amidon FB-43-2401, Fair-Rite No 2643002401, $\mu = 950$ to 3,000). Above 250MHz No 64 beads ($\mu = 250$ to 375) are suggested. Such baluns are capable of handling full American legal-limit power.

Here then is another form of simple but effective balun for broadband hf or vhf use: just some ferrite beads on the final few inches of the feedline.

Dr Ian White, G3SEK, has provided detailed notes on his assessment of the balun problem that will be expanded upon another time. In his opinion, in praising the virtues of rf choke baluns, W2DU went too far in the direction of decrying transformer-type baluns, since he discussed the problem solely in terms of balance/unbalance. The conclusion he comes to is that if you have excessive rf on a coaxial feedline, and one type of balun alone doesn't cure it, try using one of the other type as well! But keep to the guidelines.

Sounding right—or left

Apart from mechanical and electronic machine telegraphy (rtty etc) we depend for virtually all amateur communication on our ears. As noted in the November 1983 *TT*, it is entirely possible to use psycho-acoustic factors to combat interference by making use of spatial effects; in other words using the "cocktail-party effect" ability of the human auditory system to locate sounds without having to rely on moving our heads.

Yet curiously, nobody is really sure how the human ear and brain act together so effectively. Some years ago I quoted a physiologist who summed this up as follows: "The ear presents some of the most disputed problems of human physiology . . . regarded purely technically, the ear is of comparatively simple construction, so that one might hold the view that an accurate examination would immediately expose the purpose and function of each individual constituent part. Exactly the opposite is in fact the case—and all theories are still full of contradictions."

Two crucial phenomena are at the heart of the unsolved mysteries: the ability of the ear to distinguish pitch and in some way to access the tiny time differentials of the arrival of sounds on which location must depend. Helmholtz, Max Wien, Bekesey and many others have all attempted to explain directional hearing. Yet none of the theories is today accepted as providing an entirely satisfactory explanation. Stereo and "surround sound" (quadraphony) systems have had to be based on incomplete knowledge of the ear/brain system, and it is by no means certain that any of the existing or proposed systems represents the ultimate in exploiting the human auditory system.

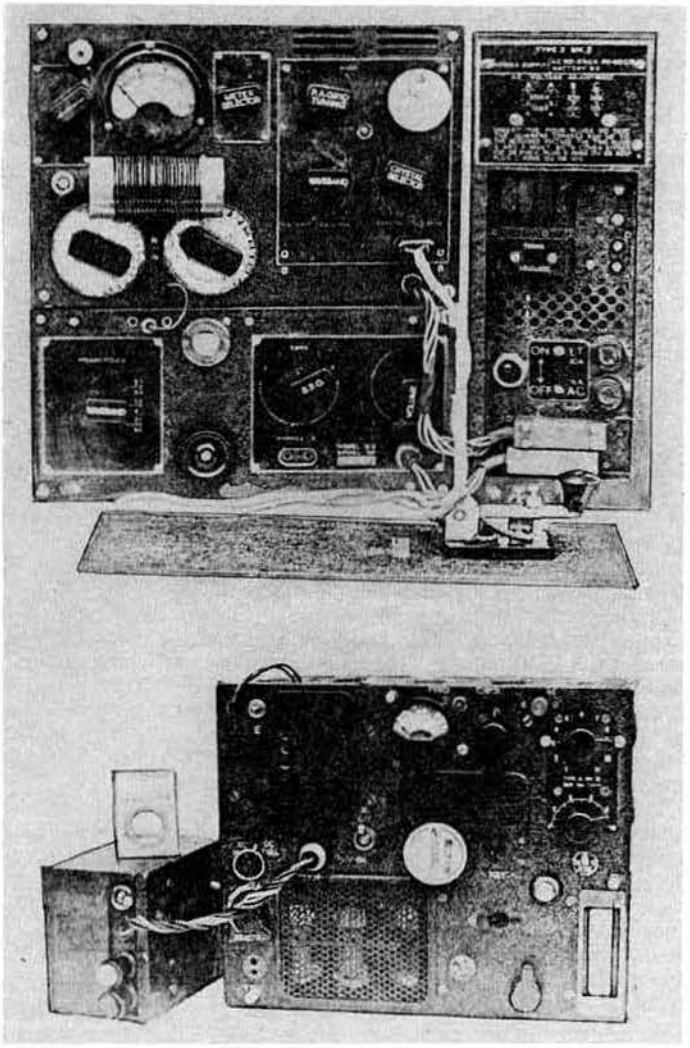
A new and still very controversial explanation has been put forward by Hugo Zuccarelli *(New Scientist*, 10 November 1983, pp438–41) in which he argues that the ear does not simply and passively receive sound; but also transmits sound. The brain then analyses the resulting "acoustic hologram" or interference pattern. Several people, including Pat Wilson at the University of Keele, are reported to have succeeded in recording continuous sounds in the form of 1–2kHz tone emitted by the ears of many individuals, presumably at very low levels. And just as each piece of a hologram produced by coherent light contains information on the complete image so it would seem the "acoustic hologram" developed in each ear can provide directional information. In other words a monaural system with one loudspeaker or one earphone is capable of providing stereo!

Hugo Zuccarelli has developed an electronic recording system based on his idea of interference patterns that he claims produces spatial effects in a monaural channel. For commercial reasons he has so far not disclosed full details of this system. It still remains to be seen whether his ideas will come to be accepted as a significant step towards solving the profound mysteries of human hearing. But it is worth keeping an eye on these ideas in order to discover whether there is any way in which radio operators could make use of them for signal processing on the lines of the pseudo-stereo and dichroic detector techniques referred to in the November *TT*.

Setting the SOE record straight

It has for long been my contention that the rapid development of "suitcase radios" between 1938 and 1945, mainly for wartime clandestine purposes, played a historically significant, yet seldom fully recognized, role in the evolution of portable, low-power hf radio communications over distances of hundreds of miles. It made a lasting impression on two-way radio (see for example "Clandestine radio—the early years" *Wireless World* January/February 1982).

Unfortunately most of the books describing the wartime work of the Resistance, Intelligence and escape networks who used these equipments have been written by authors clearly having little personal knowledge of the problems of radio propagation and technology encountered in undercover



Two of SOE's suitcase transmitter-receivers. *Top:* B2 equipment designed by John Brown with 6L6 power amplifier. Over 7,000 were manufactured in the SOE "factory" at Stoneleigh Park. *Below:* the smaller A3 equipment of which some 4,000 were produced by the Marconi Company

operation in hostile territory. (A notable exception is the original French text of "Armement Clandestine" by Pierre Lorain, F2WL, even though he was not himself a wartime operator.)

Suitcase sets of many types were produced by Special Communications at Whaddon for Intelligence and some Resistance organizations; by the Radio Communication Department of ISRB (an SOE cover name); by British industry for SOE and SAS; by a gifted Anglo-Polish team at Letchworth and Stanmore; by the German Geheimer Funkmeldedienst at Berlin-Stahnsdorf for Abwehr and RSHA communications; by the Russians; in the later stages of the war by the American OSS (who drew considerably on the experience of SOE); and by some of the organizations working inside Europe (particularly the Poles, the Danes and the Dutch). Many of those involved were, or later became, radio amateurs.

The single best-known suitcase set (still in use on amateur bands) was undoubtedly SOE's B2 (also known as the B Mark 2 and Type 3 Mark 2), designed by Major John I. Brown, G3EUR, and produced in large numbers at Stoneleigh Park. It was particularly suitable for para-military operation over hundreds of miles, though rather smaller units were favoured in urban areas of Western Europe for shorter-range working. While my own affiliations were as a base operator with a rival organization, I have no hesitation in suggesting that, for its time and purpose, the B2 and its derivatives were remarkable achievements to which tribute has been paid by survivors, and even by ex-members of the German secret radio-despatches service, whose own equipments were exceptionally well constructed.

My reason for raising this subject once again is a note from G3EUR expressing his disappointment at finding that the recently published semi-official *SOE in the Far East* by Dr Charles Cruickshank (Oxford University Press), contained a short seven-page section (Part 1 (6)) dealing with radio communications in which there are a number of misleading or factually incorrect statements. The book has been very favourably reviewed in regard to its military and political merits and is sure to be welcomed as a standard book of reference. Indeed John Brown himself found much of the book absorbing, horrifying and vivid in its taut, clear portrayal of a war and a world very different from that in Europe. However, he highlights seven points that are either wrong or capable of misleading readers with no experience of hf communications:

(1) "The first w/t equipment available . . . . weight could exceed 400lb" was not an SOE-designed equipment.

(2) The B Mk1 (55lb) is said to be "a separate entity which meant that if one element became u/s (unserviceable) the whole set was useless". G3EUR comments: "The B Mk1 comprised five separate units: receiver, transmitter, ac power pack, battery power pack and spares box, all mounted on a frame within the suitcase, and each replaceable in the field. The B Mk2, designed primarily for Europe and the Middle East, continued the modular theme without the frame.

(3) The B Mk3 was *not* designed by Col Knott as stated, but by John Brown's team in the UK, started in 1944 and completed early in 1945. It was designed especially for jungle use.

(4) The book suggests that by using quartz crystals "the operator in the field did not have to tune his set". Tuning of the transmitter was necessary on *all* models (exceptionally a low-power Whaddon transmitter needed no tuning whatsoever but provided very little rf output—*G3VA*).

(5) In a long passage of complaint the B2 is said to have been "excellent at long range and at short range up to 15 miles" but "useless" at the range of 30 to 40 miles required by some parties. Everyone with any experience of hf communication should be aware of "skip" and the problem of communicating over distances of about 15 to 60 or so miles on frequencies above about 3MHz. No low- or medium-power transmitter could have avoided this problem. The only practical solution at that time was to use distant base stations as relays, or to set up a chain of B2 relay stations spaced about 15 miles apart.

(6) The author complains that base stations appeared to close down between about 2200 and 0700—a complaint that may be related to night-time propagation effects on circuits not equipped with suitable night-time crystal frequencies. Even today, every hf operator recognizes the problem of communicating over a fixed distance at any time of the day or night without considerable resources!

(7) The use of members of the First Aid Nursing Yeomanry (FANY) as w/t operators and cipher clerks in the Far East was not (as implied) an innovation, but an extension of the success of FANY in this role, starting in UK SOE base stations in mid-1942 and progressing from there to the Middle East and finally to the Far East.

A "standard" for connectors?

In recent decades the need in all forms of consumer electronics for better standardization of pin connections of plugs, sockets and connectors between different companies and different countries has become ever more evident. In the audio field, the German DIN (Deutsche Industrie-Normen) recommendations have been widely accepted; for domestic tv it is hoped that a new Euro-connector (SCART) socket will come into general use over the next few years, permitting connection to tv sets of video tape recorders and discs, teletext adaptors, video games, home computers, DBS C-MAC receivers etc at video frequencies rather than at uhf.

Pin connections for the Euro-connector include provision for both "composite" video and "component" video inputs. This, incidentally, should prove valuable to anyone wishing to achieve optimum quality pictures from non-broadcast auxiliary equipment and using a domestic tv set as a vdu for an rtty display etc. Though one fears that extra attachments to tv sets will inevitably raise new tvi problems, particularly if the socket provides yet another way into the tv receiver for, say, 3·5MHz local signals.

A standard connector for amateurs?

Amateur radio equipment, unfortunately, has so far exhibited little consistency in the connectors used for microphone and speaker accessories. Dr Peter Best, G8CQH, controller of the Solihull & Chelmsley Wood Raynet Group, has found the lack of standardization a handicap for emergency communications, and has introduced a "standard" based on DIN sockets. He feels this would benefit the hobby generally if it could achieve wide acceptance; it has already proved of great value during local Raynet exercises, and has overcome many of the operational and administrative problems that arise when a group of people depend on equipment owned by individuals.

He writes: "The scheme uses three elements: (a) a 'rig-adapter', (b) a 'line', and (c) one or more accessories or peripherals, all furnished with DIN connectors. The seven pin DIN socket (see Fig 4) defines the complete

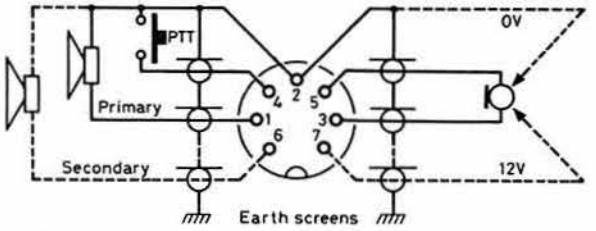


Fig 4. Proposed "standard" connections to the seven-pin DIN socket as proposed by Dr Peter Best, G8CQH, controller of the Solihull & Chelmsley Wood Raynet Group

scheme, allowing 3-, 5- (180) and 7-pin DIN-type plugs to be used as appropriate. The 'rig-adapter' is a short length of cable terminated in plugs to suit the specific transceiver, and conveying microphone, push-to-talk and loudspeaker signals to a DIN socket as a standard presentation. The 'line' is a signal cable, many metres long if required, having four individually-screened conductors to carry the microphone, ptt and ls functions from a five-pin plug to parallel-wired sockets mounted either in a small box or in the plate of a cable reel.

"Accessories or peripherals can take a variety of forms, depending on the desires and ingenuity of the owner. Typically, these might be a microphone with integral ptt, a variety of headsets which may have boom microphones, separate ptt switches including footswitches (as 'trample-to-talk' or ttt) and modified telephone handsets as a variant on the speaker-microphone concept. These would be wired to the scheme and furnished with a DIN plug of sufficient pins to suit the functions offered by that peripheral. Speakers alone take a three-pin plug (with pin 3 unused) while a microphone with integral ptt takes a five-pin plug (with pin 1 unused). Stereo headphones, with or without boom microphone and ptt, take a seven-pin plug since the scheme purposely allows such headphones to retain their separated channels for other applications. Lightweight headphones for hi-fi etc double as excellent accessories for radio operation.

"The adoption of a standard connector and pin arrangement throughout the scheme ensures that all peripherals owned by one individual become interchangeable and may be used with any transceiver (or audio system) for which a specific rig-adapter lead has been made. Likewise, this interchangeability extends to peripherals of different ownership for occasions (frequent in Raynet and contest groups) when two or more operators share the operation of a station. To achieve this interchangeability and to maximize the options which can be exercised within it, the pin assignment and cable specifications for the scheme are specific and not an accident of consensus arbitration.

"Good electrical practice requires that high- and low-level signals do not share a common earth return. Hence, throughout the scheme the microphone (a low-level signal) has two screened conductors, and only in the rig-adapter or at the transceiver connections may the signals of pins 5 and 2 be made common. Also, maximum possible separation of pins transporting high- and low-level signals through connectors is achieved with the primary speaker at pin 1, and the secondary speaker at pin 6 for stereophones (where primary becomes 'left' and secondary 'right'). The ptt, being normally an earth-referred, non-fluctuating high-level signal, is at pin 4 on the high-level 'side' of the connectors. Pin 7 is allocated as a nominal 12V connection with respect to earth-screens (pin 2) to supply active microphones (eg electret types) and certain low-current indicators (eg 'on-air' l.e.ds).

"Only the first five pins convey all the minimum essential signals for controlling a transceiver during fixed-frequency operation, so that peripherals and lines wired to this scheme give the operator freedom of movement in his shack and beyond. The use of individually-screened cores (eg RS Component 367-577) ensures minimum crosstalk in long cable runs; an essential consideration if the peripherals are ever to perform satisfactorily in an intercom mode when the audio output is not depowered during 'transmission'. Transceivers which require a series mic-ptt circuit can be accommodated in the scheme by strapping pin 5 to pin 4 (instead of pin 2) 'behind' the rig-adapter DIN socket. Normally, pins 1 and 6 are strapped together at all sockets, and safety-practice requires the exposed metalwork of boxes or cable reels to be connected to the earth-screens (pin 2) at one point."

Add-on clock-tuned notch filter

A tunable af filter capable of putting a deep, sharp notch anywhere between about 100Hz and 2·6kHz, using a switching frequency between 5 and 128kHz, was described by Steve Bramblett of Motorola in *Electronics*, 24 February 1983. This is based on the Motorola switched-capacitor digital notch-filter ic type MC145433: Fig 5. The centre frequency of the notch is tuned by the clock generator (NE5555). Note that an output transformer is required for low-impedance output, as the MC145433 is not capable of driving less than 600Ω directly. The filter can be used with almost any communications receiver or transceiver by driving the unit from the set's headphone output jack and connecting the low-impedance headphones to the filter output. It can be used to combat carrier heterodynes etc.

Care and feeding of nicads

The Japanese broadcasting organization, NHK, uses large numbers of nicad batteries (eg 300 batteries of 3·5Ah rating) for the operation of portable video equipment, and has devised a careful maintenance system based on microcomputers. These are used to record the type, number and initial date of use, frequency of individual battery operation, date of performance measurement, charging times and discharging times. While such systems (*ABU Technical Review* November 1983) would be far too elaborate for most of our needs, the NHK article does underline once again the need for care if long and reliable operational life is to be achieved with nicad batteries.

It is often claimed that a nicad cell will last for a 1,000 charge/discharge

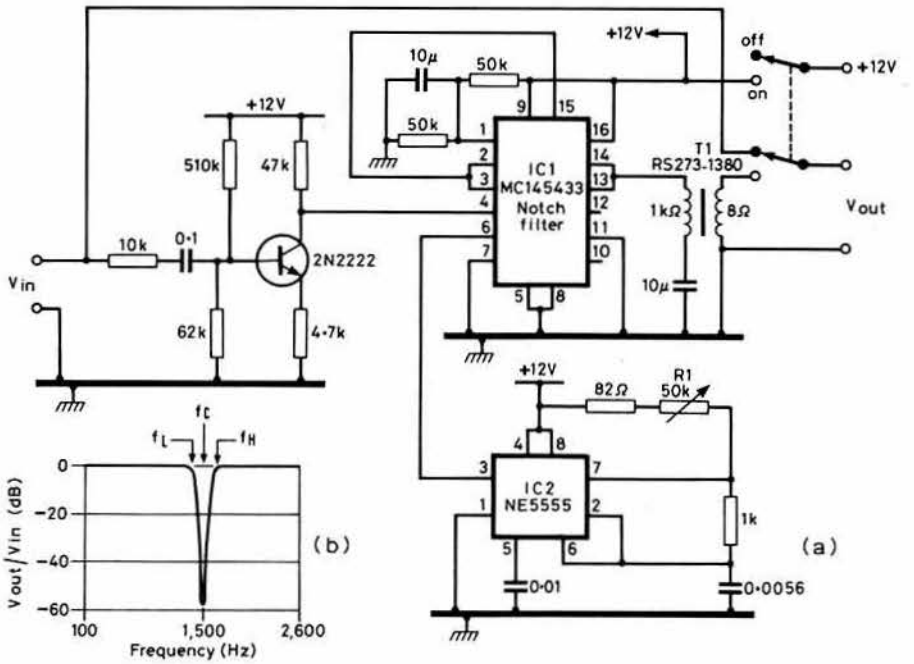


Fig 5. A switched-capacitor notch filter ic can be varied between about 100Hz and 2·6kHz by a clock to provide an external notch filter

cycles, but this is likely to be achieved only if the batteries are treated carefully. The increasing use of rapid-charging at rates well above 0·1C (ie 30mA for a 0·3mAh cell) emphasizes the need for care since there is a real danger of explosion when a nicad battery is overcharged. Excessive discharge should also be avoided since this will damage the battery. Over discharging can cause the reversal of polarity of one or more series-connected cells in a battery. When attempting to recharge a battery that has been excessively discharged, the operation should be carefully watched and monitored for a time to ensure that the battery is actually re-charging.

Because a nicad battery self-discharges when not in use at a comparatively high rate, NHK advise using a freshly recharged battery, creating a pool of discharged batteries awaiting charge.

When an NHK battery is taken off the charger it is always given a terminal voltage measurement (no-load conditions): a 12V battery is regarded as in satisfactory condition if the meter shows 13V or above. The check also confirms that there is no break in a built-in fuse or a connector fault. NHK has found that (in the conditions under which portable video equipment is used) faults arise more frequently from damaged packages, broken connector wires and other mechanical faults, arising from dropping or mishandling the batteries, than from deterioration of the cells. It strongly advises against carrying batteries by the connecting leads etc.

Batteries which have deteriorated due to infrequent use, NHK confirms, can sometimes regain normal performance after repetition of two or three cycles of regular discharge and recharge.

On the rather different subject of disposable batteries, which nowadays are only as cost-effective as nicads in circumstances where infrequent use is made of battery-operated equipment, it may be pertinent to remind readers not to be misled by the heavy promotion of alkaline cells. These *do* provide much superior performance to zinc-carbon cells in conditions of *substantial drain over long periods of continuous use*. But for low and medium drain and for intermittent use the advantage is relatively small; in these circumstances the traditional zinc-carbon cells are considerably more cost-effective. There are several different forms of zinc-carbon cells (eg SP, HP and Power Plus) and it should always be remembered that large cells tend to have better shelf-life, as well as being more cost-effective, than the smallest cells.

With nicad cells now available at relatively low cost, interest in recharging primary cells seems to have largely evaporated but should not be forgotten, provided charging rates are kept very low (to guard against explosion) and cells are put on charge promptly as they become discharged. The "dirty dc" (rectified but unsmoothed ac) technique (*ART*) remains valid for those who want to give more than one lease of life to such cells as SP2, HP2 etc.

Overvoltage protection

It is well known that if an emitter/cathode short-circuit occurs in the "pass" transistor of a typical 13·8V power supply unit—a by-no-means-unusual experience if it is called upon to run near its maximum rated current —it will result in an overvoltage being applied to what may often be very expensive equipment designed to take only the normal voltage variation of a 12V vehicle battery. For this reason it is wise to incorporate some form of overvoltage protection that acts instantly, followed by the inevitably-delayed blowing of a fuse to turn off the output voltage, should this reach some specified figure. The term "crowbar protection circuit" is, I suspect, derived from the traditional practice of discharging high-voltage smoothing capacitors by short-circuiting the supply with a heavy rod having an insulated handle before attempting to delve into, for example, a high-power radio or radar transmitter.

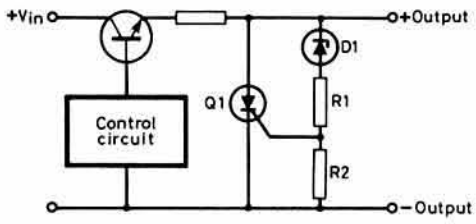


Fig 6. Common form of crowbar overvoltage protection circuit. This is reasonably satisfactory provided that the trip voltage is carefully checked

Ian Cousins, VK5IK, in *QST* October 1983, pp37–40, provides a useful and well-researched article on overvoltage protection of low-voltage power supplies. Over the years he has built up a transistor "graveyard" of no less than 44 silicon power transistors: only in one case was the fault an open-circuit; nine medium-power types used in inverters had collector-base short-circuits; the remaining 34 devices had all suffered collector/emitter short circuits. In a test arrangement, four 2N3055 pass transistors were deliberately abused by using inadequate heatsinks, resulting in thermal overload. All failed with collector-to-emitter short-circuits after periods ranging from only 2min to over 5h. It was noted that these devices tended to trip the fault-detector circuit, but after cooling tested ok; complete failure would then occur after a further short period of use.

Overvoltage problems can also arise as the result of failures of ic-type regulators, driver transistors etc. Good overvoltage protection is thus far from being over-cautious design, unless the unit is powering equipment that can take the highest possible output voltage from the psu; some units with germanium-type pass transistors, or designed to operate with very low differential between input and output voltages, may come into this category, although protection will still be needed against mains or other transient overvoltages on the input.

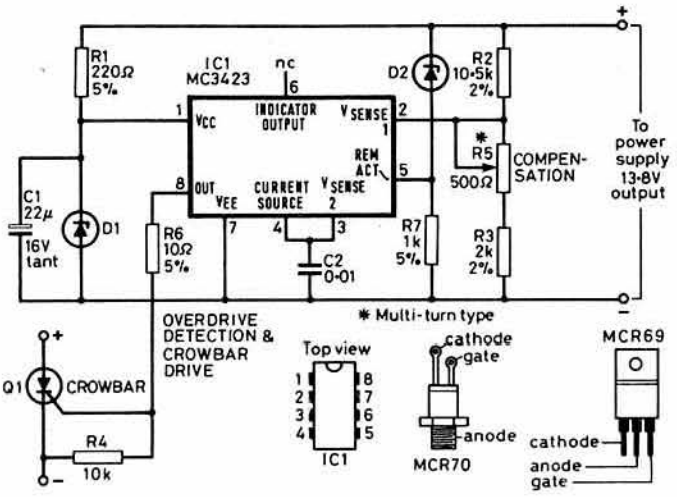


Fig 7. Overvoltage-protection circuit recommended by VK5IK. Resistors 0·25W five per cent film types except R2 and R3 which should be two per cent metal-film types. R4 is mounted close to the thyristor terminals. It reduces the possibility of triggering by noise or leakage. MC3423P (Motorola and TI) and SG3423M (Silicon General) are in plastic nine-pin packages. Devices also available in ceramic packages

VK5IK notes that the common crowbar arrangement (Fig 6) of zener diode with thyristor (scr) having a design trip level of about 15·5V is reasonably effective *provided that* a careful check can be made of the actual in-circuit tripping voltage. This precaution is essential because of the tolerances inherent in zener diodes and thyristor trigger voltages. Even with a five per cent tolerance zener diode, the tripping voltage for such a protection circuit can vary from 14V (tending to operate even with a simple change of load current) to as high as 19·2V, and so possibly failing to act even with a short-circuited pass transistor. Similarly questions can arise from variations in scr trigger current or turn-on speed. His advice is that this very common arrangement is "probably best avoided unless the load to be protected is of little value, or if equipment exists to measure actual operation."

His preferred solution is to use a comprehensive over-voltage protection system designed around the MC3423P device (Motorola or Texas Instruments): Fig 6. These devices have been available for several years but have been largely overlooked in amateur radio applications. The MC3423 contains a precision 2·6V reference, two comparators and a thyristor driver, and can form the heart of an effective system: Fig 7. For optimum protection the external components should be good close-tolerance types: metal-film, two per cent tolerance resistors for R2 and R3; a good-quality Cermet or wire-wound trimmer for R5. The use of an ic socket will eliminate the risk of damaging the ic during soldering. Motorola MCR69, 70 and 71 thyristors are intended specifically for crowbar applications, and will safely handle very high peak currents. Since the thyristor needs to handle such currents only briefly until the protective fuse blows, heatsinking is not essential, although a small heatsink bracket can provide convenient mounting.

In his *QST* article VK5IK provides detailed information on construction, setting up the system to ensure tripping at 14·75V, and methods of installing and using such overvoltage protection. However, the above notes should at least serve to introduce the MC3423.

Triple-mode power supply

In the days of high-voltage power supplies it was not uncommon to incorporate switching to provide more than one output voltage by changing the mode of rectification, for example, from fullwave (biphase) to voltage doubling etc.

An ingenious adaptation of this type of arrangement for low-voltage operation (although there is no reason why it should not be used at higher voltages) appears in the "Hints and Kinks" column of *QST* September 1983, p37 by R. B. Gibson, KE5E: Fig 8. In this triple-mode unit with S1 turned to switch-position "½", D1 and D2 are effectively out of circuit, rectification is fullwave with centre-tapped transformer, and nominal output voltage is 0·5Vrms where Vrms is the total rms voltage of the transformer secondary. In position "1" the loaded output voltage is roughly equal to Vrms; in position "2" the configuration becomes that of a fullwave voltage-doubler (D2 and D4 have no effect) and nominal output voltage is 2Vrms.

Remember that voltage and current ratings for all the components must be chosen for the "worst case" of the three modes. The piv of the diodes should preferably be 4Vrms; C1 and C2 about 2Vrms. Filter capacitance and diode current ratings are determined by maximum current in the "½" mode.

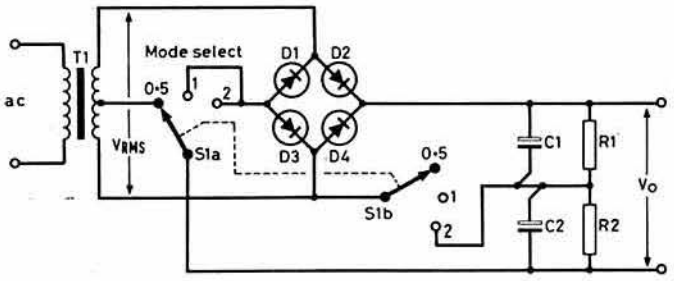


Fig 8. Triple-mode power supply providing voltage outputs nominally 0·5Vrms, Vrms or 2Vrms according to the position of S1

KE5E suggests, in low-voltage applications, that this triple-mode arrangement can provide increased operating efficiency with a supply using an adjustable three-terminal regulator, in order to reduce voltage drop in the regulator at different output voltages, permitting the regulator to handle more current at low voltages, without exceeding power dissipation limits. With an old-style 250-0-250V transformer it would be possible to obtain output voltages of nominally 250V, 500V and 1,000V.

Limiting filter-capacitor in-rush

Several comments have appeared in *TT* on the problems posed by the use of filter capacitors, often specially chosen for their low equivalent-series resistance and large capacitance value, in low-voltage power supply units. In *Electronics* 17 November 1983, J. E. Buchanan, of Westinghouse Electric Corporation, describes a simple method of limiting the turn-on, in-rush current to such capacitors by using a power-fet and a couple of discrete components: Fig 9 (a) shows how a p-channel fet can limit a current source; (b) shows an n-channel fet coping with current sink.

Initially the power fet is "off" and current is limited by passing through R1; after a short time determined by the time constant of C1 R2, the fet turns "on" and offers a resistance that may be less than 0·5Ω and so effectively by-passes R1. The turn-on of the fet can be set to coincide with the charging time of the filter capacitor C2. This time will depend on the time constant R1 C2. The fet must be capable of carrying the full output current of the psu, although fets can be paralleled and this then further reduces the turn-on impedance.

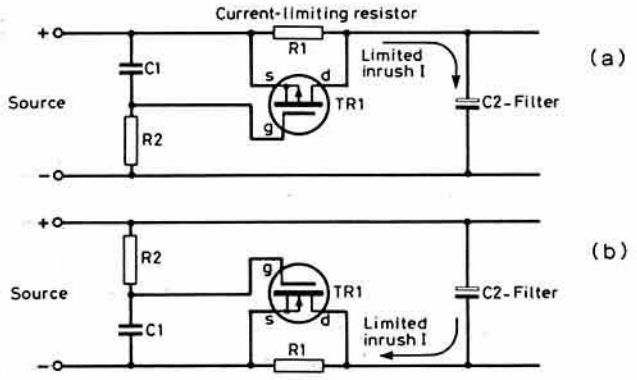


Fig 9. Use of power fet to provide an active inrush-current limiter to prevent very heavy turn-on currents flowing into a large-valve filter capacitor

Using low-cost vmos

Frank Ogden, G4MHZ, tells me that in collaboration with Tony Bailey, G3WPO, he has found that large chip af vmos devices developed by Siliconix, and marketed at prices in the region of £5, can provide excellent linear amplifiers at frequencies up to at least 14MHz, provided that appropriate designs are used. A pair of such devices can provide 50W rf output for around 4W drive from 12V supplies with good linearity. This seems a highly interesting development for those who note the still relatively high cost of pukka rf vmos and tmos (Motorola) devices.

Low-differential voltage regulator

Earlier items in *TT* have noted that it is possible to design low-voltage, high-current regulators having negligible differential between input and output voltages by providing a separate, higher input voltage (at low current) for the regulator. In "Circuit Ideas" *Wireless World* October 1983, A. Kerim Fahme shows that the higher input voltage for a 5V regulator can be obtained using a dc-dc converter ic such as the 7660. The differential is then reduced to the saturation voltage of the pass transistor(s) which will be lower with germanium than silicon power transistors. Fig 10 reproduces his circuit arrangement suitable for a 5V regulated output at several hundred milliamps when fed from a 6V battery or other source. Note that the 7660 ic should not be used for input voltages above 10V.

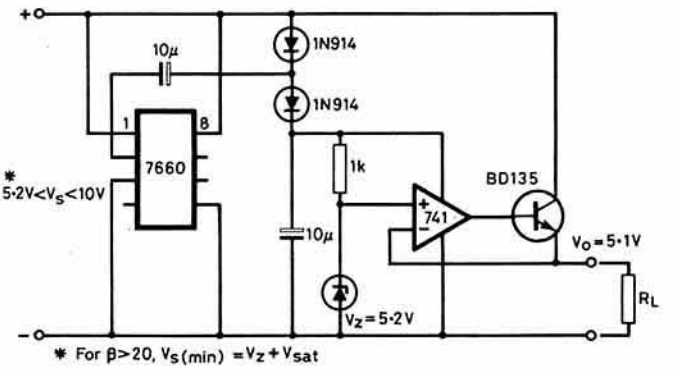


Fig 10. Voltage regulator with negligible input/output voltage differential by using a 7660 ic dc-dc converter to provide a higher input voltage for the regulator

Panel lettering

Alf Hussey, G4KUN, is an engineer by profession and enjoys making the cabinets for his homemade equipment. He passes along the methods he uses to provide lettering for a neat finish to front panels, dials, etc. Most amateur equipment is black or dark grey, and although it is possible to buy white rub-down lettering, this does not cover circuit symbols used to denote antenna, earth or other circuitry. He writes:

"My method is as follows. After spraying the panel with a matt paint, cut a piece of thin typewriter copying paper (carbon paper) to cover the part to be decorated. Secure this to the panel with a piece of masking tape on the top edge only. Then draw, with pencil and ruler, using a plastic stencil for letters and numbers, on the paper making sure the layout is right. When it is correct, lift the paper by the 'hinge' at the top, and slip underneath a piece of Tipp-Ex typewriter correction paper, available from any stationers. Now go over the penciled outlines and the Tipp-ex paper will transfer neat *white* markings on to the panel. When all is finished wipe the panel free of any dust and cover with a piece of Boots Library Film (self-adhesive clear film) giving a smooth wipe-clean finish."

In *QST*, W. E. Wiehe, WD9BBI, notes that the dtmf keypad identification marks on Icom handheld transceivers have a tendency to wear off. He advises coating the keypad with tape to protect the rest of the rig. Two light coats of clear lacquer spray provide adequate protection. The finish, he claims, is like new even after months of use. □

4-2-70

*by Ken Willis, G8VR**

THE INCLUSION OF amateur radio transmissions into the most recent NASA space shuttle programme was to some extent marred for UK amateurs by the attempts of a few misguided individuals to jam signals from the shuttle by a variety of means. As Arthur Milne, G2MI, said at the RSGB agm, why anyone would want to spend several hundred pounds on a piece of equipment and then use it to advertise the fact on the air that he is an idiot defies explanation. Meanwhile we await information from W5LFL on the stations he worked, not because of the jammers, but because he took all his copy on tape which was to be "unscrambled" on his return to *terra firma*. If you called him, good luck in the final outcome; it could result in a unique QSL card to put on the wall of any shack.

Four and six metres

John Wilson, G3UUT, will be in Holland at least until the end of February 1984, operating as G3UUT/PA. Anyone who would like to try a crossband contact with him on either 4m or 6m should write to his UK address (QTHR) for forwarding, or phone him in Holland on 010-31-40-525237. John has so far worked G4GLT, GU2HML, G3NOX, G3COJ, GM3WCS, GW3MHW, G3ZIG and GM4FDT using meteor-scatter 80m-6m, plus G3IMW, G3ZIG, G4BAO and GU2HML 80m-4m. He has used only an indoor dipole for reception of the 4m and 6m signals from the UK, and comments on how good reflections can be on these bands, even with such simple equipment.

Reports such as this, which illustrate some of the interesting features of these lower-frequency bands, lead to conjecture on the possibility of 50MHz becoming available to all UK amateurs eventually. At the RSGB agm the vhf manager, Keith Fisher, G3WSN, in reply to a question from the floor related to the 6m band, asked members not to confuse the current 50MHz "propagation experiment" with the general issue of releasing the 6m band to amateur use. The conditions of the experiment, which excluded Class B operators, were imposed by the licensing authority when the permits were issued for limited operation outside tv hours. The matter of 50MHz being opened to amateurs was one which the Society was pressing through formal channels, and with BBC transmitters in Band I due to close at the end of this year, some progress might be expected during 1984. G3WSN assured the meeting that in the event of 50MHz being released, it would be open both to Class A and Class B use, since it would not be a shared band in the sense that 70MHz now is.

Much life could be breathed into the experiment by allowing Class B amateurs to work crossband between 50MHz and the other frequencies for which they are currently licensed. The provision of a 50MHz receiving converter is not an expensive undertaking (in fact the design and construction of suitable pcbs would make an interesting club project), while a dipole for 50MHz should not prove too unsightly on the average dwelling. One great advantage of such a converter is that by detuning a little to the lower frequency side, the European tv channels on and around 49·75MHz can be received, which provide much interest both for sporadic-E monitoring and ms reception.

One operator who needs no encouragement to operate both 4m and 6m is GM3WOJ. Chris has recently moved to Fortrose, Ross-shire (QTH locator XR40a on the Black Isle), and says it is a much better QTH than he had previously in Fort William. He comments on the superb performance of 6m for ms, having worked G4IJE no less than 28 times, mostly on a weekly basis. Chris says 50MHz is also good for auroral propagation. Other news from GM3WOJ is that he had very good results in the VHF NFD and the August Trophy contest by using a new 70MHz antenna, no less than 14 elements on a 35ft boom! He says that this monster Yagi gave a clean response-pattern plus "144MHz-type gain". He and his contest group colleagues have now won the 4m slot on VHF NFD four times in the past five years. During the Saturday evening of VHF NFD he heard beacon 5B4CY on both 4m and 6m for the first time from Mull of Galloway, also TF1T on 6m. GM3WOJ will soon be back on 70MHz from his new location.

G3JEQ (Surrey) recently qualified for a 4m 20 squares and four countries award in a claim which included nine auroral cw contacts on that band. He was only the third operator to reach the 20/4 level of award in 1983. With auroras tending to be much weaker than we enjoyed in 1981-2, operation on 70MHz can be very rewarding, since an event which produces little in the way of dx on 144MHz can prove much more interesting on the lower band.

Our regular correspondent John Branegan, GM4IHJ, has been forced to relinquish his 50MHz permit due to a changed work schedule which made it difficult for him to operate during the non-tv hours.

If there is sufficient interest, GM3JFG and GM4FDT are prepared to be on 70MHz on Wednesday evenings at 2000gmt on 70·200MHz with beams to the south. Please write to them QTHR for specific skeds etc, or let *4-2-70* know of your interest in being QRV at the time offered.

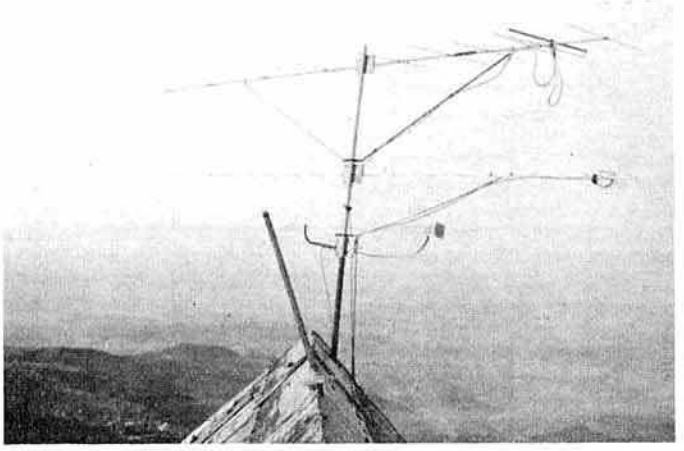
As reported in "Amateur Radio News", the licensing authority has approved the issue of a further 60 50MHz experimental permits, available only to Class A operators. The request by the Society for round-the-clock operation on 50MHz for selected UK amateurs so that any late F2 transatlantic propagation could be "caught" failed to receive approval, though by this time it is most unlikely that any such propagation would be experienced.

GW3MHD has sent a lengthy report covering several 4m and 6m issues. He still carries out test transmissions on 50·106MHz between 0745 and 0830 daily, and is seeking reports from swls or licensed amateurs, all of which will be acknowledged. He calls the folk who listen on 50MHz "ultra-swls", and among them names G6XHC (formerly BRS2098). Reports from G3AYJ and G2FWJ were also much appreciated. GW3MHW says he can do little with GM stations except by ms reflections because of local screening, though he carries out tests with GM3DOD, GM4FDT, GM4FZH and others. He also is QRV on 70MHz and can come on for schedules when requested with 15W p.e.p., though a bigger amplifier should soon be on the air for his regular 2000gmt stint looking for random contacts on the band.

A detailed report, which will be commented on later, was received from GM4FDT (Ross-shire) who claims to be the most northerly station on 50MHz.

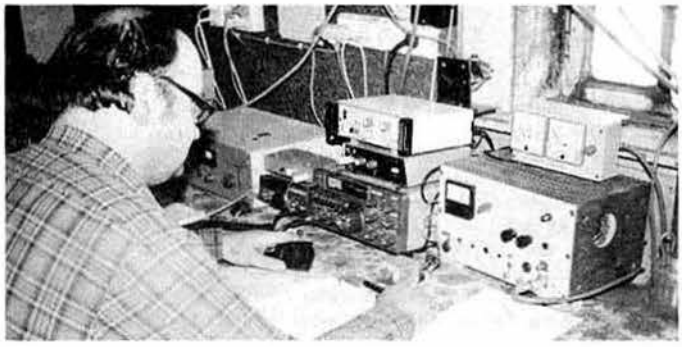
News from Czechoslovakia

VHF operators in the UK depend very much on the efforts of European operators in the remote locations to make contacts with rare squares and new countries. In this respect we have always been well served by stations in Poland, Yugoslavia, Hungary and Czechoslovakia: in all these countries there are dedicated vhf/uhf operators, many of whom possess considerable technical knowledge and ability and who are capable of building very sophisticated equipment, often in areas where the availability of components is not as easy as it is in the UK.



Antennas used by OK1KHI from mountain site, October 1983

*11 Old Downs, Hartley, Kent DA3 7AA.



Petr, OK1AXH, working UK stations on 2m, October 1983

Our Czech friends have always been among the most enthusiastic vhf operators, ready to ascend to mountain tops to activate rare squares in a country where the terrain would otherwise make a contact impossible, so it is with great pleasure that a report and some photographs were received from Franta, OK1CA, who is a regular reader of *4-2-70*. He sends details of portable station OK1KHI which operated on 2m and 70cm during October 1983 from the mountain Snezka, 1,602m above sea level in HK29b. There were good tropo conditions into the UK on 22 and 23 October, and on 2m, 375 G, 39 GW, 21 GM, 11 EI, 3 GU and 2 GD were worked, operator being OK1AGE. In the same period on 432MHz, 78 G, 7 GW, 2 GM were worked, plus GU6EFB, GI4GUS and EI6AS, all being first-time contacts for the UK stations with OK. The best 432MHz dx was EI6AS at a QRB of 1,525km, while the operator in Czechoslovakia was OK1AXH.

The entire team was OK1AGE (Stan), OK1FBI (Jirka), OK1AXH (Petr), OK1FOX (Jirka) and OK1CA (Franta), while equipment was: **2m:** FT225RD with home-brew 80W QQEO6/40 amplifier, 10-element Yagi; **70cm:** FT780R with home-brew 2 × 2C39A amplifier and 100W 21-element antenna.

OK1KHI is a club call, and they will be active in contests and during October in 1984 on 2m and 70cm. OK1CA will be active on the microwave bands. They will be looking for UK contacts.

Beacons

John Wilson, G3UUT (Cambridge) reports that the 4m beacon GB3ANG is off the air for essential maintenance and will remain so for some time.

The Amateur Radio Association of Bahrein has notified the RSGB that permission has been received to operate a vhf beacon with the callsign A92RB. The location will be atop the Gulf Hotel on the outskirts of Manama at a height approximately 180ft asl. A Dymar 830 20W transmitter will be used into a Jaybeam 5dB colinear antenna, logic control being homebrew. The Society was requested to advise on the choice of a suitable frequency for the beacon, the temporary frequency used for installation and testing being 145·500MHz (ie S20). (See also new repeater in this area under "Repeater news").

Approval has been granted from the licensing authority for the installation and 24h/day operation of a 50MHz beacon at RSGB headquarters. More information when this beacon is nearer completion.

Repeater news

From time to time *4-2-70* has reported the activities of the enthusiastic Sudbury (Suffolk) Repeater Group as authorization to activate GB3SU on RB15 was awaited. The repeater is now on the air, and Dave Howard, G4IZA, the secretary of the group, has supplied some information on the system. Callsign (GB3SU) is transmitted at 5min intervals, with full deviation when the repeater is not in use or with 20 per cent deviation when the "machine" is busy. Callsign is also sent at cessation of use. Access initially is by 1,750Hz tone, but thereafter by carrier only. Timeout has been set at 9min, but is reset upon each new access, either by tone or carrier. The location is on the BBC mast-site at Cornard, Sudbury, Suffolk. Dave makes the point that the repeater will cost about £100/annum to maintain, and asks regular users to remember this and to join the group, thereby contributing to the upkeep of a useful repeater. The newsletters put out by the group are also of a high standard.

This might be the place to remind all repeater users that, in the words of the late Harry S. Truman, there's no such thing as a free lunch, so a modest subscription to the group operating the repeater of your choice would always be greatly appreciated, even if full group-membership is not your particular scene.

Another excellent newsletter (No 36), edited by G8GTF, QTHR, has been received from the Kent Repeater Group. The group secretary is G4RVV, QTHR, and the group boasts over 500 full-members using its six repeaters "CK, EK, KN, KS, NK and SK". Its president is none other than Mike Dennison, G3XDV, the Repeater Management Group chairman, whose work on behalf of repeater users generally is legendary.

A release from the Amateur Radio Association of Bahrein in the Arabian Gulf describes their repeater on R6 (receive 145·150MHz, transmit 145·750MHz) which is operational from a location on the National Bank of Bahrein Building in Central Manama. The antenna is some 200ft above ground, and the equipment is mainly homebrew. Logic control is by G4HYD, and a single Decibel 224X antenna is used in conjunction with a WACOM WP/639 four-cavity duplexer. Stations in Saudi Arabia, Kuwait, Bahrein and Dubai use the machine, while maritime mobiles who have called in on the channel include G3RSP, G3UJB, G3CLW, F6AXV and LA2PH.

Chris Lorek, G4HCL (Cambs), reports that there has been much enthusiasm locally for the proposed site change for GB3PY mentioned in *4-2-70* November 1983, while activity on the repeater in its present location has increased six-fold, indicating that operators possess the gear but apparently have not been using it. Some objections have been raised to the site change, and the matter rests with the Repeater Management Group.

Another excellent newsletter, *Central Scotland & Borders FM News*, has come to hand and is full of information and general news of this very active group. Write to the editor, Colin Dalziel, GM8LBC, QTHR, for information on availability of this publication.

Aurora

QST, the official publication of the ARRL, contains a most remarkable picture on page 15 of the November 1983 issue. It is a photograph of an aurora, taken from the American spacecraft *Explorer 1* from a height of 20,860km above the North Pole. The entire auroral distribution is clearly visible, the photograph being taken by imaging phototometers which could "see" light from the ultraviolet through most of the visible spectrum. The picture was taken during the aurora of 25 September 1981. The author of the short article which accompanies it looks to the day when amateurs, using their own equipment, will be able to "tune in" to such satellite transmissions and have their own displays of auroral distribution. We have certainly come a long way in amateur radio in the past 40 years.

From Fraserburgh, Aberdeenshire, Laurence, GM4DMA, has sent another detailed auroral report which indicates that, especially for those further north, there is still enough of such activity to warrant keeping a careful watch on the 2m and 4m bands. Here is a summary of his report:

4m

30.10.83 1700-1730gmt EI4RF 52A QTF 020°.
9.11.83 2020-2040gmt EI4RF 57A QTF 030° (fast QSB).
10.12.83 1625-1832gmt EI4RF 54A QTF 040°.
Beacons audible GB3CTC 54A and GB3BUX 59A.
GMs worked in YP and XR squares QTF 040°.

2m

9.11.83 2024-2100gmt SK4MPI and GB3LER beacons 57A QTF 030°.
2031-2050gmt Four LAs worked in EU and FT QTF 030° (LA's QTF 345°).
14.11.83 1720-1725gmt OY9JD 57A QTF 000 (His 345).
Tried 432MHz with no signals heard either way.
OY9JD then worked on ssb 54A, and GMs worked in YP on QTF 32° (other stations 320).
GM3JFG (XR 30b) found this event to be a very good one and had 35 contacts between 1336 and 1701gmt a 11 QTF 025-040 with best dx being OH7PI (NW), OH5LK (NU) and OH2MG (MU), plus several SM, OZ, LA. This aurora extended as far south as DL and FL squares.
15.11.83 GM3JFG was again active, 1455 to 1547gmt in an event which provided contacts with OZ, SM, OH1DP (LV), PA and D, all on QTF 010.
16.11.83 Strong event first detected at 1645gmt. Peaked at 1727gmt and faded out at 1909gmt. Worked many D stations in EN, FN, FO etc on QTF 030 (D's QTF 345°). Also worked LA, SM, OZ all QTF between 020 and 035°.
GM3JFG (XR30b) reported the same event with good correlation of starting and finishing times. He worked SM, OY9JD, LA, GM and GW all on QTF 020-030.
17.11.83 Short event 1710-1720gmt with GM3ZXE worked.
26.11.83 Short event 2000-2008gmt. Worked OZ1AZZ, SK6HD and SM6CMV all on QTF 035°. Nothing heard from beacon GB3LER.
28.11.83 GM3JFG reported an event between 1851 and 1946gmt in which he worked EI, ON, SK, G6WR and G3LTF (AL) all on QTF 035.
7.12.83 Event first detected at 1635, ended at 1815gmt. Beacons GB3LER and SK4MOI heard on QTF 025°. Worked GM3XOQ (Shetland), LAs in FT, FU and CU, and an OH in LU square.
10.12.83 A very strong event, first detected at 1628, ended at 1831gmt. Many stations worked, all on QTF 030°. Ten Ds, 10 GI, 4 LA, 1 GW, 3 PA, 1 OZ, 1 SM plus several GM. Furthest south was contact with AL, CL and ZL.
11.12.83 Medium event from 1413 to 1530gmt. Again same pattern as previous day. Many D, LA, OZ etc worked, furthest south again being AL, CL, ZL, with one contact with YL.
Second Phase at 1957 until 2042gmt. Very fluttery auroral signals from SK4MPI and GB3LER. Worked GM, G, OZ and SM.

Thus in the period 9 November to 11 December, no fewer than 10 auroral events were reported by northern stations. For these events, apart from

those on 10 and 11 December, the Meudon Index was too low for stations in the south to be able to participate. Nevertheless it is clearly worth keeping an ear open, especially at the cw end of the band, where any rough-tone signals may indicate the presence of aurora.

G3WZT (Horsham), usually known for his ms work, has provided some details of auroral working by the Swedish station SM7DLZ (IQ), who has been experimenting with cross-polarized antennas during such openings. The interesting point to emerge is that during certain openings, especially when working in directions approaching east-west, signals were audible on vertical polarization which were totally inaudible when horizontal polarization was used. SM7DLZ was able to work stations in the USSR and Ireland when others in his area were hearing nothing from these directions. The phenomenon was confirmed by switching back to horizontal polarization when the signals disappeared. The effect was never evident when the path was more north-south. G3WZT has started thinking about crossed 16-element Tonnas—quite an array! Any other stations which have experienced this effect are invited to tell *4-2-70* about it. Stations which normally operate fm will usually have vertical antennas, so any evidence that they hear things from a different direction during auroras (assuming they listen or operate during such events) would be appreciated.

GM4IHJ has drawn attention to an article in *Nature* 25 August 1983 (Vol 304) entitled "A New Radar Auroral Backscatter Experiment". It refers to the SABRE system (Sweden & Britain Radar Experiment), there being two radar stations, one near Wick in Scotland, operated by Leicester University, and the other near Uppsala in Sweden. The Wick station operates on 153·2MHz, the Uppsala station 142·585MHz. Those who are interested in auroral propagation might take some time off from chasing the dx on 2m during such events and monitor these frequencies. Alternatively, on the assumption that these stations will have access to scientific data which indicates the probability of an auroral event, monitoring the frequencies to note whether the stations have become active could be useful, especially for those operators in the north who would have a better chance of hearing them during the weaker auroras. The *Nature* article makes interesting reading, too, and many libraries will have a copy.

SSTV

During a December opening on 2m, Grant Dixon, G8CGK (Ross-on-Wye) received excellent sstv pictures from PA0APM, PE1JTU, DF8BA and F1EDM. The French station received such good copy that he sent his received pictures back to G8CGK and they looked exactly like a closed-circuit demonstration. To those who operate sstv, this may not seem out of the ordinary, but what makes this an interesting story is that G8CGK's letter to *4-2-70*, like so many others today, was produced on a printer connected to a micro, and Grant uses this same micro in his sstv work. He has his equipment linked up to a Triton micro, and has written a program to print out pictures using an Epson MX80 F/T dot-matrix printer.

He says that the Epson has to be configured to the dot-graphic mode, and he uses a series of look-up tables to translate the grey-value to the correct arrangement of dots. He does not display the picture on the vdu while he is printing, because the Triton does not have high-resolution graphics, but instead views it by means of a slow-to-fast converter like the one described in *Radio Communication* February 1983. The illustration, taken from a transmission by PE1JTU (DN71g) on 3 December 1983, indicates the capabilities of this set-up, yet another example of the application of micros to amateur radio.

SSTV picture reproduced by micro-computer and dot-matrix printer (G8CGK)

RTTY on vhf

4-2-70 does not receive many reports from vhf operators using rtty, probably because *afficionados* of that mode enjoy a very professionally prepared newsletter published quarterly by the British Amateur Radio Teleprinter Group (BARTG), edited by Marvin Wallis, G5CRD. In addition to the newsletter, the group publishes excellent booklets instructing beginners on how to become operational on rtty, and pcbs are available for constructing the necessary terminal unit so that your favourite micro can be coupled up to the transceiver for full rtty operation.

Gone are the days when it was necessary to have a large piece of noisy machinery in the shack to work rtty, though many die-hards will rue the day when the micro entered the arena. With the possibility of satellites transmitting teletype messages and similar data in the future, maybe 1984 is the year for you to get into this branch of our hobby. Write to Mrs T. Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester CO7 7SF, for details of membership of the BARTG, or phone her on 0206 864079. Chairman of the group is Ian Wade, G3NRW. BARTG celebrates its silver jubilee in 1984, and includes rtty, Amtor, fax, weather forecasting, satellites and telemetry in its scope, all useful stuff for the micro addict.

Tropo

There have been some quite good tropo openings on both 144 and 432MHz, the winter so far having been mild over much of the country with stable high-pressure areas over Europe. To go back a bit, Bill Raine, G4RXR (Durham), was prompted to write about his QRP dx on 2m on 22 October when he worked, on cw, OE, DL, Y31, OK and SP for some new squares, using only 2·5W to an eight element Yagi. This gave him four new countries and seven new squares at one sitting, proof of the value of cw when the band is busy. He was active again on 12 and 13 November when there was an opening to the south, and he worked two new ones in AK and BI squares. He much enjoys the challenge of QRP and the absence of tvi which it offers.

The next event of any significance came on 3-4 December. Graeme Castleton, G6CSY (Orpington), had some good QRP contacts with squares YI, EN, FO and XN on 2m, and on 70cm worked EN, EO and FP. There seems to be a steady movement towards 432MHz as the 2m band becomes ever more crowded, with newly-licensed operators arriving on the band in such large numbers.

In the same event, Gordon Brooker, G6LLH (Berks), took his FT290 and built-in λ/4 whip to Walbury Hill in Berkshire (297m asl) and worked into EO square receiving a 57 report. The interesting thing about this contact was that Gordon was having little success at the top of the hill, but when he descended to 100ft conditions improved. Was he above the duct at the top? This opening was good into Scandinavia, and the bands were very active right through until after midnight on Sunday 4 December. Gerald Peck, G4OIG (Northampton), thought that my "barefoot FT225RD" quoted in December was not QRP at all. After working some 2m dx, he decided to try out a recently-built PE0PDV design 432MHz transverter running about 40mW. He worked PE1HWO (CL), ON4AQO (BL), ON5NY (BK), GU4LJC (YJ), PE1HNR (DM) and PE1EWR (BL), all on 3 December. Next day he worked some more Dutch stations, plus four OZs, some Ds and SM7CFE(HQ), the best dx being 925km equivalent to 14,450 miles/W.

On the afternoon of 28 December conditions were very good on both 144 and 432MHz to the south of France. G4FRX (Hampstead) could hear the Spanish beacon in VD, and the Swiss beacon HB9HB. He worked F2EA in BE and stations in ZG. Many stations just licensed were heard picking up some rare squares on 2m. At G8VR the 2m antenna was temporarily down, but using a λ/4 whip in the back of an elderly TS700, some French stations were worked easily on cw since conditions were very good. The event swung round over the weekend of 29-30 December, and the German stations started to come through in very large numbers. The event was relatively localized, out to about the "F" and "G" lines of squares to the east, with nothing being reported from Scandinavia. An opening like this one gave proof of the large number of Continental stations who live in poor locations or have simple antennas and who depend on such lifts, even to work into such common squares as AL. G4NRV (Kent), found himself on the end of a pile-up on 2m and worked 45 stations, one after another, all from Germany and Holland, and all anxious to receive a QSL. At such times one could make use of a secretary to keep the paperwork in order!

On the evening of Saturday 31 December, reports of Spanish stations from VD were received, but there are no actual contacts so far reported. One thing is becoming very clear: 144MHz is now a much overcrowded

band, and when any opening occurs it is very difficult to find a clear spot for long enough to exchange reports and QTH, let alone have a rag-chew.

QRP

My comments on low-power working in the December issue produced a large response and incidentally brought to light one of the problems which anyone trying to write this feature faces. Not everyone has access to a large garden in which to erect a Versatower or similar antenna support, neither is every operator fortunate enough to have separate space for a shack where things can be left lying around. In these times properties are expensive, and they tend to be built very close together, especially in the areas of high-density population, and there are even places where no external antennas of any kind are permitted. It must be very galling for operators in such situations to read all the time about what the "big guns" hear and work when all you can hope for is a small antenna in the loft or a $\lambda/4$ whip at gutter height. G8VR has at times in a long amateur career been faced with all of these problems, and it hurts, although there is no doubt that with patience a great deal can be done when conditions are right.

4-2-70 is *your* column, and input from stations at all levels is needed to give a full picture of the vhf/uhf scene, so recent correspondence from those who use simple equipment is just as welcome as news from the eme operators, though with space at a premium there are sometimes problems in including everything. Some recent tropo openings revealed a large number of low-power stations on the 2m band, both in the UK and on the Continent, while on 70cm there are probably more stations in the 10-25W category than there are with big "linears". So please let us hear from you.

Meteor scatter

The December Geminids shower seems to have been regarded by most who listened as almost a non-event. G3WZT said that activity was very low, both in terms of random-frequency calls and schedules. There were some highlights, however, and the peak appears to have come on 14 December, though there is little in the reports to say with any certainty at what time reflections were at their height. G4IJE (Essex) had a very satisfactory contact with EA2LU (ZC) on the random cw channel at 0510—0545 on 14 December. Paul said that reflections were strong and almost continuous at times, several being S9 and of 3-4s length. G3WZT had several schedules, none of which were completed, but he did work OK1OA (HK) at 2400 on 14 December, at which time he thought the shower was peaking.

The shower was a great success for one relative newcomer to the mode. Ian Parker, G6DFT (Hoddesdon), had 12 skeds arranged for him on the vhf net spread over the period 2200gmt on 12 December to 0800 14 December. Only four were completed, though good copy was received in all but about four. He worked YU1POA (KE), YU3FM (HG), F9HS (BD) and SP6AZT (IL). I have been fortunate in hearing tape recordings of these contacts, and that with SP6AZT was remarkable for its long reflections which enabled the operators to use break procedure and exchange "73 and good luck" messages which were a tribute to the slick operating of the two stations concerned.

Nothing has appeared in the press about the "fireworks" expected from the break-up of the small planetoid in the earth's atmosphere on 14 December, but it would be interesting to know if its presence in any way affected the ms conditions prevailing at the time.

G3WZT worked IV3HWT at 0700gmt on 12 December prior to the shower (sporadic meteors) and felt that conditions then were as good as, if not better than, during the major part of the Geminids. G4IJE continues his routine Saturday morning schedule with I3LGP (GF) and they invariably complete within the hour, though reflections from sporadic meteors are getting less frequent as we enter the "low" period at this time of year.

On the subject of tape recordings, I have heard many taken by 50MHz operators who have worked ms almost by surprise, since reflections on this band tend to be quite long at times and can crop up during a normal tropo test. Some of the operators concerned still do not appear to understand correct ms procedure. There is a tendency to regard the QSO as complete once a report has been received. A study of the procedure set out in various manuals, including the *Amateur Radio Operating Manual*, particularly "missing information procedure", is recommended for any who are in doubt.

G8VR is assisting the Swedish "*2 Metre News Sheet*" (SM6EOC/SM6AFH) in the compilation of a list of stations active on ms in (eventually) all the European squares. Drop a line to G8VR if you want to be included. All stations mentioned previously in an ms context in *4-2-70* will automatically be included, but write if in any doubt. Both ssb and cw operators are needed for this directory.

Ljube, YU7AU, who is well known on ms circuits and who operated from KA square in the Perseids, was in the UK from the end of November until about 10 December. The KA square location was at extreme ms range for most UK stations, but the excellent results justified the efforts by YU7AU and his colleagues from the local radio club YU5DST. Fifty-two ms contacts were completed, representing a 83 per cent success rate, and six contacts were over distances in excess of 2,000km.

Yet another YU ms operator, YU2JL, has promised to keep us informed of interesting vhf events from his location.

Keith Fisher, G3WSN (right), introduces Tony Whittaker, G3RKL, who lectured on an experimental ssb repeater at the Midlands VHF Convention

Midlands VHF Convention

A very detailed report, written by G3UBX, described the successful Midlands VHF Convention held on 15 October 1983. It featured trade stands, bring-and-buy stall, equipment measuring facilities and lecture session, in fact everything which a successful convention should offer in its programme. The convention was well attended, and its new location obviously worked out well, the onsite parking proving very successful. Keith Fisher, G3WSN, the RSGB vhf manager, introduced the lecture session and was on hand to answer questions of a general vhf nature to the large audience. An evening social programme provided a buffet meal and bar, with music by the South Manchester Radio Club. We look forward to next time, and hope that the Midlands VHF Convention continues to be a popular event in the vhf/uhf calendar.

Records

Paul Turner, G4IJE (Essex), has claimed the following "firsts", all in respect of 50MHz operation:

In-band	G4IJE-GM3WOJ	6.2.83	ssb	ms
	G4IJE-C31XV	19.7.83	ssb	ms
Crossband	G4IJE-DJ5MS	27.2.83	cw	ms
50/144MHz	G4IJE-OK1OA	2.3.83	cw	ms
	G4IJE-CT1WW	5.3.83	cw	ms
	G4IJE-YO2IS	22.5.83	cw	ms
	G4IJE-EA3LL	7.7.83	cw	ms
	G4IJE-YU3ES	9.7.83	cw	ms

GM3WOJ claims a 70MHz ms record for his contact with GJ3YHU (YJ60) on 12.8.82 when Chris was in the Orkneys (YT75j), the QRB being 1,079km. His claim for the 70MHz auroral record, which he undoubtedly holds, is under consideration since three stations "at the other end" are in close competition for the honours.

From here and there

An earlier reference in *4-2-70* to the fact that G6HHV's call was being pirated was cleared up when it was found that the licensing authority had issued the same call to two stations! This was not discovered until 15 months after the calls were assigned.

Terry Owen, G4PSH, is the RAFARS representative for London/Middlesex, and he is anxious to build an active group which would participate in meetings, special event station operation etc. He would like to hear from interested RAF or ex-RAF personnel, who should write to him QTHR. A net is planned for 2000gmt every Monday on S13 (145·325MHz), with a secondary frequency of 144·175MHz (ssb) if conditions are poor. In his absence, occasionally, due to work schedules, any station on frequency is invited to assume net control.

RSGB NATIONAL VHF CONVENTION

Sandown Park Racecourse, Esher, Surrey

Saturday 24 March 1984

- **One day exhibition and lecture programme**
- **Presentation of trophies**
- **Comprehensive trade exhibition**
- **Exhibition by specialist groups**
- **Equipment test facility**
- **Full lecture programme on vhf, uhf and microwave subjects**

PROGRAMME

1030 **Convention opens.** Entrance through racecourse turnstiles. (Open to exhibitors from 0800 through special exhibitors' entrance) **Refreshments.** Snack bar in the hall will be open from 1100 to 1600, and the licensed bar will be open throughout the convention.

Equipment test facility—operated by Don Hamilton, G8DON

1345 **Convention address and presentation of trophies** by RSGB President, Bob Barrett, GW8HEZ

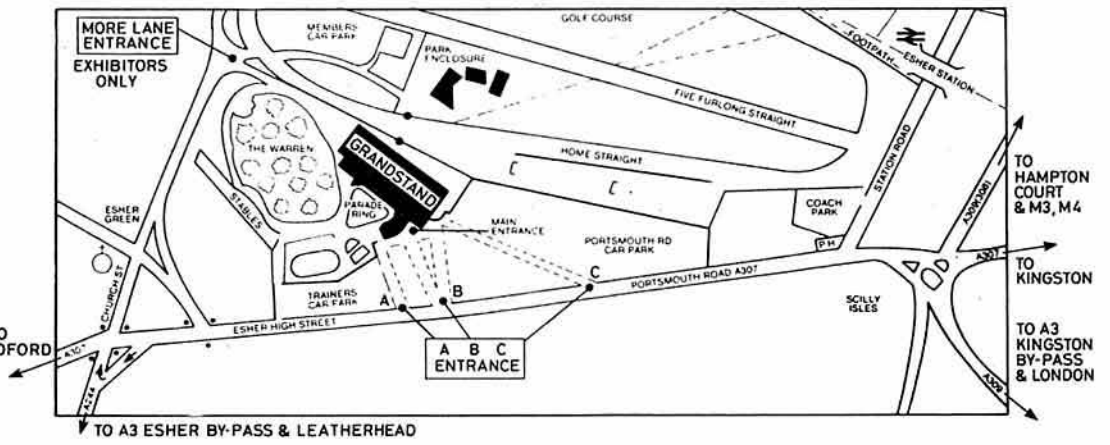
LECTURE PROGRAMME

Detailed arrangements for lectures will be notified on arrival

	Stream A	Stream B	Stream C
1415	"GaAs fets for all", John Regnault, G4SWX	"Oscar 10 experience", Ron Broadbent, G3AAJ	"Phase locking of Gunn diodes", Les Sharrock, G3BNL
1515	"EME operation", Peter Blair, G3LTF	"Solar cycle 21—facts and fancies", Charlie Newton, G2FKZ	"Microwave propagation whatever the weather", Barry Chambers, G8AGN
1615	VHF Contests Committee forum	"The 50MHz story", Keith Fisher, G3WSN, and Ken Ellis, G5KW	"The middle bands—or what can be done on 2·3, 3·4 and 5·7GHz", Dave Robinson, G4FRE
1715	Lecture session ends		
1800	Trade exhibition closes. Convention ends		

Please note that there will be no social evening this year

ACCESS MAP TO SANDOWN PARK



Map by courtesy of United Racecourses

APPLICATION FOR TICKETS

RSGB NATIONAL VHF CONVENTION 24 March 1984

Please supply tickets as under:	Cost	Number		Cost	Number
Convention and exhibition.....	£1.00	.....	**Convention and exhibition (under 18)**.....	£0.50	.....
			Convention and exhibition (under 14).....	Free	.....

I enclose cheque/postal order for £.....

Name .....

Address .....

This application for tickets must be sent to: Mr B. Rider, G4FLQ, Membership Services Section, RSGB, Alma House, Cranborne Road, Potters Bar, Herts EN6 3JN. Cheques to be made payable to RSGB.

Advance purchase of tickets will reduce entry time to the convention. Early application will be greatly appreciated

Microwaves

*by Charles Suckling, G3WDG**

2·3GHz eme news

Another 2·3GHz eme test took place on 17 December. It was extremely successful and resulted in the first ever within-Europe eme QSO on this band.

The test started with a 30min test transmission from DF0EME. The group first transmitted with full power to help the other stations align their antennas on the moon, and to get exactly on frequency. They then transmitted for a few minutes with lower power levels so that the participating stations could evaluate their receiving capabilities. During the high power periods DF0EME was solid copy at G3WDG/G4KGC on their 13ft dish, with signals peaking to about 20dB above noise in a 500Hz bandwidth—a very substantial eme signal indeed!

The next 30min was occupied with a sked between OE9XXI and DF0EME, which resulted in a first 2·3GHz eme QSO for both stations. The equipment used was as follows: DF0EME used 700W to a 33ft dish, and OE9XXI 70W to a 25·5ft dish. OE9XXI's signal was also received at G3WDG/G4KGC.

As noted last month, DF0EME hopes to be organizing a series of tests next year, and anyone interested in receiving advance details of these is welcome to write to me for details.

Oscar 10 Mode L—a user's report

The Mode L transponder on Oscar 10 continues to be activated on Wednesdays and Saturdays for 1h before and 1h after apogee. On some days when the satellite is visible twice in one day the transponder is on at both times. The activity on Mode L continues to be much lower than on Mode B, but is growing steadily. A number of eme-oriented stations use Mode L regularly—indeed the 2·3GHz test reported here was organized via the satellite. However, a number of these stations are falling into the trap of using too much effective radiated power. Amsat are still recommending that no more than 44dBW should be used, ie about 25kW eirp. With a 20ft dish, this eirp is achieved with only 8W of rf! The use of more power simply results in the lower power stations being unable to use the satellite effectively.

The reason for the use of higher-than-necessary power is probably that poor downlink antennas (eg a simple Yagi) are being used. The most efficient way to get good results from Mode L is to aim for the best possible downlink system, eg a minimum of two long Yagis, and preferably four. A mast-head preamp can also prove a great help when feeder losses are high. If a large dish is being used for the uplink, then contemplate the use of a dual-band feed which also enables the dish to be used for the downlink. I have found this mode of operation to be very effective, as one can copy many of the low power stations as well.

Operating news

John Tindle, G3JXN, made what is probably the first G to LX contact on 2·3GHz on 26 October. He was called by LX2RV on 1·3GHz following a CQ call. They then QSYed to 2,320MHz and exchanged reports of 51/53 at 1956gmt. LX2RV called John a little later in the evening direct on 2·3GHz following a QSO with PA3AOO, and conditions had obviously improved as they then exchanged reports of 54/57. G3JXN has been active on 2·3GHz since 1 October 1983. His equipment consists of a Wood & Douglas oscillator chain and amplifier to 362MHz followed by a varactor tripler to 1,088MHz and a G3LQR varactor doubler to 2,176MHz. This feeds a 2C39 mixer and a 2C39 pa running 80W input. On receive he uses an MGF1200 preamp into a DC0DA interdigital mixer. The antenna is a 1·2m dish with a disc/dipole feed, sited 15m agl and fed with 40ft of LDF450. John has so far worked six countries (G, PA, ON, DL, LX and OZ) and 13 squares, the best dx being EI and FP squares. His latest G QSOs include G8GDZ (Birmingham), G8FUO (Windsor), and G4NQC (London). He reports hearing the Leicester beacon, but only during lifts.

Dave Robinson, G4FRE, has also been busy activating 2·3GHz, and reports recent QSOs with G8FUO and G3AUS (Devon). The same evening he also heard the following beacons: DL0QQ (2,320·025, DL), PA0QHN (2,320·920, CL) and DB0VC (2,320·920, FO). He also listened on 3·4GHz and heard the DB0JO beacon on 3456·150MHz. This beacon is located at DL48d and is running 2W to a horn, beaming west.

John Tye, G4BYV, recently worked DC0DA and DF5JJ on 3·4GHz, both stations being located in DL square. His squares-worked total on this band now stands at 11. He reports that his 6ft dish with DL7QY feed is working very well, but is a bit sharp on 3·4 and 5·7GHz!

Graeme Caselton, G6CSY, writes to say that his low scoring in the 1·3GHz cumulatives was dispelled by the lift which was present on the evening of 2 December. That evening he worked PE1CQQ (DM), PA3DAQ (CM), G3APY (ZN), G4KCT (ZN), G6GJD (YN) and G3FNQ (YN). All these contacts were made with QRP at Graeme's end. His best dx to date was worked only two days after setting up his station, this was OZ7LX (FP, 895km) and OZ2LD (FO, 861km). Both of these contacts will qualify for a 1·3GHz distance award. Let us hope the QSL cards arrive soon! Graeme says that he is constantly surprised by the distances workable on 1·3GHz, even with QRP.

Another station who has made the same comment was Adrian Ball, G8PSF. During the lift at the end of October he worked F6DZK (AI, and first F QSO), F1DED (BI), ON4TX (CI, and first ON), GW8TFI/P (YL, and first GW), F1FHI (ZH), PE1AKJ (CL), HB9AMH/P (DH and first HB), F6DWG (BJ), and DK5AI (FL), as well as 10 G stations. He was also active during the lift at the beginning of December, and worked the following: G3DY (ZM), PA0FRE (CL), G3ZQU (AM), G4CCH, G4APA/P (YN), GW8TFI/P (YL), G8SFI (ZN), PE1FOT (CL), PE1DPX (DM), G4CBW (YN), DF5LQ (EO), G6ADE (ZN), DC0DA (DL) and G8HPU (AM).

Domestic dishes?

Brian Castle, G4DYF, recently wrote in asking whether a copper bowl from an old electric heater which had been given to him might be useful as a microwave dish. Readers may remember that another domestic item, viz dustbin lids, can form the basis of a very effective microwave antenna.

There are three criteria that a bowl-shaped object must fulfil in order to be useful as an antenna reflector. These are: (i) its diameter in relation to the intended frequency of operation; (ii) the focal length-to-diameter ratio and; (iii) the closeness of the curvature to a true parabola. The "required specifications" are: (i) the object must have a diameter greater than five (ideally 10) wavelengths; (ii) the f/D ratio should exceed about 0·25 and; (iii) the surface should not deviate from a true parabola by more than about 0·1 wavelengths. A small dish, or one that is not close to a parabola, will have low gain as a direct consequence, while a dish which is too deep (ie has a low f/D ratio) will be difficult to feed efficiently, and hence will also have low gain.

The dish which Brian quotes has a diameter of 11in and a depth of 3in. From criterion (i) the longest wavelength at which this dish could be used is 2·2in, corresponding to a frequency of about 5·4GHz. Thus it could be used at 5·7GHz or higher frequencies. With regard to criterion (ii), using the formula

$$f = D^2/16c$$

where f is the focal length, D is the diameter and c is the depth of the dish at its centre, the focal length works out at 2·52in, giving an f/D of 0·23. This is slightly lower than the minimum figure specified above, but the dish should still work reasonably well. As to criterion (iii), the only way to check this out is to make up a parabolic template and compare this to the actual surface curvature. A method of doing this is described on p9.66 of the *VHF/UHF Manual* (4th edition).

In my experience, dishes of this type can be quite useful on 10GHz—in fact some of my first 10GHz contacts were made with such a dish (in conjunction with a 723A/B klystron and a polaplexer—those were the days!). □

*46 Windsor Close, Towcester, Northants.

The Month on The Air

*by John Allaway, G3FKM**

ARRL Bulletin No 134 dated 14 December 1983 reads as follows: "The FCC on 14 December 1983 voted in the strongest possible manner to retain the morse code requirement for all classes of Amateur Radio licences. Private Radio Bureau Chief Robert Foosaner said that the Amateur Radio Service is well, thriving, and providing an excellent service to the American public. He strongly recommended that FCC maintain the code requirement, endorse the service as it is, and bury the concept of no-code. Chairman Mark Fowler stated that the code is very important and in some cases essential for getting the message through. He said further that radio amateurs have contributed vitally to the country and recently were stalwart in performing communications with Grenada. The vote was unanimous to reject the concept of no code".

In spite of wide publicity of the fact that the Society's QSL Bureau would be closed during November, over 700 batches of cards were sent to it during the month. Your scribe knows the problems that this can create and joins G3DRN in hoping that members will be more considerate this year.

Never despair—RS10906 reports the arrival of a QSL card addressed to a G2 station no longer in the *Call Book*—for a QSO with EA8BA in August 1951. He wonders if this is a record?

An unfortunate error appeared in the introductory comments in January *MOTA:* the beacon band extends from 28,200 to 28,300kHz, and of course all frequencies in this segment should be avoided.

DX news

FR0FLO is said to be on 1,825kHz between 0100 and 0200 and then on 3,790kHz ssb. FB8WJ and FB8WK have been worked on 14MHz ssb, and on 7MHz cw at 0100 and 0300. The latter has been contacting Europe at around 1600 on the lower part of the 14MHz cw band—operating split-frequency with calls taken several kilohertz higher.

Jan, A6XJC, should have returned from leave in the Netherlands by now, but may not be very active as he is working away from his base some of the time. A station using his callsign has recently been on rtty—Jan works only on ssb. Another station, A6XJJ, has been worked on 28MHz and says that documentation has been sent to ARRL for DXCC approval. According to the *DX Bulletin* A6XWT promises QSLs for past contacts and says that he too is sending papers to ARRL.

3X4EX is reported to be only able to QSL contacts made since 5 June 1983. He appears fairly often on 21,335kHz from 1800 onwards. There are rumours that KC7UU (who has recently been in Nigeria) is trying to visit Burundi. Karl, K4YT, was due to leave the USA last month for a three-month tour of duty in the Middle East.

DX' press says that there have been complaints that QSLs for SP2BHZ/JW and JW0P sent to SM5DQC via the bureaux have not been answered. Direct applications were dealt with at once but there has been a delay to the bureau cards, 8,000 of which have been sent for JW0P, who made over 15,000 contacts. SM5DQC is not a "professional" QSL manager and apologizes to those still waiting.

The station 4U1VIC, located in the UN building in Vienna, has been active recently. It does not count for DXCC credit but does count as a "country" multiplier in the WAE and CQWWDX contest.

LU1ZA on the South Orkney Is is scheduled to leave next month but may be found until then near 14,190kHz between midnight and 0500 when conditions are suitable. LU6ETB and LU9EIE were also supposed to be on the islands recently as AZ5ZA.

Long Island DX Bulletin says that PY7ZZ has announced that PY0T, PY0DOQ/T and PY0SP are pirates, and that there is no activity from Trindade Is at present.

ZL4OY/C assumed a new callsign on 1 January and is now ZL7OY. He has a linear and a three-element beam for the hf bands, and sloping dipoles for 3·5 and 7MHz. He prefers operating about 25kHz above lower band edges on cw, and on 3,800, 14,220 and 21,345kHz from 0000 and from 0900.

It is rumoured that there will be some activity from Marion Is (ZS2M) next month or in April. A24WF is DH2NAC in Palapye, Botswana, and he is active regularly on Saturdays/Sundays from 1200 on 28,510kHz, and from 1700 on 14,165kHz.

K4LTA and N4KFO will be in PJ7 between 17 February and 8 March, and will take part in both sections of the ARRL DX Contest. All bands 1·8 to 28MHz will be used on both cw and ssb. The Grupo Praiano de CW will activate Amapa Territory (PY8) from 24 to 26 February—also on all bands 1·8 to 28MHz cw and ssb.

KE4UX/KH9 operates after 0500 and between 1200 and 1300, particularly on Sundays. He is active on 14, 21 and 28MHz, mostly ssb, and will remain on Wake Is until November. KX6AO looks for European contacts between 1600 and 1900 on 14,220 or 21,300kHz—QSL to the address in "QTH Corner."

Overseas news

David Gynn, G3SBP, has written from the USA to say that he has now moved to the W3 call area and hopes to be active as G3SBP/W3 in due course when he has his Commodore 64 set up for rtty use. He still has QSLs and logs from his 8Q7BN and J6LMT activities, and anyone needing confirmation should write to the address given in "QTH Corner".

News of developments in Papua New Guinea has been received from P29BR via G8PG. It seems that seven native New Guineans and three expatriates took the RAE in November—a most encouraging piece of news, as to date only one New Guinea national has held an amateur licence. Project "Goodwill" kits from ARRL have solved the equipment problem. There was recently a major natural disaster in PNG when 30in of rain fell in 36h—a local organisation like Raynet would be very useful!

A letter from the Radio Club Paraguayo says that at a meeting on 18 September Carlos Schreiber, ZP5WH, was elected as president. Carlos Crichigno, ZP5HF was appointed as award manager and IARU liaison officer.

Up-to-date news of Tim Chen, BV2A/B, comes from G4KLP who was in Taiwan recently. Tim's operating times as given in November 1983 *MOTA* are not correct—in fact, he is in Kaohsiung during the week (commencing Tuesday) and returns to Taipei at weekends. The expedition made by the two Italian operators in September made 4,720 QSOs and received very satisfactory co-operation from the authorities; it is very possible that 1984 will see further expeditionary activity by JAs or Ws.

Brunei became independent on 1 January 1984, and to celebrate the event the Brunei Amateur Radio Transmitting Society will be operating special event callsigns VS5I, VS5IB and VS5IC, from 0001 24 February to 2359 26 February. Frequencies used will be as follows (all ±QRM): 3,505, 3,795, 7,005, 7,085, 14,005, 14,205, 21,005, 21,185, 21,285, 28,005 and 28,505kHz. Special commemorative QSL cards will be printed. The Brunei Independence Celebration Award will also be obtainable (see "Awards").

Dr Sid, ST2SA, very well known for his fine signals on ssb, has now become very interested in Amtor—much more relaxing for him because of the absence of QRM!

*10 Knightlow Road, Birmingham B17 6QB.

BARTS was officially recognized by the Brunei authorities in January 1983, and had 14 transmitting and 14 listener members by the end of the year. Listeners are allocated the calls BRU 001 SWL etc. Please note that at the time of writing there was still no official VS5 QSL bureau.

Tom Venn, V3TV, will be in Belize until April when he will return to the UK. He is currently very active on 21MHz—mainly on ssb—and has made many QSOs with Europe, particularly with Gs and RSARS members. Look for him between 21,165 and 21,170kHz between 1300 and 1400 most days—on Tuesdays he keeps a schedule with G3ATK at 1330 on 21,165kHz, and he often fits in some "contest-type" contacts before or after this. Tom is hoping to have a few 3·5 and 7MHz QSOs before he leaves, and he asks for QSLs to go to the address in "QTH Corner".

G4VHO is in Selangor, Malaysia, and at the time of writing was awaiting a 9M2 call. He has a TS430S and vertical antenna for 3·5–28MHz, and awaits the arrival of a TET three-element beam. G4RZQ will be his QSL manager, and David will be looking specially for UK contacts. West Malaysia has about 200 licence holders—but as the fixed and mobile licences are different the total of licensed amateurs is rather less. Power input is 150W and bands are similar to those in the UK (with some variation due to the different Region 3 allocations). David would appreciate schedules with South America—he was until recently CE3EYN, and his wife is Chilean; please write to: D. Calderwood, 11 Jalan Beta SS 21/10, Damansara Utama, Petaling Jaya, Selangor, Malaysia.

G4GWU is working in Katerini, Greece, and will be there until September. He is greatly frustrated by not being able to get a reciprocal licence—the Society has been negotiating through the DTI for some time, but to date Greece has agreements with only the USA, Canada and Cyprus.

Expeditions

At the time of writing, Iris and Lloyd Colvin were in Ecuador following their successful operation from the home of Francisco, HK0BKX, on San Andres Is. They worked more than 8,000 stations from there in two and a half weeks, and contacted 126 different countries as W6KG/HK0. Their next move was expected to be to the Galapagos Is. As always, QSLs go to the YASME Foundation (see "QTH Corner").

Problems seem to have arisen over VK9NS's proposed expedition to the Kermadec Is. Reports say that the New Zealand Government will not grant him permission to operate from there due to alleged pressure from NZART which is said to wish for the next big expedition to the islands to be undertaken by New Zealanders. *Informacion DX* says that ZL1AMO has mentioned on his QSL that this may take place during February or March 1984.

DL1VU's Pacific trip should have progressed to Tuvalu by now, and if so he may be found as T2UVA on cw only 27kHz above the low band edges on 14, 21 and 28MHz, and in the 7,000–7,005 and 3,500–3,510kHz parts of the lower frequency bands. He was expected to remain in T2 until 20 February, then visit 5W1DC before going on to American Samoa as KH8/DL1VU, and then Tokelau Is as ZM7VU. There appear to be two changes to the list of QSL managers given last month—cards for KH2/DL1VU should go to DB9CI, and for KH0/DL1VU to his own home QTH.

DX' press reports the likelihood of a visit to Aves Is by the Radio Club Venezolano to celebrate its 50th anniversary. This is scheduled for the end of this month, and the callsign will be YV0AA. The expedition should be on the air for 72h, and there will be two ssb and one cw station covering all bands 1·8 to 28MHz, and including perhaps rtty and Oscar activity.

DX News Sheet says that the Clipperton Is expedition should take place from 5 to 23 March. The callsign should be FO0XX.

1983 28MHz Countries Table

G3VOF - 195	G4MUW - 101 (ssb)	G4SDZ - 48
G3XQU - 186	G3XBY - 101	G3KSH - 44
G3KHZ - 185	G4GGY - 92 (ssb)	G4RPX - 43
G3GIQ - 175	G4GOF - 78 (ssb)	G3PXT - 40
G3JFH - 135	G3XTJ - 66 (cw)	G3JFF - 38
G3KDB - 129 (cw)	G4PEL - 66	GM4RFE - 35
G3TXF - 105 (cw)	G4EHQ - 61	G3XBM - 35
G3SXW - 104 (cw)	G6HM - 53	G3PSM - 26 (cw)
G4OBK - 104	G4PKP - 49	G4FVK - 24.

The final table will appear in March

3·5MHz dx

With the declining sunspot activity and the subsequent shift of many dx stations from the hf bands 3·5MHz dxing is becoming more popular, and good contacts can be made even with modest equipment if the peculiarities of the band are known. Many dx paths are open only at "grey line" times, and knowing when these are is most useful. Those who have already read *80 Meter DXing* by ON4UN will be interested to learn that John Devoldere (whose 3·5MHz DXCC score is now 311!) has produced a new 130pp book, *World-Wide Sunrise/Sunset Tables*, giving data for 502 areas of the world covering all DXCC countries and many different locations in large countries (eg 100 in the USA). The book sells for USA $10 (or equivalent in banknote or international money-order) from J. Devoldere, PO Box 41, B9000 Ghent, Belgium. If you send your QTH co-ordinates you also receive a personalized sunset/sunrise table and personalized list of beam-headings and great-circle distances to all 502 locations listed in the book.

A reminder to those trying to work dx at the top end of the phone band (around 3,800kHz) that they should be careful not to transmit outside the band—this is a contravention of licence conditions, so please be careful.

INTERNATIONAL BEACON PROJECT (28MHz)

Frequency (kHz)	Callsign	Location	Remarks
28,150	VE3TEN	Ottawa	See 28,275kHz
28,202·5	ZS5VHF	Durban	
28,205	DL0IGI	Mt Predigtstuhl	
28,215	GB3SX	Crowborough	
28,217·5	VE2TEN	Chicoutimi	
28,220	5B4CY	Zyyi	
28,222·5	HG2BHA	Tapolea	
28,230	ZL2MHF	Mt. Climie	
28,235	VP9BA	Bermuda	
28,237·5	LA5TEN	Oslo	
28,242·5	ZS1CTB	Capetown	
28,245	A92C	Bahrain	
28,250	Z21ANB	Bulawayo	
28,257·5	DK0TE	Konstanz	
28,260	VK5WI	Adelaide	
28,262	VK2RSY	Dural	
28,266	VE6RTW		
28,270	ZS6PW	Pretoria	
28,272·5	9L1FTN	Freetown	Under construction
28,277·5	DF0AAB	Luetjenberg	
28,284	KA1YE/B	Henrietta, NY.	Not IBP
28,285	VP8ADE	Adelaide Is	
28,287·5	H44SI	Solomon Is	Under construction
28,290	VS6TEN	Hong Kong	
28,295	VU2BCN	Bangalore	
28,296	W3VD	Laurel Md.	Not IBP

Welcome

To the following who joined the Society during November 1983: DL6KG, F6DXM, NE8G, VK6NVV, W2JPN, W8MRE, ZL1AQO, 5B4CH and 9V1JY. Listener new-members include I. Vickery and T. Vickery (EI), G. Esmaeil Zadeh (EP), O. Olanubi (5N), F. Ayerra (EA) and H. Woolrych (SV5).

Contests

PACC Contest

1400 11 February to 1700 12 February

1·8 to 28MHz, cw and ssb (no cross-mode) adhering to IARU band plans. There are single- and multi-operator and listener sections. Exchange RS/T plus serial number (from 001). Netherlands stations will also indicate their province (GR, FR, DR, OV, GD, UT, YP, NH, ZH, ZL, NB or LB). Stations may be worked once on each band, and each QSO with the Netherlands counts one point. The multiplier is the number of provinces worked on each band added together (ie maximum is $6 \times 12 = 72$). Listeners should log different PA stations and note the code group given by both sides of the QSO. Summary sheets and specimen log forms are available from G3FKM (sae please). Logs must be posted no later than 31 March to PA0INA, F. Th. Oosthoek, Fred Maystraat 36, 4614 Bergen op Zoom, Netherlands.

ARRL International DX Contests

0000 18 February to 2400 19 February (CW)

0000 3 March to 2400 4 March (Phone)

Single-operator single- or multi-band, multi-operator single- and multi-transmitter, and QRP (less than 5W input) categories. Exchanges consist of RS/T plus figures indicating power input. W/VE stations will indicate their state or province. Each QSO counts three points, and the multiplier is the total number of contiguous USA states and Canadian provinces worked (added together from each band in the case of multi-band entries). Certificates will be awarded to leading stations in each country, and to those making over 500 QSOs. The latter must include "dupe" sheets with their entries. Entry forms are available from ARRL DX Contest, 225 Main Street, Newington, Conn, 06111, USA—please send a large sae and some ircs. Sheets are not available from G3FKM.

The Bermuda Contest

0001 17 March to 2400 18 March

Actual operation may not exceed 36h, and off periods must be clearly logged and each must be of not less than three consecutive hours. 3·5 to

28MHz—no new bands and no crossmode or crossband QSOs permitted. Exchange RS/T, and UK stations give their county. They work USA and Canadian stations who will indicate their state/province, and Bermudians who will give their parish (Sandys, SAN; Pembroke, PEM; Southampton, SOU; Hamilton, HAM; St George, STG; Devonshire, DEV; Warwick, WAR; Smiths, SMI; and Paget, PAG). For UK stations each completed QSO counts five points, and a station may be worked on a band on both cw and phone provided that the two QSOs are made 30min (or more) apart. The same VP9 may be worked on each band. The multiplier is the total number of VP9s worked on each band added together. The logs should show dates, times (gmt) etc, and separate sheets must be used for each band. Duplicate sheets must be included for each band on which 200 or more contacts have been made. For every duplicate for which points are claimed a penalty of three QSOs will be deducted. Each page must be clearly numbered and marked with callsign, year, and band to which it refers. All contestants must sign a declaration that they have complied with the rules and terms of their licence, and logs must reach the Contest Committee, Radio Society of Bermuda, Box 275, Hamilton 5, Bermuda, no later than 31 May 1984. UK contestants are advised to send logs by airmail.

The top scorer in each state, province, county and German DOK will receive a printed award. The top scorer in each country will receive a trophy awarded at the society's annual dinner in October 1984. Round-trip air tickets and accommodation will be provided—the winners will stay at the Stonington Beach Hotel. Note that all stations shall be *single-operator only and must be operated from their own private residence or property.* Top winners in 1979, 1980, 1981, 1982 and 1983 may win area awards only in 1984. In the 1983 event G3UKS scored 256,500 points, G3VPW 132,275, G5CMX 93,600, GW3NNF 79,925, G4CNY 45,750, G3KKJ 4,980, G4JBH 4,120, G4FJT 1,110, G4GFH 400, G4IJW 378 and G3YBD 140.

AGCW-DL Hand-Key Party

1600 to 1900 4 February

3,530–3,560kHz cw only. Exchange RST, QSO number, and age (ladies send XX). Only manual keys may be used. Stations may be worked once only, and each QSO counts one point. Each operator who has made 20 QSOs may nominate another as a "good cw-op"—he or she will gain 10 points. Logs should include a declaration that only a manual key was used, and they should be sent to Friedrich Fabri, DF1OY, Mallinckrodtstrasse 52, D-4790 Paderborn, FR Germany, to arrive before the end of February.

G. Marconi QRP Phone Contest

0000 4 February to 2400 5 February

A maximum of 24h operation in up to four periods. Single- or multi-band single-operator. 3·5–21MHz ssb, 28MHz ssb and a.m. Maximum power 10W p.e.p. output. Exchange RS only. QSOs with stations in own country count one point, in same continent two points, and with others five. Multiplier is number of DXCC countries—each counts once only. QSOs using "non-directive antennas" have double QSO-points value (these are wires and verticals without passive elements and just one active element). A power bonus of three for power up to 1W and two for 1 to 4W is to be used. Electronic kits will be awarded to the 1st, 2nd and 3rd in the general list. Enclose summary sheet giving equipment details etc and method of measuring transmitter power, as well as the usual signed declaration. Post within 30 days to M. Cappozza, I0OAY, Via Sierra Nevada 99, 00144 Roma, Italy.

The First BYLARA Contest

1900 to 2200 1 March

1100 to 1400 3 March

Count only one period. HF section activity around 3,690 and 7,088kHz. Any mode but only one contact on each band. YLs work yls and oms, oms work only yls. Exchange RS/T plus serial number. Five points per BYLARA member worked, three points per yl and one per om. No multiplier. Send logs to reach Mrs D. Wood, GM4COO, 13 Scotland Drive, Dunfermline, Fife KY12 7SY, by 14 March.

Awards

Brunei Independence Award

Available to licensed amateurs and listeners. Applicants must make contact with one of the special event stations described in "Overseas news", plus one other VS5 station (if applying from Region 1 or 2—Region 3 applicants need three) in 1984. Send certified log entries (with time in gmt) plus US $2 or six ircs to VS5-BARTS, Box 222, Bandar Seri Begawan, Brunei.

The 100 LA Award

Issued by the Stavanger Group of NRRL to licensed amateurs and listeners (the latter on a "heard" basis). One hundred QSOs with (or confirmed reports from) LA or LB stations on or after 1.1.84 are required, and these may be on any bands except 10, 18 and 24MHz. It is issued for cw, phone or mixed modes. Applicants should send a list of the contacts, certified by the award manager of a national society, plus 10 ircs to: Award Manager, Stavangergruppen av NRRL, Postboks 354, 4001 Stavanger, Norway. Please note that the list must detail callsign, date, band, reports and mode, and that LF, LI and LH stations do not count for this award.

Golden Antenna Award

Presented annually by the town of Bentheim, W Germany, "to a radio amateur who, through amateur radio, has helped to save human life or relieve human suffering". In 1983 eight amateurs were nominated: two from YO, two from VK, one from FK8, and three from the FR of Germany. The winner was DJ3FC, who arranged the transportation of a gravely-ill engineer from Mogadishu back to Germany for treatment. The winner is invited to Bentheim to attend a ceremony at the town's expense. Further information is available from DARC HQ.

The Canadaward Certificate

Issued by CARF for confirmed QSOs with all Canadian provinces and territories on one band only (12 QSLs required). Separate awards will be issued for each band if applied for and mode endorsements for cw, ssb, rtty and sstv are also available. All QSOs must have been made after 30 June 1977. Send QSLs plus $2 (Canadian or USA) or 10 ircs and return postage to PO Box 2172, Station D, Ottawa, Ont, Canada, K1P 5W4. A five-band award is available and costs $25 plus return postage. Application forms and details of return postage costs may be obtained on request from CARF at the address given.

QTH CORNER

AZ5ZA	LU2A, PO Box 100. 1428 Buenos Aires, Argentina.
C53AA, C53WCY	RSTG, PO Box 2470, Banjul, Gambia.
C53K	via OH2LP, O. Hellsten, PI 22, SF-02630 Espoo 63, Finland.
GB0WCY	via GD3KHE, G. Hayes, 11 Central Drive, Onchan, Douglas, Isle of Man.
HC1SK/HC8	via SM6DYK, Pilvagen 4, S-520 50 Stenstorp, Sweden.
W6QL/HC1, W6KG/HC8	Yasme Foundation, PO Box 2025, Castro Valley, Cal, 94546, USA.
JY7KV	SM0KV, O. Ekblom, Forshagag 28, 12348 Farsta, Sweden.
KE4UX/KH9	D. Kniss, PO Box 248, Wake Is, 96898, Mid-Pacific.
KX6AO	Bill McRae, PO Box 36, APO San Francisco, Cal, 96555, USA.
TA2WCY	B. Kacan, DJ0UJ, Schumacherring 31, D-8000 Munich 83, FR Germany.
TR0AB	F6AJA, J-M Duthilleul, 515 Rue du Petit Hem, Bouvignies, F-59870 Marchiennes, France.
V3TV	via G3ATK, Dr. E. Young, Orchard House, Camel St, Marston Magna, Yeovil, Somerset BA22 8DB.
VS6CT	Box 180, Harrow, Middlesex.
VU7WCY	via VU2APR, Andhra Pradesh RS, 5-B P. S. Nagar, Hyderabad 500457, India.
G3SBP/W3	D. Gynn, 9104 Petros Court, Fairfax, Va 22031, USA.
ZD9CC	via ZS2DK, Box 10432, Port Elizabeth, Rep of South Africa.
3D6AL	Box 64, Manzini, Swaziland.
5H3WCY	via SM0DJZ, J. Hallenberg, Idungaten 3, 19500 Mersta, Sweden.
5V7JJ	PO Box 07, Niamtougou, Togo.

Around the bands

Interest in the lower frequency bands has been on the increase as mid-winter approached and sunspot activity diminishes, and some choice dx has been worked. It does seem that the calls of a number of dx stations are being pirated, mostly on 1·8MHz; the "VK9NS" reported by G3BDS a little while ago proving to be in that category. It really is very childish, and one wonders at the degree of abnormal pathology in the brains of those who do these things. G3LPS specializes on 7MHz and notes that the band is fading earlier in the mornings than it did last year, or even 11 years ago at this time, when JAs were workable until 1000.

This month's logs were submitted by G2HKU, G5JL, G3s BDQ, GIQ, GVV, KHZ, KSH, LPS, YRM, G4EHQ, GW4KGR, G4s OBK, PEL and UOL.

Stations listed in italics were using A1A.

1·8MHz. 0000 *EZ0AGC, RV9WCY, RW9A, UA9ADY, 5N8ARY.* **0100** *LZ2CJ, TF3KG,* VE1BNN. **0500** *K1MEM, KH6ACI1, W8LWL.* **0600** *CT4BD, N4JJ.* **0700** *FC9VN, JW5NM, K6SE, W1s.* **0800** *K5UR* (Ark), *W6RW, K0VGB, W5AQ* (Miss). **1700** *ZL3GQ.* **2000** *G6ZY/EA6, TU2TF.* **2100** *RA9AKM, VE1YX, VK6HD.* **2200** *UH8HCA, VE1BVL, 3V8AS.* **2300** *KV4FZ, K1KI, WA2SPL, YV1OB.*

3·5MHz. 0000 FM7WS, *RL7WCY, UA9, VP2KBZ, ZS1CT.* **0400** *EA8RL.* **0600** *N7RT* (Ariz), *VP2s EAG, EEW, KAA, KC, ZL2OM, DK6PE/6W8.* **0800** J37AH, *JW6MY, V3CAG, W7FU,* 6Y5IC. **1700** VE3BVD/DU6. **2000** *VU2LO.* **2100** JA6XMM, TA2WCY, VO1IF, W1FC, W5YU. **2300** RV0WCY, *VP2KAC, N6XI/4X4.*

7MHz. 0000 *JY9CZ.* **0600** *C53V, 5J1LR, DJ6SI/9L1.* **0800** *JA3FYC, JA4CQS, UK1PGO* (FJL), *VK, ZL1VV.* **0900** *UK0LAG, UA0YAE, VK3MR, ZL2UV.* **1500** *KV6M, W6KUT.* **1600** *JN1KEJ, W7FU, 4U1ITU, 9M2PV.* **1700** SV1OL/SV5 **1900** 5H3WCY. **2000** *C31OF,* YB0WR. **2100** *ZC4BI.* **2300** TA2WCY.

10MHz. 0700 *JA3JW.* **0800** *CT4DX, DL7AD/EA8, TI5Y, ZL, DK7PE/6W8.* **0900** *ZM3RK, 3V8AA.* **1300** *DL, F, HB, LA, OE, OK, OY7ML, VE1BB.* **2000** *K4FGP.*

14MHz. 0700 FK0AQ, JA, KE4UX/KH9, VK, YJ8TT, ZL, ZL3PA/C. **0800** AH2AW, C21BD, HL1MV, KX6LU, *NL7CV,* T30AX, ZL4OY/C, *8Q7BW.* **0900** AZ5ZA, CE0FQU, UK1AGO, VS5GA, VS6HJ, 9M6MH, 9M8PW. **1000** A71BK, KL7XD, YI1BGD. **1100** CR9AN, G4DUW/DU1, *8Q7BX.* **1500** W6-W7 (to 2000),

3A2EE. **1600** KH6BB, VU7WCY. **1700** FB8WK, J28DQ, *V3CAC*, VE7, 4K1QA. **1800** 9L1DR. **2000** D68GA, KC4AAC, VP8MT, ZD9BU/MM (at Gough Is). **2100** 3X4EX.

18MHz. 0900 *CT, DL, G, LA, OZ, UB.* **1200** *CT4SH.*

21MHz. 0800 JA, *JY7KV*, VK (to 1200), ZL. **0900** A71BK, C50WCY, HZ1AB, JA, *G4ABI/ST2*, VU7WCY, YB2BNJ, 4S7NP. **1000** A92BE, D44BC, 3D6BF, 3V8AS, 9K2DZ. **1100** G4DUW/DU1, *TA1UA*, VP8QP, VU83AJ. **1200** J28DN, *SV1NA/SV5*, 5N6CJR, 6U0WCY, *8Q7BX*. **1300** A4XXC, *3B9FK*. **1400** *PJ7A*. **1500** *TR8WCY*, ZS3WCY. **1600** HH2VP. **1700** ZD7BW, 5R8AL.

24MHz. No reports.

28MHz. 0900 C53T, *TU2NW, VK6, 5H3WCY*, 8Q7BX, *9H4C*. **1100** *HZ1HZ, S42HZR*, 3B9FK. **1200** *D68GA*, HZ1AB, *KV4FZ*, DF3NZ/ST2, *VP2MEV*, 7X2BK. **1300** 9Y4RD/SU, *VP2KBZ, 9Y4VT*. **1400** HC1HC, *W6KG/HC8*, OX3SG, *TR8JD*, W2. **1500** TG9GI, *ZF2HF*, 6U2EX. **1600** W9NED/HR2, W3-5, W9.

Thank you to all who supplied information and to the editors of the following for news items extracted: *DX'press* (PA0GAM), *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), and *Lynx DX Group Bulletin* (EA2JG/EA3CBQ).

All items for **April** issue **to reach G3FKM** no later than **1 March** please, but please also remember to send your entries for the new all-band countries worked (after 31 December 1983) table to reach G3GIQ by 15 February; in addition to those for the 1984 28MHz table which should continue to be sent to G3FKM. □

HF propagation predictions for February 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	...	.24	541	...	...	.78	986	...	...	487	778	6..	421	765	557	854	985	532	224	788	†t4	2..	...	4††
Malta	...	.25	442	...	...	.88	888	2..	.1.	387	788	941	662	765	557	996	998	632	235	799	†††	3..	..2	4††
Gibraltar	...	..2	222	...	...	.37	877	3..	...	.88	888	94.	342	276	556	895	898	753	334	799	†††	12.	...	4††
Iceland	...	...	11.	...	...	..2	665	1..	...	.28	889	71.	11.	.76	667	872	784	364	335	688	†††	†3.	..2	4††
ASIA																								
Osaka	...	...	...	...	...	.44	...	...	...	176	211	...	...	153	224	412	...	.2.	..2	563	...	...	...	24.
Hong Kong	...	.35	2..	...	...	178	61.	...	...	155	553	1..	1..	.23	235	632	1..	...	..2	576	...	...	...	253
Bangkok	...	.57	73.	...	...	278	873	...	...	.25	557	4..	3..	..2	225	744	3..	...	..2	578	...	...	...	255
Singapore	...	.45	441	...	...	268	885	...	...	125	557	4..	3..	..2	225	755	2..	...	..2	577	...	...	...	254
New Delhi	...	.66	63.	...	...	378	87.	...	...	224	555	...	521	..1	225	456	73.	...	..2	578	4..	...	...	25†
Teheran	...	.77	761	...	...	477	886	...	1..	532	557	511	743	2..	225	767	873	...	..2	588	†4.	...	...	25†
Colombo	...	.77	762	...	...	367	887	...	...	112	557	611	32.	...	225	767	61.	...	..2	578	3..	...	...	25†
Bahrain	...	.77	661	...	...	566	886	...	3..	422	457	622	853	1..	125	887	872	...	..2	588	†4.	...	...	255
Cyprus	...	.78	774	...	...	498	998	3..	421	765	668	953	986	532	346	898	996	31.	113	688	††3	...	...	3††
Aden	...	.77	774	...	...	466	788	3..	4..	311	257	854	953	1..	.24	788	872	...	..2	577	†4.	...	...	255
OCEANIA																								
Suva (S)	...	...	.1.	...	...	..2	551	...	...	.25	556	4..	...	.43	234	51.	...	121	..2	3..	...	...	...	...
Suva (L)	...	.2.	...	...	...	.74	21.	241	111	275	444	741	..1	442	114	51.	...	22.	..1	2..	...	...	...	...
Wellington (S)	...	..1	1..	...	...	.15	642	...	...	.66	556	2..	...	253	235	51.	...	12.	..2	2..	...	...	...	...
Wellington (L)	...	...	...	...	...	31	...	.1.	112	174	211	442	..1	252	113	52.	...	12.	..1	2..	...	...	...	...
Sydney (S)	...	.43	22.	...	...	187	674	...	...	375	557	3..	...	143	235	721	...	.1.	..2	52.	...	...	...	2..
Sydney (L)	...	...	...	...	...	.13	...	.2.	..1	.65	321	263	...	.43	223	641	...	.2.	..1	42.	...	...	...	...
Perth	...	.55	421	...	...	378	775	...	1..	135	557	611	2..	..2	225	764	...	...	..2	573	...	...	...	25.
Honolulu	...	...	...	...	...	...	...	1..	...	...	1.2	61.	.11	.32	214	41.	..2	421	..2	1..	...	3..	...	...
AFRICA																								
Seychelles	...	.33	541	...	...	455	786	3..	4..	211	257	864	942	...	.24	788	84	...	..2	578	†2.	...	...	24†
Mauritius	...	.57	664	...	...	356	788	4..	52.	211	357	875	952	...	.24	799	83.	...	..2	588	†..	...	...	25†
Nairobi	...	.65	664	...	...	366	688	51.	631	411	157	986	984	1..	.24	799	883	...	..2	587	†5.	...	...	255
Harare	...	.35	665	1..	...	256	678	721	651	411	137	998	994	2..	..4	799	883	...	..1	588	†5.	...	...	25†
Capetown	...	.34	776	3..	...	.66	678	841	751	421	126	898	995	3..	..3	699	884	...	...	478	†5.	...	...	.5†
Lagos	...	.68	888	4..	.1.	.86	668	852	781	451	115	899	897	62.	..2	699	788	3..	...	378	4††	...	...	.5†
Ascension Is	...	.37	545	2..	...	.87	556	741	775	162	112	698	999	64.	...	379	888	61.	...	158	†††	3..	...	.2†
Dakar	...	.28	877	5..	...	.78	667	851	675	74	113	698	989	551	...	489	878	62.	...	158	54†	3..	...	.2†
Las Palmas	...	.17	767	4..	...	.69	989	83.	353	187	666	896	999	664	334	699	989	741	1.1	479	†††	4..	...	.4†
S AMERICA																								
South Shetland	...	..1	345	4..	...	.25	777	751	565	175	443	355	577	552	11.	123	345	52.	...	..1	..2	2..	...	...
Falkland Is	...	..2	677	5..	...	.27	876	741	565	.75	422	256	788	552	1..	.24	577	62.	...	..1	245	3..	...	...
Rio de Janeiro	...	..4	423	3..	...	..8	655	651	565	.55	211	267	999	452	..	.37	888	62.	...	.15	†††	3..	...	..2
Buenos Aires	...	..1	536	5..	...	.16	866	641	455	.75	411	246	899	452	1..	.14	688	62.	...	..2	3††	3..	...	...
Lima	...	...	666	5..	...	...	876	63.	123	.21	521	124	688	252	2..	..3	588	62.	...	..1	2††	4..	...	...
Bogota	...	...	666	5..	...	...	876	53.	122	.12	521	124	677	243	2..	..4	687	62.	...	..1	3†5	4..	...	...
N AMERICA																								
Barbados	...	...	766	5..	...	..4	866	64.	223	..6	521	155	788	233	2..	.26	887	62.	...	..4	††4	4..	...	...
Jamaica	...	...	466	4..	...	...	776	63.	111	.12	531	134	677	143	21.	..4	687	62.	...	..1	3†5	4..	...	...
Bermuda	...	...	466	4..	...	..1	877	74.	111	..5	532	355	677	133	2..	.36	888	521	...	..3	5†5	4..	...	...
New York	...	...	155	3..	...	...	687	73.	11.	..2	553	354	665	123	22.	135	788	521	...	..3	4††	4..	...	...
Mexico	...	...	45	3..	...	...	.87	52.	1.	.1.	353	112	366	142	22.	..1	278	521	...	...	.4†	4..	...	...
Montreal	...	...	145	3..	...	...	587	72.	11.	..2	554	563	665	123	221	235	788	521	...	.13	4††	4..	...	...
Denver	...	...	..2	1..	...	...	.27	51.	.1.	...	.55	331	354	.3.	122	112	268	421	...	...	.4†	3..	...	...
Los Angeles	...	...	..1	1..	...	...	..6	51.	.1.	...	.26	321	253	.31	.23	1.1	158	421	..1	...	.2†	3..	...	...
Vancouver	...	...	...	...	...	...	..1	3..	...	...	.16	531	242	.21	.24	322	147	421	..1	...	.24	3..	...	...
Fairbanks	...	...	...	...	...	...	...	...	...	...	112	52.	231	.32	224	642	234	421	..2	321	..2	3..	...	...

The provisional mean sunspot number for November 1983 issued by the Sunspot Index Data Centre, Brussels, was 33·2. The maximum daily sunspot number was 90 on 8 November, and the minimum was 0 on 22 to 26 November inclusive. The predicted smoothed sunspot numbers for February, March, April and May 1984 are, respectively: (classical method) 61, 59, 57 and 56; (SIDC adjusted values) 51, 49, 47 and 46.

SWL News

*by Bob Treacher, BRS 32525**

HF dx news

An interesting letter from G4PVM, ex-A8808, found Paul Tittensor admitting that it is easier to hear them than work them, especially when only running 100W to an inverted-V! He is QRV on 28, 21 and 7MHz, and reports working two JAs on 7MHz at 0730 (long path) in early December. Heard but not worked were tasty morsels such as W6, W7, FO8, A35 and VE7. Paul has worked 83 countries on 7MHz in quite a short time, but only has 16 confirmed to date. Even as a transmitting amateur QSL cards take an age!

Martin Parry, BRS52543, was only monitoring the bands between 0600 and 0700 during early December and caught YJ8RG on 7 and 3·5MHz with weak signals. Dave Whitaker also reported a lean time, but was delighted to hear ZL2BT on 1·8MHz ssb at 0730 on 7 December for country No80 on the band.

Douglas Johnstone, BRS54163, wrote to the editorial office in Chelmsford. It should be noted that *all* mail for this piece *must* be sent to the address at the foot of this page. Douglas has been listening for eight months while studying for the RAE and uses an Eddystone 740 and a Windom antenna. He has received a number of QSL cards, in particular HC1CN, YS9RVE, S79WHW and V2AO. 3V8AS was the callsign used by DJ6QT during October and November last year. QSLs can be sent to DJ6QT via the bureau.

Ray Henderson, BRS84426, is another with an FRG7700 set-up. He also uses a Tono 350 computer. Both he and Ron Cross, RS84869, wanted more information on the worldwide beacon network on 14·100kHz. I can really do no better than refer readers to *Rad Com* February 1983, p148, and March 1983, p243, where G3FKM provides a good deal of information. W6RQ will be very pleased to receive reports. Once again, his address is 46 Cragmount Avenue, San Francisco, California, 94116, USA. If more detailed information is required I suggest that readers write direct to W6RQ, enclosing two ircs for a reply.

Several members remarked on the abysmal behaviour of some so-called "amateur radio enthusiasts" when W5LFL's signals were audible on 144MHz. One swl was so disgusted that he decided not to sit the last RAE and to remain a listener. Unfortunately, there are always a few people in any hobby or sport who find some weird sense of fun in spoiling the enjoyment of others.

On 7MHz, the ZL2AAG net on 7,085kHz at 0700 continued to provide much in the way of Pacific dx. CE0AE, YJ8TT, C21NI, VK9ZM, VK9WCY, FO8JN, H44IA and ZK2RS being but a few. KX6LA, A35ZM and ZL4PO/C have also been noted at around the same time. Later in the day, FB8WJ was consistently good copy on 7,047kHz at around 1830. The 3·5MHz band produced some interesting dx during early evening hours, with YB8AX, YB0WR, JAs, VKs, A92s, VE3BVD/DU6 and 4S7s good copy. From 2115, VK6s, JAs, 4S7s and 8I0WCY(YB) were audible. However, the activity did not compare with that of several years ago when good dx could be heard almost every evening. Activity on 1·8MHz, at least on ssb, is not considered to have been very great during December, but conditions were favourable on the 27th, and 9M2AX was audible around 2300 at 5 and 5. Conditions stayed good during the night, and between 0045 and 0400 W1FC, W1CF, W1OO, AB1A, K1ZFE, WA2SPL, AA4MM, HI8JAG, HK4BKB and YV2IF were all copied on ssb. The last day of the year provided a final chance to work stations with the WCY suffix. There were certainly plenty to choose from during the year, with VU7WCY providing perhaps the most desirable WCY suffix right up to the eleventh hour. A pity signals were not stronger, but rumours are rife that by the time this is read there will have been another expedition.

VHF corner

Tropospheric propagation was evident on a number of occasions during late October and early November last year. Martin Parry, BRS52543, mentioned openings on 22, 23 and 27 October. The first opening provided an OK in HK square, three DLs in DK, DL and FK squares, a GM in WQ square, and some French stations near the Channel coast. On 27 October another OK was copied, plus French stations in BI square. Martin considered that the best of the conditions went over his head, as GIs were heard working many Y and OK stations and GWs were heard in QSO with stations in SP. Dave Shapiro, ARS53844, managed an EA during a recent opening to give him a new country on 144MHz. Andy Smith, BRS50134, commented on his summer activities.

DX stamps service

G3TXF has written to provide details of his "mint" stamps service. Some of the keener QSL card collectors might be interested in a cheap way of getting QSL cards direct from QSL managers. An up-to-date list of those common "QSL manager" countries for which G3TXF has a store of stamps is available by sending an sae to 10 Wilton Grove, New Malden, Surrey KT3 6RG. Examples of stamps held are—CT, DL, JA, VE, W, ZS, YB and 7X. Using mint stamps is usually a cheaper way of QSLing than buying ircs. It is also much easier for the QSL manager if he can put the card into the envelope and the envelope directly into the postbox.

CVRS SWL Contest results

In the ssb section of this contest 32 entries were received. Jean-Jacques Yerganian, ONL-383, won the event, closely followed by Martin Parry, BRS52543. Eleven British swls sent entries, and others were received from ON, UA, PA0, OE, 4X4, W, VK, HZ and JA. In the cw section six entries were received, and the section was won by John Goodrick, BRS44395, followed closely by another British listener, Brian Coyne.

Newcomers

Along with the entries for the QSL card competition, results of which should be announced next month, came letters from a few new correspondents. Some were experienced listeners, including G. J. Glasspool, BRS2918, who started swling in 1935 on a three-valve 'Lissen" kit. His biggest thrill was receiving QSL cards from the USA. He sent a dollar bill to an amateur in the States and in return received a supply of three cent stamps which he then used to acquire the QSL cards. He was successful in 99 per cent of the reports which he sent. Nowadays reports are only sent to "real" dx stations and to W6, W7, KL7 etc. The results are still quite good. One question posed deserves some column space: "How do you enter swl competitions when it takes so long to receive QSL cards?" The answer is that in all swl contests organized by the RSGB and other bodies, QSL cards are *not* required in order to submit a scored log. Simply follow the rules as published. If you want to send a QSL card to a station participating in a contest certainly do so, but you do not need to have received the QSL card before you submit the log.

W. M. Rigby, RS84758, joined the hobby in August with an FRG7700, an FRT7700 tuner and a 144MHz Slim Jim. Being unused to ssb transmissions, he reported some difficulty in deciphering the callsigns due to either fast talking or irregular phonetics. Apart from using a tape recorder to enable the signals to be replayed, the only remedy is to persevere, and with experience it will become much easier to read the callsigns quickly and efficiently. The use of headphones may make it easier to copy weaker stations, as all extraneous noise is eliminated, and is a must for dx work on the lower frequency bands. The majority of really dx signals —over 6,000 miles away—are on those bands and tend to be weak; except in exceptional circumstances and they have to be dug out of the noise.

Here and there

G4NDJ sent a copy of an swl report he had received for GB2WLE from Nick Bainbridge, BRS32388. Several other Gs have remarked before about the standard of Nick's reporting, so I am including Nick's swl report in the "best swl report" competition to enable the judges to consider it with others.

GM3OXC, one of the GB2BP operating team, wrote requesting listener reports on transmissions from the special event station from the Magnus Platform during September. For direct QSLs, the address is GB2BP, BP Pet Dev, Dyce, Aberdeen. All other cards will be answered via the bureau.

While on the subject of special event stations, GB0CSR was one of the first GB0 callsigns issued, and was active from 21 October to 17 November. Listener reports will be answered 100 per cent. The QSLs should go either via G3KMA or direct to me.

Finale

Insufficient updates have meant that 1983 table scores have been held over until next time. News, views and comments for April should reach your scribe no later than Tuesday, 21 February, with late copy by Wednesday, 29 February. □

*79 Granby Road, Eltham, London SE9 1EH.

QRP

*by Rev George Dobbs, G3RJV**

Sources of circuitry

One of the most common complaints from would-be constructors of QRP amateur radio equipment is that circuits and ideas are difficult to find. Although there is room for additional material, sources for circuits are easily available. Perhaps the single best book is the ARRL publication *Solid state design for the radio amateur* by W7ZOI and W1FB. This book, which has been called the home constructor's bible, is full of ideas and buildable circuits. It is an impressive blend of theory, circuit ideas and complete projects to build, and a must for the serious experimenter. A rather more simple, practical book from the ARRL is *Solid State Basics* by W1FB and W1VD, which contains circuit ideas for the beginner with complete layout photographs. Each stage of construction is on non-etched boards and is supported with the relevant theory. The complete beginner may enjoy *Understanding amateur radio.* This book, again from the ARRL, is a combination of principles and construction for the newcomer, and would be a useful book for a licensed amateur or RAE candidate. These three American books are all available from RSGB Publications (Sales).

The RSGB book *Amateur radio techniques* by Pat Hawker, G3VA, is a valuable addition to the constructor's bookshelf. Now in its seventh edition, it is a compendium of circuit ideas, information and hints compiled from the popular "Technical Topics" column in *Radio Communication.* This year the *G-QRP Club circuit handbook* was reprinted. The book, previously only available in small numbers to G-QRP Club members, is a compilation of circuits from the club magazine *Sprat.* It is an experimenter's source book of circuits, ideas and projects. Radio amateurs who are interested in construction, even if they do not as yet use QRP equipment, may be interested in joining the G-QRP Club and receiving the club's quarterly magazine *Sprat,* which always contains a large proportion of practical circuitry. An A5 or larger stamped addressed envelope sent to me will be returned with a sample of *Sprat* and details of the club.

Swinging the OXO further

In October 1983 I described the OXO minitransmitter circuit of GM3OXX as probably the most popular QRP "fun rig", and in December's QRP column a companion receiver circuit was offered.

Several readers have written to me claiming successful results with the OXO circuit, including some transcontinental QSOs on 14 and 21MHz. The original circuit (Fig 1, p904, *Rad Com* October 1983) used a 60pF variable capacitor in series with the fundamental crystal to allow some variation in the frequency of operation. The principle of varying the frequency of a crystal oscillator with series capacjtance (a VXO circuit) can be improved if some inductance is also added to the circuit. Fig 1 shows the addition of an inductor, L1, to the crystal oscillator of the OXO circuit. Using the values shown a frequency shift of some 18kHz has been available on the 14MHz band with fundamental crystals. The degree of shift will vary with different samples of crystal and values of C1 and L1. Experimenters might like to try variations of both C1 and L1 but the greedy will find that attempting too much frequency shift will probably result in loss of oscillation or unreliable start up of the oscillator circuit. L1 is wound on the common 3/16in (4·8mm) former with an iron dust core, and C1 can be a surplus component. However, good results have been had by using semi-airspaced trimmer capacitors with knob and shaft Araldited on to the screw adjuster.

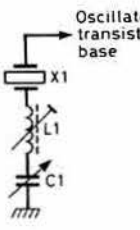


Fig 1. Swinging the OXO further. A simple idea for adding some inductance to increase the frequency swing in the VXO arrangement for the OXO transmitter *(Rad Com* October 1983). Values depend on the band in question

*17 Aspen Drive, Chelmsley Wood, Birmingham, B37 7QX.

Seen here on a tour of NASA during the ARRL Convention in October 1983 are: l to r G3FKM, G3RJV, GM3OXX and G4BUE. *Photo:* Jo-Anna

QRP in Texas

For most people QRP and Texas may appear to be mutually exclusive terms. Surely Texas is the one place in the world where the inhabitants claim that everything is on a large scale? In fact almost all the officers of QRP ARCI, the American national QRP organization, are Texans. So it was therefore natural that when the 1983 ARRL National Convention was planned for Houston, it became the first such occasion on which a major QRP programme was included. A committee headed by Ed Popp, K5BOT, Leo Delaney, KC5EV, and Fred Bonavita, W5QJM, planned a whole series of social events and lectures for QRP enthusiasts. The main QRP event at the convention, which was held over the first weekend in October, was the QRP forum; a programme of six lectures.

George Burt, GM3OXX, Chris Page, G4BUE, and myself were invited as speakers, and we were joined by Wes Hayward, W7ZOI, and Adrian Wiess, W0RSP. Wes Hayward is perhaps one of the most respected writers in the field of amateur radio, being with Doug DeMaw, W1FB, the joint author of *Solid state design for the radio amateur.* Adrian Wiess is the QRP editor of *CQ Magazine,* the former editor of the *Milliwatt* magazine, and the sponsor of the Milliwatt QRP DXCC Awards. The response to the lectures was amazing, and the lecture room was filled to capacity for all the speakers. The organizers of UK radio events could well learn a lesson from the Americans and the excellent way in which they cater for the social needs of the participants. The QRP section, like the other specialist groups, had its own hospitality suite, a small suite of rooms for like-minded people to meet informally and talk over a drink. The usefulness and enjoyment gained from these social contacts was immense. America is certainly the land of the large expensive commercial station and QRO but the three UK participants in the QRP forum were pleasantly surprised by the considerable interest in QRP and home construction of simple equipment.

More commercial QRP equipment

The Tedco transceiver is a rare but interesting piece of equipment. An example of a radio amateur who had a good design idea and decided to sell it. The transceiver is a single-band, 80m transceiver built and sold by a one-man company in the USA. A few of them trickled into the UK about five years ago. I have used one and was very impressed by its direct conversion receiver. The transmitter only runs about 1W dc input but I managed many European QSOs with my prototype model. The whole transceiver is built on one printed circuit board but the case is quite large as it contains mountings for banks of dry cells for portable operation.

The Mizûho transmitter kits are a small range of simple kits which, although still in production, are no longer imported into the UK. There is a basic transmit board for 7MHz and a board for 21MHz. The boards (coded QP7 and QP21) are simple crystal controlled 2W transmitters, and each kit contains a crystal which is 7·020MHz for either board. This is very useful for use on the 21MHz band as it appears at 21·060MHz, the international QRP calling frequency. A ready-built variable frequency oscillator for 7MHz, the VFO7, is available and can be used with either transmitter board. Several QRP operators use this board and some have added a direct conversion receiver board to make up a complete transceiver. Mizuho have produced a receiver board but I have never seen this nor the complete transceiver built from these modules, which I once saw advertised in a Japanese journal. Perhaps some enterprising dealer will begin to import these boards into the UK again? □

Contest News

NATIONAL FIELD DAY

It has come to the attention of the HF Contests Committee by way of allegation, that certain clubs and groups have been using, or have had available on site, equipment that is illegal for use in NFD. These include linear amplifiers, and, when operating in the Restricted section, the use of more than one receiver.

In order to deter future infringements of the rules in this manner the HF Contests Committee has decided that in the event of such an infringement being proven, **all operators** listed as being associated with the group in the operation of the station will be barred from entering any RSGB contest organized by the HF Contests Committee for **five years**.

Additionally the committee has reviewed the arrangements for site inspections, and certain changes are being made. These are detailed in the National Field Day rules (published in this issue) with particular reference to rules 7 and 13.

To the clubs who abide by the rules this should cause no dismay or alarm, possibly it will be welcomed as it will mean that everybody should be operating basically on an equal footing. The committee regrets that it is necessary to take such action, but it feels that it is the only way to deter would-be cheating and an unfair approach to National Field Day.

National Field Day 1984 rules

Please note the changes in rules 3 (time of start), 5, 7 and 13.

Packets of contest stationery will be sent to prospective entrants during May.

1. The general rules for RSGB hf contests, published in the supplement to the January 1984 issue of *Radio Communication*, will apply.

2. **Notification of site.** Each group intending to compete must send details of the site to be used to: RSGB HF Contests Committee, c/o Mr M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND, to arrive not later than Saturday 28 April 1984. Details must include name of the person responsible for the entry; the address to which contest stationery should be sent; section to be entered; name of group; callsigns to be used; national grid reference and sufficient access information for an inspector to be able to locate the site.

3. **When.** From 1600gmt Saturday 2 June 1984 to 1600gmt Sunday 3 June 1984.

4. **Eligible entrants.** Any group of RSGB members within the prefix zones G, GD, GI, GJ, GM, GU and GW. NFD is a multi-operator contest.

5. Operation must be from a portable station not located in a permanent building or semi-permanent structure such as a Portacabin etc, and not using a mains supply. No equipment or antennas may be installed on the site prior to 24h before the start of the contest. This does not apply to the storage of equipment.

6. **Mode.** CW(A1) only, in the 1·8, 3·5, 7, 14, 21 and 28MHz bands.

7. **Sections.**

(a) Open section. The station shall consist of a transceiver (or transmitter and receiver) with an additional receiver if desired, which may only be used for monitoring purposes. There is no restriction on the number or type of antennas, but the maximum height must not exceed 60ft (18·5m).

(b) Restricted section. The station shall consist of a transceiver (or transmitter and receiver) with one antenna which must be a single-element such as a dipole, vertical, long wire, etc, having not more than two elevated support points and not exceeding 35ft (11·5m) above ground at its highest point.

Both sections. Standby equipment may be at hand but not powered or connected in any way simultaneously with the main equipment.

The presence on the site of any amplifiers or modified commercial equipment capable of excess power, will result in the entry being disallowed. Your attention is drawn to the panel "National Field Day" at the beginning of "Contest News".

8. **Scoring.** Points will be scored as follows:

(a) Fixed stations in Europe (including the British Isles)	2 points
(b) Fixed stations outside Europe	3 points
(c) Portable and mobile stations in Europe (including the British Isles)	4 points
(d) Portable and mobile stations outside Europe	6 points

The contacts on 1·8MHz and 28MHz should be scored as above and the totals multiplied by two to obtain the claimed score.

9. **Group contacts.** Points must not be claimed for contacts made by a competing station with members of its own group.

10. **Entries.** These are to be in accordance with general rule 6 with the following exceptions:

(a) Separate logs must be used for each band using the standard RSGB hf log and NFD cover sheets.

(b) An additional standard cover sheet, summarizing the overall multiband entry, must be included.

(c) Entries must be postmarked no later than Monday 18 June 1984 and sent to RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND. Entries sent to RSGB headquarters or having insufficient postage will not be accepted.

(d) Duplicate contacts must be marked as such without any claim for points. Unmarked duplicates will be penalized at 10 times the claimed score and logs containing in excess of five will be disqualified.

11. **Trophies.**

(a) The National Field Day Trophy to the station having the highest checked score, regardless of section.

(b) The Bristol Trophy to the station having the highest checked score in the other section.

(c) The Gravesend Trophy to the group having the second highest checked score in the section with the largest number of entries.

(d) The Scottish NFD Trophy to the Scottish group having the highest checked score.

(e) The Frank Hoosen Trophy to the group having the highest checked score on the 14MHz band.

(f) Certificates of merit to the groups in each section with the highest checked scores on the 1·8, 3·5, 7, 14, 21 and 28MHz bands.

12. **Check logs.** While overseas stations are not eligible to enter NFD, check logs are very welcome. A certificate will be awarded to the overseas station in each continent whose check log shows the most points contributed to competitors.

13. **Inspections.** All stations are subject to inspection by nominated representatives of the HF Contests Committee. The inspector's brief will be to ensure that the rules and spirit of the contest are being observed. Should the inspector be unable to locate the site due to inadequate or incorrect information being given, the entry will be disallowed. In the event of a last-minute change of site, it is the responsibility of the members of the group to make suitable arrangements for the inspector to find the new site. The inspector must be given *immediate* access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest.

March 144/432MHz & SWL Contest rules

1400gmt-1400gmt 3-4 March 1984

The following general rules, published in the supplement to the January 1984 edition of *Radio Communication*, will apply: 1, 2, 3, 4e, 5a, 6a, 7a, 8b, 9, 10a, 11a, 12b, 13-24. Please note that /A stations must enter section O. Logs from listeners will be particularly welcome.

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

April 432MHz CW Contest rules

1300gmt-1700gmt 8 April 1984

The following general rules, published in the supplement to the January 1984 edition of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6b, 7a, 9, 10a, 11a, 12b, 13-24.

All entries and check logs to: VHF Contests Committee, c/o B. J. Morton G4HWA, 39 Green Lane, Blackwater, Hampshire GU17 9DG.

Low Power Contest 1984 rules

1. **Aim of contest.** To encourage QRP operation.
2. **Eligible entrants.** Single-operator stations only. UK entrants must be fully paid-up members of the RSGB.
3. **When.** Sunday 15 April 1984, 0700-1100gmt and 1300-1700gmt.
4. **Sections.** **(a)** British Isles stations using 5W input or less.
(b) Overseas stations using 5W input or less.
5. **Frequencies.** 3·5MHz and 7·0MHz bands only.
6. **Mode.** CW(A1A) only.
7. **Contest call and exchange.** CQ QRP. Exchange RST and serial number starting at 001, plus input power, eg 579001 3W.
8. **Scoring.** 15 points for each completed contact with another QRP station. Five points for all other contacts. Overseas stations may only claim points for UK contacts.
9. **Logs.** Separate logs must be submitted for each band. All exchanges to be shown.
10. **Declaration.** Each entry must be accompanied by the following declaration: "I declare that my station was operated in accordance with the rules and spirit of the contest and in the event of any dispute the decision of the Council of the RSGB will be final." The declaration must be signed and dated.
11. **Address for logs.** RSGB HF Contests Committee, c/o N. S. Cawthorne, G3TXF, 10 Wilton Grove, New Malden, Surrey KT3 6RG.
12. **Closing date for logs.** Logs must be postmarked not later than 7 May 1984.
13. **Awards.** The 1930 Committee Cup will be awarded to the leading station in Section (a). Certificates of merit will be awarded to the leading three stations in each section, and to the highest placed entrant in each section using 1W input or less.

RSGB SSB Field Day/IARU Region 1 1983 results

The 1983 event attracted a few more entries than in the previous year, which is pleasing, though once again the weather played some big trumps. After weeks of fine weather, somebody somewhere decided this was the weekend for it all to end. Force 8-9 gales with driving rain took a heavy toll of masts, antenna supports, etc in many parts of the country. Despite the tribulations, the Northumbria ARC, G4AAX/P, triumphed in the Open section, scoring 680,184 points. Runner-up was Cray Valley RS, G3RCV/P, maintaining its place gained last year. An unnamed group from Wales, GW4NZ/P, took third position. Comparison with last year's results table makes for interesting reading, especially with regard to the leading stations and ratio between points and multipliers.

OPEN SECTION

Posn	Callsign	Group	Number of points/multipliers 3·5MHz	7MHz	14MHz	21MHz	28MHz	Total pts/mults	QSOs (claimed)	Score
1	G4AAX/P	Northumbria ARC	762/15	415/11	2,364/54	1,343/48	192/6	5,076/134	1,495	680,184
2	G3RCV/P	Cray Valley RS	818/21	1,080/19	969/38	657/47	122/18	3,646/143	1,058	521,378
3	GW4NZ/P	—	526/8	354/9	2,167/49	1,060/34	17/4	4,124/104	1,216	428,896
4	G4HRS/P	Horsham ARC	1,205/20	703/22	828/41	773/29	60/6	3,569/118	981	421,142
5	G3WOR/P	Worthing & D ARC	832/15	871/16	975/35	1,136/34	45/7	3,859/107	1,106	412,913
6	GW4DLY/P	Wirral CG	819/14	717/18	1,654/46	358/30	2/1	3,550/109	963	386,950
7	G4IRC/P	Ipswich RC	1,037/21	1,125/19	394/23	895/38	4/2	3,455/103	973	355,865
8	G5BK/P	Cheltenham ARA	242/8	442/12	1,968/44	953/30	—	3,605/94	1,020	338,870
9	GW4CC/P	Swansea ARS	300/11	155/6	1,577/38	897/45	—	2,929/100	857	292,900
10	G3XEP/P	White Rose ARS	901/17	613/13	441/32	579/32	51/8	2,585/102	675	263,670
11	G6CW/P	ARC of Nottingham	1,003/15	619/17	651/35	417/26	19/4	2,709/97	704	262,773
12	G3SYA/P	Preston ARS B	772/15	267/10	935/37	500/26	190/9	2,664/97	724	258,408
13	G3ASR/P	Edgware & D RS	699/15	608/13	787/41	430/26	53/5	2,577/100	676	257,700
14	GI3XRQ/P	Bangor & D ARS	600/12	235/9	1,062/36	660/28	187/6	2,744/91	769	249,704
15	G4GCT/P	North Bristol ARC	166/8	142/9	1,441/39	1,001/23	9/2	2,579/81	859	223,479
16	G3BPK/P	Douglas Valley ARS	387/10	408/9	1,371/41	407/20	51/4	2,624/84	711	220,416
17	G8JC/P	Worcester & D ARC	589/10	346/12	1,562/41	108/11	—	2,605/74	729	192,770
18	G3VGG/P	Bromsgrove & D ARC	323/10	334/11	1,014/35	411/30	23/3	2,105/89	614	187,345
19	G3SFG/P	Southgate ARC	685/12	418/12	1,011/45	143/12	—	2,257/81	608	182,817
20	G3WOI/P	Newbury & D ARS	629/13	540/12	934/43	161/10	5/1	2,269/79	579	179,251
21	G3NWR/P	Wirral ARS	667/12	750/12	945/33	109/13	—	2,471/70	765	172,970
22	G3OZF/P	Aylesbury Vale RS	781/18	561/12	370/24	297/16	7/2	2,016/72	448	145,152
23	G4PRS/P	Poole RAS	530/11	50/4	829/36	156/13	146/8	1,711/72	465	123,192
24	G3GHN/P	Clifton ARS	587/12	452/8	849/35	70/7	—	1,958/62	496	121,396
25	GM4HEL/P	Helensburgh ARC	481/10	214/10	808/33	170/16	9/2	1,682/71	418	119,422
26	G4NWG/P	Ainsdale RC	627/12	37/4	819/23	409/21	—	1,892/60	498	113,520
27	G5FZ/P	Lincoln SWC	915/12	302/8	488/27	—	—	1,705/47	446	80,135
28	G4PVO/P	Droitwich ARC	762/13	396/11	294/20	48/6	—	1,500/50	365	75,000
29	G3XRT/P	Ilford RSGBG	484/8	272/10	273/20	24/6	—	1,053/44	251	46,332

RESTRICTED SECTION

Posn	Callsign	Group	Number of points/multipliers 3·5MHz	7MHz	14MHz	21MHz	28MHz	Total pts/mults	QSOs (claimed)	Score
1	GD3AHD/P	Liverpool & D ARS	895/16	457/16	773/39	903/41	145/7	3,173/119	812	377,387
2	G3WSC/P	Crawley ARC	1,027/23	477/12	778/37	281/21	45/7	2,608/100	680	260,800
3	GM8TT/P	West of Scotland ARS B	809/13	759/23	498/28	330/27	108/3	2,504/94	655	235,376
4	GU3HFN/P	Guernsey ARS	211/6	301/11	478/32	1,162/45	9/2	2,161/96	653	207,456
5	G3KLH/P	Racal ARG	435/8	274/8	1,145/33	581/28	72/5	2,507/82	711	205,574
6	G3FYQ/P	Pontefract & D ARS	385/12	365/15	1,312/33	305/19	7/1	2,374/80	658	189,920
7	G3NJA/P	Torbay ARS	910/19	535/12	564/30	261/18	21/3	2,291/82	567	187,862
8	G4GGD/P	Leconfield (ASMT)	701/17	432/16	597/38	138/16	24/9	1,892/96	487	181,632
9	GM3NEQ/P	"Windy Yetl" G	379/9	352/15	1,150/33	276/16	45/3	2,202/76	595	167,352
10	G3FVA/P	South Manchester RC	654/15	360/13	463/31	149/19	25/4	1,651/82	409	135,382
11	G4AYM/P	Gloucester ARS	677/11	628/13	697/30	76/10	—	2,078/64	502	132,992
12	G4MVN/P	Southdown ARS	658/12	602/13	755/32	40/6	—	2,055/63	507	129,465
13	G6UQ/P	Stockport RS	778/15	483/11	507/30	104/8	9/1	1,881/65	483	122,265
14	G2DMR/P	Sutton & Cheam RS	837/13	245/13	361/29	125/13	47/3	1,615/71	401	114,665
15	G4KUQ/P	Bats Contest G (Bristol ATS)	654/14	247/8	546/24	220/12	57/2	1,724/60	394	103,440
16	GM3ZRC/P	Greenock & D ARC	431/13	240/10	742/28	158/9	5/1	1,576/61	367	96,136
17	G4GQR/P	BAD CG (Brighton & D)	899/15	91/11	545/23	60/8	12/2	1,607/59	415	94,813
18	G3NTJ/P	East Lancs ARC	277/6	182/4	868/31	314/13	—	1,641/54	480	88,614
19	G4LCK/P	St Helens & D ARC	542/12	270/10	385/26	124/14	19/3	1,340/65	304	87,100
20	G6HH/P	Hastings E & RC	499/11	370/12	174/20	356/18	2/1	1,401/62	376	86,862
21	GM3UWO/P	Kilmarnock & Loudoun ARC	621/13	501/16	318/16	76/6	30/2	1,546/53	346	81,938
22	G4ODR/P	Enfield CG	420/11	231/8	631/30	37/7	2/1	1,321/57	328	75,297
23	GM4EAF/P	Perth & D RAG	491/11	502/12	571/19	—	—	1,564/42	359	65,688
24	G3FJE/P	Shefford & D ARS	537/12	541/15	232/18	16/4	—	1,326/49	326	64,974
25	G3CNX/P	Grimsby ARS	659/11	462/11	208/18	28/5	10/1	1,367/46	314	62,882
26	G3BRS/P	Bury RS	643/14	232/10	266/16	41/7	6/2	1,188/49	288	58,212
27	GM4PRO/P	GM4PRO & Friends (The Gang of 4)	337/9	388/10	485/17	64/6	—	1,274/42	379	53,508
28	G4JWD/P	Harrow Misfits	228/9	107/10	408/23	149/10	60/3	952/55	263	52,360
29	G3KUE/P	Preston ARS A	385/10	146/8	312/21	177/10	—	1,020/49	237	49,980
30	G4LAD/P	Leeds & D ARS	559/10	546/12	126/8	10/2	—	1,241/32	283	39,712
31	G4MUR/P	—	360/11	62/5	249/18	130/13	—	801/47	196	37,647
32	G4JED/P	SE London Raynet Association	289/12	109/7	186/18	132/14	—	716/51	175	36,516
33	G4FUR/P	Coulsdon ATS	267/11	39/5	211/15	99/10	25/1	641/42	174	26,922
34	G5ECD/P	—	223/9	134/7	333/19	10/3	—	700/38	183	26,600
35	G6OI/P	Stourbridge & D ARS	—	93/5	605/28	—	—	698/33	198	23,034

The restricted section was again dominated by Liverpool & D ARS, GD3AHD/P, which improved its final total, though the winning margin was cut down by Crawley ARC, G3WSC/P, which was mid-table last year.

Conditions were not rated as being all that good, especially on 21MHz and 28MHz. 14MHz produced some good dx and helpfully stayed open quite late in some parts of the country. The two lf bands were good and a considerable amount of contest traffic was generated.

Contestants' comments

"Gales two years running! Aerial erection was a problem but isn't a field day about overcoming the elements? Fortune favours the brave"—*Northumbria ARC.*

"Please reduce wind speed by 80mph next year"—*Cray Valley RS.*

"Half-hour before start joins in 80m dipole parted and remaining part blew out horizontally. Lowered mast, reconnected and back on air just in time"—*Ipswich RC.*

"No problems in erecting antennas in high wind, but nearly lost two operators who went hand-gliding with our tent!"—*Edgware & D RS.*

"We are probably the only club with a priest who blessed each of his contacts (G4EEQ) and a yl who showered her 88s right, left and centre (GW4PUH). It has been suggested that her female voice cut through the QRM but one of our top operators said there was no way was he going to have an operation!"—*Wirral ARS.*

Adjudicator's comments

Once again as in so many contests the committee checks, the majority of entrants follow the rules for submitting entries, but the minority always have to make checking difficult. There was one example of a log entered in pencil and inked over afterwards, and several using both sides of the log sheets. Clarity of writing goes a long way to making the task of checking easier. It is appreciated that the entering of a thousand or more contacts is a wearisome task, but to check a thousand scribbled contacts is even worse. The other favourite problem of unmarked duplicates also raised its ugly head. To those who have lost literally *thousands* of points due to a duplicate problem it is recommended you read the article published in the November 1983 issue of *Radio Communication* on this subject. Computer-generated logs, as has been mentioned in other contest reports, are acceptable, but beware when it checks for duplicate contacts that it is programmed to bring out G3AAA/P as well as G3AAA and that it does not conclude they are different stations. The /P was lost on many occasions by a considerable number of groups and this is marked as an incorrect callsign. In checking this event the adjudicator was assisted by G3TXF.

Check logs were received from EA6TC, **ED8CGP/P, UA2FFC,** UA3TAM, UA4NAA, UK3DAQ, UL7QF, UV3NB, 8Q7BT and **9K2BE.** The callsigns listed in bold type will receive a certificate for being the station giving most points to UK competitors from their respective continents. *RS20249*

RSGB October 432MHz-24GHz Contest results

Propagation

The date for this year's October 432MHz-24GHz contest was unfortunately a few days too late, coming after the good conditions, which would have particularly benefitted the higher bands, had mainly faded out. Nevertheless, a good deal of Continental dx was worked.

Comments from the logs: *G4PUB/P* (432MHz) "Occasional lifts in evidence for short periods"; *G3PBV* (432MHz) "Nothing special after the opening"; *G4FSG/P* (1,296MHz) "Some good dx"; *G3JXN* (2,320MHz) "Mad rush to finish (almost) rig in time for contest ... very enjoyable first day's operating on 13cm —six squares"; *G4PZZ/P* (5·7GHz) "We had several attempts to hear PA0CRA but no luck"; *G4MBS* (10GHz) "Intermittent drizzle not dense nor persistent enough to be a benefit".

Activity

There still seem to be two categories of entrants: The "big" contest groups who concentrate mainly on making large scores on the lower bands (432 and 1,296MHz), and quite a few microwave enthusiasts who spend a lot of time trying to make difficult QSOs work against the odds, who use the lower bands mainly for talk-back purposes, and who wish that more people would take out the higher bands!

Comments from logs: *G4HWA/P* (1,296MHz) "Not enough stations active"; *G3TQF/P* (3·4GHz) "Amazing lack of activity"; *G4LRT* (3·4GHz) "Preamp working well, but no activity"; *G4FHQ/P* (10GHz) "Good conditions, but low activity".

Geography

Again the top scores were made from the east (AL and AM squares), which was favoured by propagation as well as its relative proximity to centres of activity (and operators' very good equipment!). Operators in the north and west found it very hard going indeed.

Comments from the logs: *G4SSS/P* (432MHz) "Our problem is to try and attract east coast stations to beam west"; *GM8TSI/P* (similarly *GM3TAL/P*) "Very difficult to do well in a contest like this from up here. We worked everybody we could hear"; *GM8MJV/P* "We should have 13cm next year".

Winners (and runners-up in sections with more than 10 entries) will receive certificates. Thank-you to G2DHV for his checklog. *G4KGC*

432MHz SECTION 1 (SINGLE OPERATOR)

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G4CQR	26,055	153	AL71c	GM8TSI/P	504	21-el	100
2	G3JXN	18,298	114	ZL39e	DG4FAO/P	705	21-el	140
3	G3HRY	8,176	47	ZM77h	DK5VI/P	601	48-el MB	10
4	G6ETA	6,380	45	AL56a	F6KAW/P	385	17-el	85
5	G3PBV	6,231	22	YK32b	PE0MAR/P	558	23-el	50
6	G4AGQ	5,655	48	ZL66b	F1DPX	366	19-el	10
7	G6GJD	5,186	22	YN15h	F6CTT/P	522	2 × 48-el MB	30
8	G6CMV	1,973	10	YM69e	F1CVU/P	334	4 × 19-el	10
9	G6BBS	1,641	12	ZK15a	F1DPX	322	19-el	10
10	G4ITF	1,458	13	ZK15a	F1DPX	322	19-el	10
11	G4LRT	707	6	ZM45d	F6CTT/P	312	2 × 18-el	20

432MHz SECTION 2 (MULTI, PORTABLE AND CLUB STATIONS)

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G4PUB/P	88,839	330	AL47d	F1AJD	645	2 × 21-el	400
2	G4MRS/P	76,464	275	AM67f	F6CIS/P	721	4 × NBS	400
3	G4LOJ/P	66,786	239	AM07d	Y23BD	768	2 × 27-el QL	400
4	G4SIV	62,156	233	ZM29h	DL4OL	706	4 × 21-el	300
5	G4THB/P	61,538	182	ZO48e	F6KCP/P	734	4 × 21-el	400
6	G6EKR/P	52,431	216	AL56b	GM3TAL/P	644	21-el	60
7	G3FVA/P	38,423	192	ZN61a	DK8VR/A	733	4 × 23-el	150
8	G8HRC/P	36,599	143	AL17a	DK4MM/P	616	2 × 21-el	100
9	G4GZO/P	34,236	190	AK11a	GM8TSI/P	522	2 × MB	150
10	G8YEE/P	32,733	149	ZN53g	DF0AP	728	4 × 19-el	50
11	G3PIA/P	31,612	181	ZL33h	DJ9DL	603	21-el	150
12	G3TQF/P	28,926	155	ZM26c	F1KNO	638	21-el	250
13	GW3EOP/P	26,980	134	YL23h	PE0MAR/P	526	2 × 19-el	50
14	G4MVN/P	22,188	130	AK11j	F1DPX	685	2 × 48-el MB	100
15	G4SSS/P	21,624	99	YL72h	PA0EZ	628	88-el MB	50
16	G8OHM/P	21,465	137	ZM73j	DF9ON	725	88-el MB	20
17	GM8TSI/P	17,966	67	YP58f	F6CTT/P	644	4 × 21-el	100
18	G6LJO/P	14,855	116	YN70f	F6CTT/P	419	88-el MB	50
19	GM3TAL/P	3,460	8	XP15f	F6CTT/P	770	18-el	15

1,296MHz SECTION 1

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G3JXN	7,822	59	ZL39e	DJ5BV	519	4 × 23-el	100
2	G4KIY	6,755	40	ZM40j	DL0HC/P	542	1·5m dish	50
3	G4NQC	5,679	39	ZL50c	DL0KK/P	448	4 × 23-el	75
4	G8CZZ	2,698	30	ZL38e	G3LRP	240	23-el	8
5	G4LRT	2,405	23	ZM45d	G4HWA/P	225	27-el QL	30
6	G3PBV	1,773	7	YK32b	G4ALE/P	360	15/15	30
7	G4UCW	887	7	AM53e	G4HWA/P	245	21-el	1
8	G6CMV	566	5	YM69e	G4ALE/P	266	4 × 23-el	3

1,296MHz SECTION 2

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G4ALE/P	24,484	103	AL47d	F6CIS/P	637	8 × 23-el	300
2	G4FSG/P	19,077	79	AM67f	HB9AMH/P	696	4 × QL	200
3	G4NXO/P	18,489	90	AL45j	F2TU/P	578	4 × 23-el	160
4	G4HWA/P	13,876	53	ZO48e	DL0HC/P	642	12ft dish	300
5	G4ANT/P	13,512	59	AM07d	DL0HC/P	458	4 × 26-el QL	200
6	G3UHF/P	10,447	66	ZN61a	PA0EZ	488	2m dish	100
7	G4NVA/P	10,045	54	ZN53g	F1BEG/P	554	4 × QL	25
8	G8FEZ/P	8,731	43	AL56b	DL0HC/P	440	6ft dish	40
9	G3NNG/P	8,154	56	ZL33h	ON5GF	469	4 × 23-el	40
10	G3YKI/P	7,784	43	AK11a	FT2U/P	589	2 × 15/15*	30
11	G3OHM/P	7,385	53	ZM73j	DL0KK/P	551	4 × 23-el	35
12	G4JDI/P	4,437	37	ZM26c	PE1GHG	376	2m dish	300
13	G8KAX/P	3,271	20	AL17a	G4HWA/P	307	4 × 23-el	3
14	GM8MJV/P	796	4	YP58f	G4CBW	246	4 × 23-el	1

2,320MHz SECTION 1

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G3JXN	1,564	12	ZL39e	PA3BPC/P	383	1·2m dish	70
2	G3WDG	538	7	ZM65d	G3ZIG/P	182	45-el QL	20
3	G4LRT	430	7	ZM45d	G3JXN	109	42-el QL	8

2,320MHz SECTION 2

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G3ZIG/P	3,917	17	AM07d	DC0DA	445	2m dish	10
2	G4GLN/P	2,366	13	AL47d	DK2UO	367	2m dish	40
3	G4FAW/P	1,898	15	AM67f	PE1HQO	345	1·2m dish	20
4	G4OHM/P	1,595	13	ZM73j	PE0MAR/P	383	4ft dish	10
5	G3NNG/P	1,007	8	ZL33h	G3ZIG/P	246	33-el QL	0·5
6	G3ZUD/P	879	9	ZM26c	G4FAW/P	152	4ft dish	10
7	G8FUO/P	33	1	AL45j	G4GLN/P	33	45-el QL	0·5

3,456MHz SECTION 1

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G3MBS	184	2	ZL65e	G3FYX/P	109	Periscope + 3ft dish	2
2	G4LRT	35	1	ZM45d	G3TQF/P	35	4ft dish	0·03

3,456MHz SECTION 2

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G3TQF/P	35	1	ZM26c	G4LRT	35	4ft dish	0·0005

5,760MHz SECTION 1

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G4MBS	54	1	ZL65e	G3FYX/P	109	Periscope + 3ft dish	2

Contests Calendar

4 February	AG CW-DL Hand Key Party *(Rules in February* MOTA*)*
4-5 February	G. Marconi QRP Phone *(Rules in February* MOTA*)*
4, 5 February	7MHz Phone *(Rules in September issue)*
4-5 February	YU DX *(Rules in January* MOTA*)*
5 February	144MHz CW *(Rules in January issue)*
11 February	1st 1·8MHz *(Rules in January issue)*
11-12 February	PACC *(Rules in February* MOTA*)*
18 February	1·8MHz Mixed Mode WAB*
18-19 February	ARRL International DX (CW) *(Rules in February* MOTA*)*
19 February	432MHz Fixed *(Rules in January issue)*
25, 26 February	7MHz CW *(Rules in September issue)*
25-26 February	UBA (SSB) *(Rules in January* MOTA*)*
25-26 February	REF (Phone) *(Rules in January* MOTA*)*
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*)*
24-26 March	BARTG Spring RTTY
1 April	ROPOCO 1
8 April	432MHz CW *(Rules in February issue)*
14-15 April	BARTG Spring VHF/UHF RTTY
15 April	Stevenage & DARS 144MHz fm
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
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.

5,760MHz SECTION 2

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G4PZZ/P	18	1	AM07d	G4BYV	36	4ft dish	—

10,000MHz SECTION 1

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G4MBS	54	1	ZL65e	G3FYX/P	109	Periscope + 3ft dish	2

10,000MHz SECTION 2

Posn	Callsign	Points	QSOs	QTH	Best dx	Km	Ant	Power
1	G4FHQ/P	348	5	ZM31j	GW3PPF/P	92	1·5ft dish	0·01

VHF/UHF Listeners Championship 1983 results

Once again Bob Treacher, BRS32525, won the Hanson Trophy, but by a much narrower margin than he is accustomed to, thanks to the efforts of Martin Parry, BRS52543. He made most of the early running and secured the runners-up spot by a considerable margin. It was gratifying to see an improvement in swl support last year. For 1984 the rules regarding logging of contacts with the same station on 144MHz have been revised from "1 in 20" to "1 in 10" to encourage more entries. *G3XDY*

Station	Mar	May	VHF NFD		Jul	Aug	Sep	Total
	144/432	144 LP	144	432	432 LP	70	144	
BRS32525	881	468	1,157	—	144	—	965	3,615
BRS52543	1,177	—	1,013	65	—	336	498	3,089
BRS28198	1,173	—	—	—	—	—	—	1,173
BRS25429	—	—	879	—	—	—	—	879
BRS62088	—	125	142	—	—	—	119	386

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 July issue.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **April** issue should reach them by **20 February** and for the **May** issue by **16 March.**

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.

Accrington (NW Repeater Group)—16 February, 8pm. Globe Bowling Club, Willows Lane, Accrington. Sec Howard Aspinall, G3RXH.

Ainsdale (AARC)—14, 28 February, including cw class. Sea Scout Hall, Sea Wall. 5, 19 February (DF hunts, commencing 11am), 7, 21 February (Social chit-chat at the Mount Pleasant Hotel, Manchester Road). Details from sec David Norris, G4TUP, 148 Sefton Street, Southport PR8 5DA, tel 35947.

Bury (BRS)—5 February ("Ham feast"—the rally with a difference. Open at 11am), 14 February ("Earthing", by Roy Jones, G3NKL), 7, 21, 28 February (Informal), 8pm. Mosses Community Centre, Cecil Street, Bury. Sec Brian Tyldsley, G4TBT, 4 Colne Road, Burnley, tel Burnley 24254.

Fylde (FARS)—7 February ("Public service radio", by John Parkinson, G6DNK), 21 February (Informal with morse class), 6 March ("Changes that electronics have brought to air navigation and flying control during the last 40 years", by Mr Jefferson, senior air traffic controller at Blackpool Airport), 7.45pm. Kite Club, Blackpool Airport. Details from Harold Fenton, G8GG, tel 0253 725717.

Manchester (SMRC)—3 February (Radio clinic), 10 February (Spectacle in sound and colour. A social evening by Peter Bass, G6MOQ), 17 February ("An interesting oscillator", by Murray Ellis, G2CAZ), 24 February (Talk on valves by Chris Muriel, G3ZDM), 2 March ("History of SMRC", by Matt Barnsley, G3HZM), 8pm. Sale Moor Community Centre, Norris Road, Sale. Sec David Holland, G3WFT, tel 061-973 1837.

Liverpool (L&DARS)—7 February (Natter night), 14, 21, 28 February (To be announced), 8.15pm. Wavertree Conservative Club, Church Road, Liverpool 15. Sec Alan White, G6XBN, tel 051-427 3243.

Stockport (SRS)—8 February ("How to enter contests", by Ray, G3NOM), 15 February (Informal natter night), 22 February ("Sun, earth and radio", by Gordon, G3LEQ), 8.15pm. Blossoms Hotel, Wellington Road, Stockport. 11 February (Annual dinner dance, Southlands Hotel, 7 for 7.30pm). New officers: chairman, John Verity, G4ECI; treasurer, Alan Buxton, G8CZW; sec Mel Betts, G4FFW. Further details from Bill Egan, G4JQC, 84 Sanddown Road, Hazel Grove, Stockport, tel 061-483 7643.

Warrington (UK FM Group Western)—3 February, 2 March. Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Gordon Adams, G3LEQ, tel 0565 4040.

Wirral (W&DARC)—8 February (Technical film night), 22 February (Visit by local trader). Irby Cricket Club, Irby. 15, 29 February, 7 March, "D & W's". Details from Gerry Scott, G8TRY, tel 051-630 1393.

Wirral (WARS)—1 February ("Insight into microprocessors", by Frank, G3YGL), 15 February ("RSGB contests", by Norman, G3CSG), 7 March ("HF propagation", by Gordon Adams, G3LEQ), 7.45pm. Guide Hut, Westbourne Road, West Kirby. Sec Cedric Cawthorne, G4KPY, tel 051-625 7311.

REGION 2—RR to be appointed

Goole (GR&ES)—6 March (Natter night), 13 March ("Contest planning for 84", discussion), 20 March (Talk), 27 March (Constructors' evening), 8pm. 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.

Birmingham (South Birmingham RS)—There has been a change of date and venue for club lectures. These will now take place on the second Wednesday in each month. St Lawrence Pastoral Centre, Church Road, Northfield, Birmingham B31. Normal club meetings still at Hampstead House, Condover Road, (off Fairfax), West Heath B31. 8 February ("CEGB", energy talk by Mr Gouding), 7.45pm at above new address. Sec G8RGQ, tel 021-476 8312.

Dudley (DARC)—28 February ("TV outside broadcasting, 1950-1983", by Joe Jacobs), 7.45pm. Central Library, Dudley. Sec G4SQP, tel Codsall (209) 5636.

Halesowen (MEB Sports & Social Club—Radio Section)—14 February ("Home construction", by Rev G. Dobbs, G3RJV), 22 February (General meeting), 8pm. MEBHQ Social Club, Mucklow Hill, Halesowen. Details from sec G4RWH, tel 021-747 8784.

Hereford (HARS)—3 February (AGM), 17 February (Informal), 24 February (Club annual dinner), 8pm. Civil Defence HQ, Gaol Street, Hereford. Sec G4CNY, tel Hereford (0432) 273237.

Shrewsbury (Salop ARS)—2 February (Telephone exchange visit), 9 February (Natter night), 16 February ("St Dunstans and accessories for the blind", by G3VRI), 23 February (Natter night), 8pm. Details from sec G6UDB, tel Shrewsbury (0743) 62737.

Solihull (SARS)—21 February ("WAB", by Dr Nash, G4GEE), 7.30pm. Manor House, High Street, Solihull. Sec G6HSZ, tel 021-742 3378.

Stourbridge (StARS)—6 February (Informal), 20 February (To be announced on GB2RS), NB: new meeting place, The Robins Wood Centre (ex Beauty Bank Primary School), School Street, off Enville Street, Stourbridge. Sec G8JTL, tel Lye (593) 4019.

Stourbridge (Wordsley RC)—23 February (Expedition review 1983 with slides and planning for 1984), 8pm. Vine Inn, Camp Hill, Wordsley, West Midlands. Sec Andrew, G4TGM, tel Kingswinford (2) 295082.

Stratford-on-Avon (S-on-A&DARC)—13 February ("Power supplies", by Paul Edwards, G8KGJ), 27 February (Surplus sale), 7.30pm. Control Tower, Bearley Radio Station, Bearley, Nr Stratford. Contact Ian, G6CWK, tel Stratford-on-Avon (0789) 68863.

Sutton Coldfield (SCARS)—27 February (Homebrew competion for junior and senior trophies). Central Library, Sutton Coldfield. New sec G6UFD, tel 021-358 6501.

Warwick (Mid-Warwickshire ARS)—14 February ("RTTY", by Ken Young, G3ZCG), 28 February (AGM), 8pm. 61 Emscote Road, Warwick. Sec G4TIL, Southam (092681) 4765.

Wolverhampton (WARS)—Mondays, 8pm. Change of club meeting place: now at Wolverhampton MEB Club, St Marks Road, off Chapel Ash, Wolverhampton. Sec G6AKN, tel Wolverhampton (5) 782883.

Worcester (W&DARC)—6 February ("Calculations for the radio amateur", by Dave Fry, G4JSZ), 8pm. Oddfellows Club, Worcester. Sec G4NRD, tel Evesham (0386) 41508.

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. Tel Derby (0332) 556875.

Buxton (BARS)—14 February (TBA), 28 February (Informal meeting), 8pm. Egerton Hotel, 36 St Johns Road, Buxton. Sec Derek Carson, G4IHO, tel Buxton 5006.

Derby (D&DARS)—1 February (Junk sale), 8 February ("The Salem repeater", G4PMM), 22 February ("Forensic and failures investigation", by Jim Campbell), 29 February (Technical topics), 7 March (Junk sale), 7.30pm. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby 556875.

Heanor (South East Derbyshire ARS)—Tuesdays during term, 7.30pm. South East Derbyshire College, Ilkeston Road, Heanor. Details from new sec Bill Peck, G4VNB, 2 Sandfield Avenue, Ravenshead, Nottingham NG15 9AR, tel Mansfield 795380.

Lincoln (LSWC)—8 February ("Astrophotography", Don Ayris, G4GZA), 22 February (Activity night/night on the air), 8pm. City Engineers Club, Waterside South, Lincoln. Sec Pam Rose, G4STO, tel Gainsborough 788356.

Melton Mowbray (MMARS)—17 February ("TV teletext and video", by G8KUW), 7.30pm. St Johns Ambulance Headquarters, Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK, tel Melton Mowbray 63369.

Newark (N&DARS)—2 February ("Radio teletype", by G4HVC), 1 March ("Fault finding", by G4FUO and G4MDV), 7.30pm. Palace Theatre, Appleton Gate, Newark. Sec Roger Hiscock, G4MDV, tel East Stoke 539.

Scunthorpe (S&DARC)—Tuesdays, 8pm. Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe. Details from new sec Ida Aizlewood, G6ZCA, 36 Kings Street, Winterton, Scunthorpe, tel Scunthorpe 732268.

REGION 5—RR J. S. Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or at work, 0582 21151.

Cambridge (C&DARC)—3 February (Informal morse class, operating club station G2XV), 10 February (Video show, "In your shack"), 17 February (Informal, morse class, operating club station G2XV), 7.30pm. Coleridge Community College, Radegund Road, during term time. Publicity officer David, G2FKS.

Luton (Kent Process Control ARC)—1 February (Informal evening), 8pm. Club House, Tenby Drive, Luton. Sec G3DOT. Club open to employees only.

Peterborough (GPARC)—16 February (Probably junk sale and quiz), 7.30pm. Southfields Junior School, Stanground, Peterborough. Sec Frank Brisley, G4NRJ, tel 0733 231848.

St Neots (SNARS)—13 February (A visit by the membership services officers of RSGB), 27 February (Natter night). Horseshoe Inn, Offord Darcy, nr Huntingdon. Sec G8XSO.

Wellingborough (Nene Valley RC)—1 February ("VHF—then and now/RSGB awards", a lecture by Jack Hum, G5UM), 8 February (Natter night and hf transmitting), 15 or 22 February (Lecture, "6 metres", by John Worsnopp, G4BAO), 29 February (Video, "Heard Island expedition", by H1DXA), 8pm. Dolben Arms, Finedon for lectures and natter nights; transmitting and morse classes, First St Mary's Scout Hall, Finedon. Sec Lionel, G4PLJ.

Not a lot of club news this month, I expect a lot of club secretaries were too busy Christmas shopping! Clubs not mentioned please make use of the RSGB news headline service. *G3DOT.*

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240.

Aylesbury Vale (AVRS)—21 February (Talk by Peter Blair, G3LTF, on amateur moonbounce). Details from Cathy Clark, RS44513, tel 0844 514161.

Vale of White Horse (VoWHARS)—7 February (Alan Simpson, G3UMF, will talk on fast scan amateur tv), 6 March (Petra Suckling, G4KGC, will address the club on vhf contests). Sec Ian White, G3SEK.

Sincere thanks to members who gave me their support in the 1984 Council election.

Some of the members of the RAF Halton AR&EC with the club's 144MHz station when the club operated the special event station GB2HAR. The occasion was the RAF Halton Aircraft Apprentices Reunion. L to r: Back row: Jim Harding, G4PFR, Dennis Sharley, G6WCS, Mike Goodearl, G6RLY. Front row: Brian Clark, RS44514, Les Cropley, G6XGB, Tony Gilchrist, G8BVJ, sec, and Cathy Clark, RS44513. *Photo:* RAF Halton Photographic Section

REGION 7—RR to be appointed

Ashford (Echelford ARS)—13 February (Constructional meeting (bring along your latest projects)), 23 February ("Domestic satellite tv reception techniques", by Paul Matthews, G3AWZ), 7.30 for 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Club nets Sunday, 1000, 1·93MHz ± QRM; Wednesdays, 2000-2100, 144·575MHz (fm). Sec Alf Othen, G8FSZ, tel Byfleet 48307.

Biggin Hill (BHARC)—21 February (Demonstration of 10GHz operation), 8.30pm. St Mark's Church Hall. Details from Ian Mitchell, Greenway Cottage, Tatsfield, tel 376.

Crystal Palace (CP&DRC)—18 February (AGM and constructional contest), 8pm. All Saints Parish Room, Upper Norwood, SE19. Details from Geoff Stone, 11 Liphook Crescent, SE23, tel 01-699 6940.

Wimbledon (W&DRS)—10 February (Film night, titles to be arranged), 24 February (Inter-club quiz with Coulsdon ATS), 8pm. St John Ambulance HQ, 124 Kingston Road, Wimbledon SW20. Details from sec Geoff Mellett, G4MVS.

REGION 8—RR M. Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE Tel 0795 70132.

Chichester (C&DARC)—7 February (Club meeting in the Long Room) 16 February (Talk on "GB3VR video repeater", by M. Newell, G8KOE, in the Green Room), 7.30pm. Fernleigh Centre, 40 North Street, Chichester. Details from sec T. M. Allen, G4ETU, tel West Ashling 463.

Hastings (HERC)—15 February (To be announced on GB2RS), 7.30pm. West Hill Community Centre, Croft Road. Fridays (Natter night at club station), Ashdown Farm Community Centre. Details of RAE and computer classes from G6WKL, tel Hastings 439925. All other club details from sec George North, G2LL, tel Cooden 4645.

Margate (Thanet RC)—14 February (Junk sale), 28 February (Talk by RAF Manston, "Air-sea rescue"), 8pm. The Grosvenor Club, Grosvenor Place, Margate. Details from sec I. B. Gane, G4NEF.

Sittingbourne (Swale ARC)—Mondays, 7.30pm. Nina's, 43 High Street, Sittingbourne, Kent. The club would like to thank all those who participated in its 144 & 432MHz contest held in January. Details from sec Brian Hancock, G4NPM.

Tunbridge Wells (West Kent ARC)—10 February (Talk on airline communication systems), 24 February (Surplus equipment sale). Adult Education Centre, Monson Road, Tunbridge Wells. 14, 28 February (Informal). Victoria Road Drill Hall, Tunbridge Wells. Details from Brian Guinnessy, G4MXL, tel 0892-32877, after 7pm.

REGION 9—RR W. J. Colclough, G3XC, Highview, Indian Queens, St Columb, Cornwall TR9 6LL. Tel 0726 860485.

Axe Vale (AVARC)—3 February (Junk auction), 7.30pm. Cavaliers Inn, Axminster, Devon. Details from pro Roger Jones, G3YMK, tel 0404 864468.

Cornish (CRAC)—5 February ("RTTY terminal units", by G4EIK, G4MSV, and G4SDU). St Stephens Church Hall, Trileigh. Computer section: 20 February ("Forth—an alternative language", by Bert Hammett, G3VWK). Pro Simon Rodda, G4PEM, Cliff Hotel, Penzance, Cornwall, tel 0736 3948 or 3524.

St Austell (English China Clay)—13, 27 February, 7.30pm. Pentewan Labs. Subjects at time of writing were not finalized. Details from sec Mike Porter, G4OKS, tel 0726 850818.

Exeter (EARS)—13 February ("Transmitter valves", by George, G3AOJ), 7.30pm. Community Centre, St Davids Hill, Exeter. Informal meetings other Mondays, Emmanuel Scout Hut, Okehampton Road, Exeter. Pro Roger Tipper, G4KXR, 11 Chancel Court, Chancel Lane, Pinhoe, Exeter, Devon, tel 0392 68065.

REGION 10—RR E. J. Case, GW4HWR, 2 Abbey Close, Tyrhiw, Taffswell, Mid Glamorgan CF4 7RS.Tel 0222 810368

Abergavenny & Nevill Hall (A&NHARC)—Thursdays, 7.30pm. Pen-y-fal Hospital, Abergavenny, above male ward 2. Tuesdays, 7.15pm, RAE classes, Seminar Room, Nevill Hall Hospital, Abergavenny. The club is a registered examination centre and all applications for March and May examinations must be made to the secretary, D. Ff. Jones, at his new address: 80 Croesonen Parc, Abergavenny, Gwent NP7 6PE, tel 0873 78674.

Barry (BCoFERS)—Thursdays, 7.45pm. Barry College of Further Education Annexe, Weycock Cross, Barry. The week commencing 25 February marks the 25th anniversary of Barry College of Further Education. There will be a special event station to celebrate the event, probably GB4BRS. 25 April (College dinner). Sec Simon Lloyd Hughes, GW8NVN.

Cardiff (CRSGBG)—13 February (Film show), 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec Cyril Laws, GW6ZHP, tel Cowbridge 3212.

Newport (NARS)—Mondays, 20 February (Film show), 27 February ("The RSGB and Region 10", by John Case, GW4HWR), 7pm. Brynglas House, Brynglas Road, Newport. Sec Robert Johns, GW4NXD, tel Pontypool 56348.

Port Talbot (BSCARS)—Thursdays, 7.30pm. BSC Sports & Social Club, Margam. The St David's Day special event station will again be operational on 1 March to celebrate the National Day of Wales. Event co-ordinator R. R. Jones, GW4HOQ, 'Bryn-Ynys', Strawberry Place, Morriston, Swansea SA6 7AG. Sec R. Bray, GW4ESV, tel Britton Ferry 821993.

Swansea (SARS)—First and third Thursdays in each month, 16 February (Nigel Gardner, GW8ODU, on "Construction and rf applications of fets"), 7.30pm. Lecture room 'N', Applied Sciences Building, Swansea University. Free coffee. Details from sec Roger Williams, GW4HSH, tel Swansea 404422.

REGION 11—RR B.H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Colwyn Bay (Conwy Valley ARC) (GW6TM)—9 February ("Satellite communication", by Chris Gilliam), 7.45pm. Green Lawns Hotel, Bay View Road, Colwyn Bay. Sec Mr J.N. Wright, GW4KGI, 46 The Dale, Woodlands, Abergele, Clwyd LL28 7DS. Tel 0745 823674.

Rhyl (R&DARC) (GW4ARC)—6 February ("Maps", by Bert Green, GW2FLZ), 20 February (Talk by John Lawrence, GW3JGA), 7.30pm. 1st Rhyl Scout HQ, Tynewydd Road, Rhyl. Sec John McCann, GW4PFC, 67 Ashley Court, St Asapha, Clwyd LL17 0PL, tel 0745 583467.

Wrexham (WARS)—2 February (Exhibition at the technical college), 15 February (Talk on radio theory). Friends Meeting House, Holt Road, Wrexham. Sec Pete Higgs, GW4IGF, "Oulton", Parkside, Rossett, Wrexham, Clwyd, tel Rossett 570212.

REGION 12—RR M.R. Hobson, GM8KPH, 4b Tummel Crescent, Pitlochry, Perthsire PH16 5DF.

Elgin (Moray Firth ARC)—First Monday in each month, 6 February (Visit to Moray Firth Radio, Inverness), 7.30pm. Spey Bay Hotel, Spey Bay, nr Fochabers. Wednesdays, Moray College of Further Education, Elgin, 7.30pm. Details from sec Rev Stan Bennie, tel 0542 32312.

Forfar (F&DARC)—Now meeting again after a break of almost 18 years. Details from sec Ken, GM1ABN, tel 0307 63095.

Inverness (IARC)—Comeron Youth Club, Planefield Road, Inverness.

Unst (URC)—Details from Mr Auty, Valsgarth, Haraldswick, Unst.

The following repeater groups also exist in the region. All contacts are QTHR.
Black Isle, GB3BI. Contact GM4OIJ.
Grampian, GB3GN/AB/PD. Contact GM8HGD.
Orkney, GB3OC. Contact GM3IBU.
Perth, GB3PR/PU. Contact GM8KPH.
Shetland, GB3LU. Contact GM4LBE.
Speyside, GB3SS. Contact GM4ILS.
Mull, GB3HI. Contact GM3RFA.

REGION 13—RR Andrew Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fife KY1 2LH. Tel Kirkcaldy (0592) 200335.

Dunfermline (DARS)—9 February, 8 March, 7.30pm. Room 7, Old High School, Priory Lane, Dunfermline. Details from Neil, GM8IID, tel 728778.

Edinburgh (Lothians RS)—8 February ("Black box night", GM8GEC), 22 February (TBA), 7 March (Construction competition and rig check night), 21 March (Surplus sale), 7.30pm. Harwell House Hotel, Ettrick Road, Edinburgh. Details from Colin, GM4HWO, tel 031-332 5502.

Galashiels (G&DARS)—1 February (Visit to Exacta Circuits Ltd, Selkirk), 15 February (Discussion of plans for Anglo Scottish Rally), 18 February (Amateur radio display, Leisure Activities Fair, Galashiels), 29 February ("Slow scan television", by GM8JFE), 7.30pm. Focus Centre, Livingstone Place, Scott Street, Galashiels. Details from GM3DAR, tel 56027.

Hawick—I believe a club is being formed in this area. Information for inclusion in this column would be appreciated.

Kelso (KARS)—Mondays, 7.30pm. Abbey Row Community Centre, Kelso. KARS are hosting the Anglo Scottish Rally to be held on 6 May at Kelso. Details from Andre, GM3VLB, tel 24664.

Peebles (PARC)—First and third Monday in each month, 7.30pm. Kingsmuir Hotel, Springhill Road, Peebles. Details from Nigel, GM6VDN, tel 20372.

Scottish Borders Repeater Group—Plan to host the 1984 Scottish Amateur Radio Convention in Hawick on Saturday 24 September 1984. Details from Bruce, GM4BDJ, tel Langholm (0541) 80018.

REGION 14—RR to be appointed

Ayr (AARG)—10 February (A night with GM3AXX), 24 February ("A history of uhf", by GM3YDN), 7.30pm. Community Leisure Centre, 24 Wellington Square, Ayr. Sec R.D. Harkess, GM3THI, tel Ayr 42313.

REGION 15—RR J. T. Barnes, GI3USS, Whitegables, 95 Crawfordsburn Road, Bangor, Co Down BT19 1BJ. Tel 0247 3948.

Bangor (B&DARS) (GI3XRQ)—3 February ("Towers and aerials", by GI3TLT), 8pm. Sands Hotel, Bangor. Sec GI4OCK.

Ballymena (BRC) (GI3FFF)—Tuesdays, 8pm, morse tuition. Wednesdays, 8pm, RAE tuition. Thursdays, 8pm, club night. Sundays, 4pm, club activity. All at club rooms, 70 Nursery Road, Gracehill. Sec GI4HCN.

Belfast (BRSGBG)—Third Wednesday in each month, 8pm. 90 Belmont Road, Belfast. AR GI4RXS.

Belfast (QUOBRC) (GI3LLQ, GI8FQB)—Tuesdays, 7.30pm. Club Rooms, 37 Fitzwilliam Street. RAE and morse tuition available. Details from Victor, GI6JHF, tel 703027, evenings, or 661111, ext 4006, day time.

REGION 16—RR T.D. Howe, G3PLF, 18 Vange Hill Drive, Basildon, Essex SS16 4DD. Tel 0268 24453.

Braintree (B&DARS)—6 February ("Amateur transmitters, theory and practice"), 20 February ("Collecting and renovating old radio equipment", by John Brown), 7.45pm. Braintree Community Centre, Victoria Road. Details from Pat Penny, G6TAF, tel Braintree 26487.

Colchester (CRA)—9 February ("Design and production of printed circuit boards", by Bev Clues), 23 February ("Making the micro work", by Robin Cobbold), 7.30pm. Colchester Institute, Sheepen Road. Details from Frank Howe, G3FIJ, tel Colchester 851189.

Ipswich (IRC)—8 February (Repeater group's meeting (GB3PO/GB3IH)), 29 February ("The building of the Orwell Bridge", by S. H. Cooper), 8pm. Club Room, Rose & Crown, Norwich Road. Sec Jack Tootill, G4IFF, tel Ipswich 44047.

Loughton (L&DARS)—3 February (CW practice), 17 February (Bring & buy sale), 8pm. Loughton Hall, Rectory Lane. Sec C. Knowles, G6FWT.

Stowmarket (S&DARS)—6 February (Junk sale), 7.30pm. Red Cross Hut, Station Yard. Details from Martin Goodrum, G3ZQU, tel Stowmarket 676288.

Vange (VARS)—2 February (Junk sale), 7.30pm. Main Hall, Bastable Tenants' Community Association, Long Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 876018.

Bournemouth (BRS)—3 February ("Tests on your radio", by G8GNB), 17 February (Natter night), 7.30pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel Ferndown (0202) 877945.

Eastleigh (Itchen Valley ARC)—17 February (Pre-AGM discussion and RR's visit), 2 March (AGM). Alternate Fridays, 7.30pm. the Scout Hut, Brickfield Lane, Chandlers Ford. Sec G6DIA, tel Totton 863039.

Fareham (F&DARS)—Wednesdays, 1 February (Construction techniques), 15 February ("Did Morse get it right?", by G3CCB), 8 and 22 February (NNOTA), 7.30pm. Portchester Community Centre, Portchester. Sec G4ITG, tel Fareham (0329) 234904.

Guernsey (GARS)—Following an EGM on 25 November 1983 the following officers were elected: president, GU4GNS; sec GU3MBS; treasurer, GU6JQF; committee members GU1ADR, GU6TDE and GU8TGP. Tuesdays and Fridays, 8pm. the Lodge, La Corbinerie, Oberlands, St Martins. Sec, tel 0481 57605.

Jersey (JAEC)—8 February (AGM), 8pm. The Communications Centre, St Brelade. Sec GJ8KNV, tel 53333.

Liphook (Three Counties ARC)—1 February (Talk by G. C. Arnold from *Practical Wireless*) 15 February (Morse decoding by computer), 29 February (Talk and demo of Amtor and rtty by G4EMR), 7.30pm. Railway Hotel, Liphook. Sec G6SOQ, tel Bordon 3395.

Weymouth (SDRS)—6 February (EGM), 7.30pm. Army Bridging Camp, Wyke Regis, Weymouth. Sec G3ZGP, tel Weymouth (0305) 912893.

Wimborne (FRARS)—Following the second AGM held on 27 November the following officers were elected: chairman, G8YCA; vice-chairman, G8MCP; treasurer, G4BGT; sec G8VFY, tel Wimborne (0202) 882271.

Winchester (WARC)—18 February (AGM), 7.30pm. The Scout Log Cabin, Stockbridge Road, Winchester. Sec G3SHQ, tel Twyford (0962) 713003.

REGION 19—RR R.J.C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (C&DARC)—1 February (Natter), 8 February (Equipment evening), 19 February (Natter), 22 February ("Sierra Leone 10m beacon project", by Roger, G4OAA), 29 February (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)—21 February (Receiver preamps—a discussion). Committee Room, Chiswick Town Hall, High Road, London W4. Sec W. G. Dyer, G3GEH, tel 01-992 3778.

Edgware (E&DRS)—9 February (A talk by Bosch Ltd), 18/19 February (ARRL cw contest, Hatfield Cricket Club), 23 February (Informal discussion). Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec Howard Drury, G4HMD. Information from 01-952 6462.

Harrow (RSH)—3 February (Contest forum), 10 February (Informal and practical evening in the Roxeth Room), 8pm. Harrow Arts Centre, High Road, Harrow Weald. Details from Chris Friel, G4AUF, tel 01-868 5002.

Havering (H&DARC)—1 February (Junk sale), 8 February (Informal), 15 February ("Wartime wireless", part 1, a talk with slides by G3EUR), 22 February (Pre-contest briefing and informal), 29 February ("The Hadrabs dxpedition to Andorra", by G8APZ), 8pm. Fairkytes Arts Centre, Billet Lane, Hornchurch, Essex. Details from A. Negus, G8DQJ, tel Upminster 24059.

St Albans (Verulam ARC)—28 February, 7.45 for 8pm. RAFA HQ, New Kent Road, St Albans. Informal meetings are held on the second Tuesday in each month at the same address. Details from new sec, Hilary Clayton-Smith, G4JKS, tel St Albans 59318.

Stevenage (S&DARS)—7 February ("The ESA launch site in French Guiana", by G3TIK), 21 February (Talk by the Cambridge Repeater Group—provisional), 8pm. TS Andromeda, Fairlands Valley Park, Shephall View, Stevenage, Herts. Morse classes 7.15pm. Pro Trevor Tugwell, G8KMV, sec, G4BGP, tel Baldock 893736.

REGION 20—RR B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, Bristol BS20 8NQ. Tel 0272 848140.

Bridgwater (Sedgemoor ARC)—20 February (Club skittle evening (contact the sec for venue and time)), 19 March (Practical demonstration of rtty by G4EHU). Bridgwater Arts Centre, Castle Street, Bridgwater. Details from B. Horsey, G3TTP, tel 0278 652058.

Bristol (BARC)—Tuesdays, 7 February (Computer night), 7.30pm. YMCA, Park Road, Kingswood. During February the club will be introducing video tape lessons for the RAE class. further details from Trevor Cockram, G8GFZ, tel 0272 791066.

Bristol (BRSGBG)—27 February (GB3BS, GB3AA, and further projects (including new types of repeaters) planned by the Bristol Repeater Group. Mark Goodfellow, G4KUQ, will present the talk), 7.30pm. Queens Building, Bristol University. Details from Chris Short, G8GLQ, tel 0272 621253.

Bristol (North Bristol ARC)—Fridays, 24 February ("Ambulance radio communication systems", and hopefully a demonstration of test gear by Mr Douglas Whitaker, of the South Western Regional Health Authority), 7-9pm. SHE 7 Bremar Crescent, Northville, Bristol. Details from Ted Bidmead, G4EUV.

Bristol (South Bristol ARC)—1 February (Bring & buy/dealers' night), 8 February (70cm night, by Mark, G4SDR), 15 February (Talk on Raynet by Paul, G8XIH), 22 February (QRP night, by Steve, G4MCQ), 29 February (Video night, by Martin, G4EIA), 7.30pm. Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. Details from Len Baker, G4RZY, 62 Court Farm Road, Whitchurch, Bristol, tel 0272 834282.

Cheltenham (CARA)—2 February (Talk on crime prevention), 16 February (Natter night), 2 March (Construction contest), 7.30pm. Stanton Room, Charlton Kings Library, Cheltenham. Details from Gill Harmsworth, G6COH, tel Cheltenham 525162.

Gloucester (GARS)—1 February (A visiting speaker will be demonstrating his collection of vintage radios), 8 February (No meeting, but 144MHz net instead), informal meetings on other Wednesdays, 7.30pm. St Barnabus Hall, Stroud Road, Gloucester. Details from Tony Martin, G4HBV.

Portishead (Gordano ARC)—22 February (Film show (Rolls)). Ship Hotel, Down Road, Portishead. Details from Robin Coles, G8ROC, tel 0272 691685.

Yeovil (Y&DARC)—2 February ("Radio noise", by G3MYM), 9 February ("How to make radio equipment", by G3MYM), 16 February ("How bipolar transistors work", by G3MYM), 23 February (Natter night), 7.30pm. the Recreation Centre, Chilton Grove, Yeovil. Details from Eric Godfrey, G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset, tel 0935 75533.

One of the Mid-Lanark teams who helped operate the special event station GB2MOD at the National MOD of Scotland. L to r: GM4UEH, GM4UXX, GM4PSV, GM4OYK and GM8BSE. ***Photo:*** **Ronald Cowan, GM4SRL**

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 **23 February** (April); **20 March** (May); **16 April** (Jun); **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

HRO National vib psu type P686W, six spare vibrators, vgc, AR88 6V vib psu, type MI8319, 115V ac pedal generator, meter reference, 810215 7A without stand, HRO coils, 50-100, 100-200, 500-1,000, blower, fans, 200-250 ac, KW160 cw/a.m. tx, offers. G3ANK. Tel Christchurch (Dorset) (0202) 486141.

Yaesu FT290R 5⅛ magmount, 9-el Tonna, new cond, carriage incl, £200. Yaesu FT101ZD fm, new cond, carriage incl, £550. Datong D70 morse tutor, brand new, £40. G6CHB, QTHR. Tel John 091-416 2606.

Trio R1000 communications rx, mint cond, orig box, packing, instruction manual, £185 ovno. Reason for sale, passed morse test, applying for A licence, need hf tx/rx. G6WND. Tel Wroxham (06053) 3240, evenings.

12AVQ hf vertical antenna, 20-15-10, £15. *Wanted:* Circuit info etc for Russian scope model CI5Y. Can photocopy and pay your expenses. G3ZOH. Tel Brian, Farnborough (Kent) 58413.

Yaesu FT707, comp, boxed, handbook, used one year, unmarked, £395. Yaesu FC707 tuner for above, boxed, unmarked, £65. Tel Bryan, 01-777 5353, after 7pm any day, or before 9.30am.

Microwave Modules MMT148/28 transverter, as new, £60. G2DQX, QTHR. Tel Southport (0704) 26660.

BC221 psu, orig charts, Labgear pa coils, B2 coils, 14 xtals, KW2000A series, see manual page 4, Yaesu FT101Z/ZD, WARC, auxiliary 3-band conversion kit, cost £19, project cancelled, manual info available, offers. G3ANK. Tel Christchurch (Dorset) (0202) 486141.

Standard C78, 70cm fm portable, nicads, charger, 12V power lead, £160 ono. Storno low-band, fm mobile, ideal for 4m, £25 ono. G8XVV, QTHR. Tel Preston (0772) 313886.

Eddystone 770R, good cond Amstrad 6-band rx, Sharp 10in tv/bw, radio, portable cassette, both mint, offers. L.D. Ireland, 16 Cathebedron Road, Carnhell Green, Camborne, Cornwall. Tel Praze 831236.

Panasonic RF3100L, 1·6-30MHz mains battery fm lw mw ssb cw, double superherodyne, purchased one owner, 14 months old, instruction book, service manual incl, rec retail £204, bargain at £135. D. S. Hughes, Tan Coed, Chwilog, Pwllheli, Gwynedd. Tel Chwilog 601.

TS20V hf ssb/cw tx/rx, exc cond, wkg order, Hansen DL20 dummy load, orig box, handbook, £265. GM4USY. Tel 0382 543082, evenings, 0382 302562, day.

MMT432-144, early model, no rep shift, mint, £85. MMC 50-28, £20. MMC432-28S, £25. MMC 432-144, £20. Heathkit handy talkie VF2031, eight channels fitted, charger, leather case, separate mic, xtal toneburst, £100. Pye PF70, RB4, RB6, RB10, xtal toneburst, preamp, £50. 2m pa, QM70, £30. AR22 digital synth rx, 140-150MHz, charger, £65. G8AVA, QTHR. Tel 03745 52434.

FP707 psu, £69. Mobile bracket, £9. SP107 spkr/case, £19. Shure 526T, £35. Yashica FR1, f1·4, slr, one touch zoom, 80/200, ML lenses alone valued over £200, exchange hf/vhf rig, w.h.y? *Wanted:* Atlas 215 or similar. G3MXO. Tel 021-788 0518.

FT7B, 80-10m, 50W op, a.m./ssb/cw, comp with packing etc, £295. AVO transistor/diode tester, mains op, mint cond, £25. G4FQF, QTHR. Tel Romford 47998.

TS700, Trio all mode, 2m tx/rx, base station, £225. Liner 2 ssb mobile, 2m rig, £55. Icom 225 2m fm, mobile, synthesized, 144, 146, £85. All perfect. G4INM, QTHR. Tel Chelmsford (0245) 59194.

Robot 400 slow-scan television converter, £375. GM3WIL, QTHR. Tel 0292 79217.

IC2E 2m synthesized handheld Microwave Modules MML144/25W power amplifier, £130 ono. Would consider exchange for 70cm gear with cash adjustment. GW3YKZ, QTHR. Tel 0633 858314.

C8800 2m fm synthesized, 10W, mic, manual, cables, mobile bracket, 18 months old, vgc, £165. GM4SVM NOT QTHR. Tel 0786 5834.

FT480R plus mode switching psu, only £270. G8YOO. Tel Stourbridge 3560 for details, after 6pm.

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.

Property of silent key G2DJM: FT401DX, exc cond, £230. Codar AT5, T28, mobile psu, home base psu, £50. Eddystone 640, valves, £35. Valve voltmeter, offers. G6MGI, QTHR. Tel 0332 760773.

Sharp MZ80K computer, 48k, software includes K Basic, A Basic, extensions, Pascal, Forth, Fortran, machine language, QTH locator, morse tutor, morse, rtty, Sargon chess, vgc, orig packing, £300 ono. GM4NEV NOT QTHR. Tel Cumbernauld (02367) 24501.

Eddystone rx type 770W, £55. Brenell STB2 stereo reel-to-reel tape recorder, requires new rp heads, £50. Solartron oscilloscope type CD643S, dc-12MHz, £30. Rogers stereo amp with Armstrong stereo tuner, two speaker columns, £50. G8ZDH. Tel Windsor (Berks) 69015.

VFO for TS520S, £35 ono. G3VTJ, QTHR. Tel 021-475 1107.

Racal RA17L, good cond, £125 ono. G3TRV, QTHR. Tel Wakefield 379163.

Uniden 2020 hf tx/rx, 80-10m, 180W dc input, ssb, cw, a.m., digital analogue dial, noise blanker, cw filter, £275. Morse keyboard, £35. 2m mobile λ/4 clip on, £9. Top band tx/rx separates, £25. *Wanted:* Cushcraft vertical. G4JQC NOT QTHR. Tel 061-483 7643.

IC2E, BP4 battery box with built-in charge circuit, Electret stick mic, orig packing, manual, etc, used little, £140. G3RAS, QTHR. Tel 0274 593867.

Shure 444D dual imp mic, £25. Leader gdo, lf, hf, vhf coils, £28. Matching ant imp meter, £28. Heath wx centre, windspeed, indoor/outdoor temp display, £100. Junkers morse key, £20. Naval key, £20. Two Heath morse osc, £5 each. 12AVQ vert ant, 20-15-10, unused, £29. Two transformers, 20V, 20A, £10 each. Variac transformer, 0-250V, 5A, £6. All items mint, carr extra. Tel 0202 522796, after 6pm.

FT290, in vgc, Mutek board, nicads, carry case, £185. MML 144/100LS linear, 1/3W input, 100W output, £99. MML 144/30LS 30W output, 1/3W input, £49. All ovno. G4UGV NOT QTHR. Tel 0732 823662, or 0493 661027.

Racal RA17 rx, 0·5-30MHz, in good cond, manual, offers? G8OTB, QTHR. Tel Nick, 01-445 7516, evenings only.

Burndept uhf base station, modern talkthrough, remote control, £139. Two Wood & Douglas uhf hand portables, wkg SU8, £125 the pair. Two Pye PF5 uhf hand portables, exc cond, wkg back-to-back, £150 the pair. GW6BPU. Tel 0222 24542, daytime.

IC215 2m fm portable, 15 channels, nicads, charger, manual, orig packaging, used little, vgc, now surplus to requirements, £130 ono. G8LHQ. Tel Mike, 01-582 7116.

Trio TS120V, TL120, SP120 base or mobile stn, comp boxed, exc cond. G4HSB, QTHR. Tel Peter, 0642-816608.

Icom IC730 hf tx/rx, mic, cond as new, boxed, £390 ovno. Mics: Shure 444D, Trio MC50, £18 each. Katsumi mic compressor MC22, £10. G3MIN, QTHR. Tel Shoreham (Sussex) 3552.

Trio 500S amateur bands rx, 80-10m, handbook, £40. Command rx BC348L, vgc, with separate mains psu, £50. Tel 0203 57303, after 6pm and weekends.

Icom IC255E, 25W fm, HM10 scanning mic, £155 ono. *Wanted:* Icom power supply IC3PS, IC20L amplifier (for IC215 and IC202S). G3HCM NOT QTHR. Tel Coventry (0203) 473698, evenings or weekends.

IC2E charger, case, 12V pack, spkr/mic, Adonis headset, £135. TRS80 model 1 level 2, 16k, lower case Atari joystick, port display cassette, power supply, some books, good software, £230. Instructions and packaging for all items. G6IBC, QTHR. Tel 01-790 8163 after 5pm.

Brand new 4 × BLY35 rf transistors, threaded stud, nut fitting, £5. New boxed valves, 5V4, 2 × 6SK7, 6K7GT, 6Q7GT, OA3, GZ30, 6V6, the lot, £3. 600/3Ω transformer, £1.25. New boxed valve EL506, £2.50. P&P extra. G3LTU, QTHR. Tel Cleethorpes 696412.

Racal prototype tx, based on MA79, contains removable linear using pair 6146 valves, interesting project, or could be broken for spares. *Wanted:* linear using pair 813s, no objection good homebrew. G4GEN, QTHR. Tel 082571 2205.

Datong morse tutor, as new, £35. G4TGK. Tel John, New Romney 62295.

KP100 squeeze cmos, 230/13·8V morse key, 10 months old, in new cond, £45. Tel 0270 582669.

High gain triband, 10/15/20 junior, 3-el beam, only three months old, £120 ono. G4UKX NOT QTHR. Tel Bedford 46586.

TS700G, mint cond, standard, unmodified, genuine reason for sale, can deliver London area, £325 ono. G8MJZ. Tel 01-805 3055.

Icom IC202E, nicads, £120. FDK Multi 700EX, £135. Trio 2300, two sets nicads, charger, £125. All comp with orig packaging. Eddystone 770R, £50. Pioneer PL12D2 record deck, £20. G8HHQ, QTHR. Tel Martyn, Winchester 822565, day, or Romsey 515581, evenings/weekends.

Yaesu FT7, mic, cable, no known faults, £220. Would take almost anything in part exchange, eg G2DAF tx/rx, KW2000, KW77, etc. W.H.Y? GW4BCD, QTHR. Tel Porthcawl 8963, after 6pm.

Yaesu FT101ZD Mk3, fm, ext vfo, exc spkr, £525 ono. FT707, with fm, £400 ono. TH3 Junior Mk3 Tri, £95. G4URK. Tel Maidstone 28401, or Tunbridge Wells 30819.

Two by 10ft sections of Alumast lattice tower, cost new £66 each plus VAT, yours for £100. Both only six months old, used two months. Buyer collects. G8TPR, QTHR. Tel Gordon, 01-864 8261, any time.

Trio 3200 fm 70cm portable tx/rx, seven channels, £95 ono. FDK Quartz 16 fm 2m mobile tx/rx, 10ch, £75 ono. Lafayette HA230 gen cov communications rx, £35 ono. G4NOW. Tel Dave, 01-850 4848 (SE9) evenings and weekends.

40ch 2m palmsizer handheld tx/rx, carrying case, mains charging unit, 10ch marine monitor, £150, or exchange for hf tx/rx, cash adj. G4NOZ. Tel Les, Colchester (0206) 66120.

Trio TS120V hf tx/rx, Trio TL120 100W linear amplifier, incl mic, morse key, connecting leads, manuals etc, £380. All in vgc. Reason for sale, buying micro. G4ANW, 34 Moggs Mead, Petersfield, Hants. Tel 01-606 8553, office hours.

FT780R Yaesu 70cm multimode, 1·6MHz repeater shift, £275. G8NWR, QTHR. Tel 0905 820167.

FDK Multi 700EX 2m fm, 25W, mint cond, 5λ/8 whip, mag mount, £150 ono. No split. G4JTK, QTHR. Tel 051-356 1757.

Trio 530S, AT230, SP230, mic filters etc, best offer secures. Would consider solidstate part exchange. G4OIN. Tel 021-451 2571.

Teletype corporation teleprinter, TT7/FG, Creed 7B, suitable collector or museum, £15 for both. Buyer collects. AR88 wkg, £25. Three-band 3-el beam, £50 ono. Buyer collects. G3LQB, QTHR.

Beautiful 2m mains operated linear amplifier, utilizing QQV0640 by Electronic Developments, comp with preamp, spare valve and fan, £95 or exchange for 2m mobile rig. 2-el 10m quad, £22. G4VKA NOT QTHR. Tel Lichfield 52646.

Realistic DX302, exc cond. Reason for selling: passed RAE and morse, £100. G4UUM. Tel Pete, Waltham Cross (0992) 34329.

Complete hf, vhf, uhf station, comprising of FT902DM, 10-160m, 2m 144-148MHz, 70cm, 430-440MHz, 4m-70MHz, via FTV901R, all three modules, all the facilities of the all mode hf rig on 2-4-70, FC902 atu, FV101Z vfo, SP901P phone patch spkr, FL2100Z linear, six matching units in exc cond, most under one year old, £1,350, will consider split. FT707, used mobile, SMC checked, £350. FRG7 with fm mod, £145. MM50/500 frequency counter, £50. Temporarily closing down. G4TKP NOT QTHR. Tel Bob, Derby 383442.

Partridge Supermatch atu, mini antenna, 3·5 to 30MHz, £30. Electron, Oric, BBC programs: morse tutor, £4.50; QTH locator, £4.50; BBC rtty, £5. MML 144/100 2m 100W linear, £75. 13V 18A psu, £80. G8KMV, QTHR. Tel 0438 354689, evenings.

MM144/30LS Microwave Modules 30W power amp, preamp, as new, £50. G6KLD NOT QTHR. Tel 01-888 1393, north London.

FDK Multi 2000 2m ssb/cw/fm mains/12V, 10W output, 144-148MHz coverage, comp with mains, 12V leads, commercial preamp, auto toneburst, repeater shift, ideal home or mobile, £160. G3YZQ, QTHR. Tel 021-779 2194.

Trio TS830S hf tx/rx, as new, in orig packing, only used for transverting, £575 ono. G3ZZJ. Tel Mike, Wigan (0942) 715083, evenings/weekends.

Newbrain programs: QRA gives bearings, distances, displays path on map of Europe, converts lat/long to locator. Logbook keeps details of stations worked. Microwave converts ngr to path details and draws path contours, £6 each. G8MWR, QTHR. Tel 0203 616941.

Nag 144XL 2m linear, 10W in, up to 250W out, mains supply, built-in preamp, £300 ono. G3HRY, QTHR. Tel Newport Pagnell (0908) 616519.

FT101 Mk1 cw filter, fan, G3LLL dbm, spare pa valves, vgc, £220 ono. Datong FL1 audio filter, as new, £30. G3PRD, QTHR. Tel Worksop (Notts) (0909) 475399.

Trio 9130, 2m all mode tx/rx, hardly used, still boxed, brand new Welz swr/power meter, two mobile antennas, gutter mount, mobile spkr, all exc cond, £380 ovno. Tel Warrington 64435.

IC240, boxed, as new, £120. PSU, £10. Linear MML 144/100S, 10W in, 100W out, still under guarantee, £95. Buyers inspect and collect. G4MMY, QTHR. Tel Wakefield 270525.

Trio 9000 multimode, 2m, vgc, mobile bracket, scanning mic, £230. Eight-el Quagi SQYO8, Hirscham rotator, £70. Will separate or £280 the lot, all 12 months old, no offers please. G6LVT NOT QTHR. Tel Crewe (0270) 60770.

Swan 500, comp with ps spkr, two mics, Reslo xtal, dummy load R, 20MHz counter, swr, pwr, 200W SO239 meter, spare valves, one 12ft 2in light gauge boom tube, all good cond, £300 lot. G. Hill, G2BQZ, 19 Station Road, Tadcaster, N Yorks. Tel 0937 833544.

Used once: 2x13-el Tonna, phasing harness, 11m RG8U coaxial cable, PL259 and N-type plug fitted, reason for sale new QTH soon, £56 the lot, may split. G6ELH, QTHR. Tel 01-950 5334, after 6pm.

TS520SE and AT200, TR7730, exc cond. GW3BUT, QTHR. Tel 0222 614017, office hours.

2,000 records (ex mobile disco), one pair 15in 100W full range exponental Binns (will split). Sell/exchange for ham or computer gear. G6MMG. Tel Dave, 051-430 9167 (Merseyside area).

QTH: detached stone-built house, three or four bedrooms with washbasins, luxury bathroom, large lounge, well fitted kitchen, gas ch, good size garden, cosy outside shack, Versatower, 10min from sea front, ideal bed breakfast business. G2FQP, QTHR. Tel Weston-super-Mare 32788.

ICRM2 remote control unit for use with IC211E, IC245E or IC701, used little, £45. G8SEE, QTHR. Tel 0209 716526.

Rover 100 P4, 1961, over £300 spent on recent overhaul, limited model 16621, orig logbook, overdrive, Servo-assisted discs, £100s of spares, MoT, £899, or will exchange for IC251E plus ICR70 or equivalents. G6XCG, QTHR. Tel Basildon 555645.

R1000 rx, mint cond, digital display, no mods, timer, manual, orig packing, dc kit, fitted new 2m converter, £220 ono. GM6NAM, QTHR. Tel Dave, 041-886 2627.

Silent key sale: KW Atlanta, £160 ono. KW power supply, £30 ono. Property GW4KJH. *Wanted:* HQ1 mini quad, fair price paid for model in good cond. GW4PNZ. Tel Swansea (0792) 204206 or W. Evans, 71732, during working hours.

Radio Amateur Callbook, USA and foreign, 1983 editions, comp with spring, summer and fall supplements, set of eight books, cover price US $62.90 for £20 incl postage. Steve Gibbs, GU3MBS. Tel 0481 57605.

Sig gen, Tech TE20D, 120kHz-500MHz (130MHz fundamental) af/rf output, mains powered, vgc, used little, £30. Philips Pocket Memo mini cassette recorder, vgc, uses Tandy Mini 30 cassettes or similar, cost new approx £40, accept £8. Taylor, G4EBT, QTHR. Tel 0709 70021.

Icom IC260 2m multimode mobile, £220. Microwave Modules 100W, 2m linear amplifier, 10W in, £90. G8IFN, QTHR. Tel Chelmsford 441504.

Icom IC24G 1/10W fm, comp, incl spare power lead, mobile mic, £150. FDK Multi 750E 1/10W multimode, £200. both unmarked, in orig cartons. G3ASJ. Tel Wilberfoss (Yorks) 325.

Icom IC245E 2m multimode mobile, homebrew scanner, £190. Microwave Modules converters, 144/28, £10; 432/28, £15. Could deliver Portsmouth or Wolverhampton areas. G8GMC NOT QTHR. Tel Portsmouth 751585.

Yaesu FT902DM, indistinguishable from new inside and out, certified on spec by Holdings, unbelievably low use in tx during life, must be a bargain at £565. New transverter also available to purchaser, price tba. RS52155. Tel John, 01-857 8096.

Icom 215 2m portable tx/rx, nicads, helical antenna, telescopic whip, xtals fitted for R0-9, S19-23, extra xtals for 145·300 tx and rx, 145·800 tx incl, £95 plus carriage. G4OOP. Tel Cramlington (0670) 714645.

Icom 720A hf tx/rx, PS20, AT500, 2KL500, 2KLPS, SM5, ICFL32, ICFL34, IC BC10A/E, HK706 key, CT300 dummy load, Tono 9000E sender/decoder, Tono CRT1200 12in green display, PX402 power supply, Datong morse tutor MDL D70, Daiwa DN620A swr meter, Icom 251E vhf multimode base station, all equip can be seen working and is less than a year old, it is very little used for receiving and not at all for transmitting, offers. C. L. Hesp, 1 Evesham Grove, Sale, Cheshire M33 2EY.

Hitech (S100 bus) high resolution colour graphics board and software, £150 (half price). Eprom uv erasing lamp unit, mint, £26. North Start format software to clear cpm, C/BASIC etc, possible part exchange atv Fortop, MTV435. G6THT, QTHR. Tel Crawley (02933) 515201.

Realistic DX100L shortwave rx, good cond, £45. Yaesu FRT7700 atu, £20. Buyer collects or postage extra. R. N. Carrick, 31 Fairfield Lane, Barrow-in-Furness, Cumbria LA13 9AN.

Yaesu FT780R, 70cm tx/rx, 1·6MHz repeater shift, £250. G4TBI. Tel Maidenhead 34313.

70cm handheld Palm 4, 6ch, comp with case, £100. PF1 unit charger, tx and rx plug in, £20. IC202S 2m ssb portable, in orig box, £100. All work well. I am selling to finance computer. G4MQB. Tel Martin, Bournemouth 421781.

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.

Icom 740 with fm board, internal ac psu, desk mic, hb, all accessories, virtually unused, as new cond, £650 ono. G3ONU, QTHR. Tel 0923 676344.

Yaesu FT290R, charger, case, orig box, £200 ono. Alinco 30W 2m linear amp, hardly used, £20. MML 144/30LS, as new, £40. Creed 7B, cased with converter board, components (kit), offers. G4UHM NOT QTHR. Tel 0245 468149, evenings.

28ft Wharram catamaran, £2,000 or exchange for ham equipment to same value. Poverty dictates so accept anything reasonable, even money. G4TUG. Tel Wellingborough (0933) 664524.

Pye PF70 mic, in vgc, working order, comp with cable, connector, £9.50 each. PVC-covered stranded connecting wire (approximate diameter 1·2mm), £2 per 100m length or 10 of 10m coils in different colours. M. J. Ferguson, 79 Coles Road, Cambridge CB4 4BL.

Yaesu FT707 solidstate 100W tx/rx, new bands, FC707 atu, mic, mobile bracket, base station, stand, all in mint cond, still under guarantee, £485 ovno. Carriage extra. Tel 0202 522796, after 6pm.

KW2000A, wkg, manual, mains, push switch fitted, £140. KW204, FRDX400, exc circuits, info, £125 each, £230 both. Valves: 832, 829, 807, £1; QQV320, £2. Spare 6CH6, 6146s, free with txs. Other bits. Carriage negotiable. G3NGT, QTHR. Tel Gosport 584861.

Teleprinters—Creed 7B, £10. 7ERP, £15. Creed 75, £12. Creed autos, £10. Several part machines for spares. Buyers collect. G3WLO, QTHR. Tel Amersham (02403) 3371.

Drake TR4C hf tx/rx, remote vfo RV4C, psu, mic, £275. Realistic DX302 rx, £100. G4TBI. Tel Maidenhead 34313.

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 and stage, random character groups for learning or a typed-in text for plain language practice. The best programs to get you that A licence, £6. GW3RRI, QTHR. Tel 0286 881886.

QTH, Winchester, 80m asl, semi-detached three-bed, all mod con, planning for 30ft pole, £39,500. G6FBR, QTHR. Tel Winchester 66764.

BCC tx/rx, N69D, £10. Receiver type 46116, 1·5-9MHz, £10. Cossor 1035 scope Tranny-US, £10. *Wanted:* GEC tube LD924E. Tel London (01) 883 3474.

Rotator AR40, unused, £55. Antenna, Tonna 144/9XD, new, unused, £16. AR88, in exceptional cond, £30. 2m converter, £5. Buyer collects. G4EAH, QTHR. Tel Crowthorne 771591, evenings.

Creed 7B teleprinter, comp with cover, gwo, second 7B for spares, £15. Buyer to collect. Rick Keens, G8NDN, QTHR. Tel New Romney (Kent) (0679) 64142, after 6pm.

Trio TS510, 200W, 80-10m, new pas, spare set of valves, £200. BC221 frequency meter, incl psu, £20. *Wanted:* FT7. G4OYF, 13 Higher Holcombe Close, Teignmouth, Devon TQ14 8RE. Tel 06267 3834.

Yaesu FR50B hf amateur bands rx, £40. Absorption wavemeter, 65-230MHz, £7. G8MRQ, QTHR. Tel Nottingham (0602) 280252.

FT77, 100W, mic, marker unit, cw filter, as new, purchased August as standby, seldom used, prefer buyer inspect, £425. GM3GJB, QTHR. Tel 0324 23608.

FRG7 gen cov rx, atu, £150. IC24G 2m fm tx/rx, £100. Acorn Atom 12k rom, 12k ram, £75. *Wanted:* 70cm handheld, top band rig, audio filter 10m fm, 2m, power amp. G4TGJ NOT QTHR. Tel Richard, 0707 51449.

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.

UK101 8k, Premier Basic 4, Mono 2, fast cassette interface, eight-way expansion board, case, cw leads, manuals, assembler, exmon, £70. 1kW dummy load, £28. 1kW two-way antenna switch, £8. Will haggle. Buyer must collect. GW4JXB, QTHR. Tel Mike, Aberystwyth (0970) 828446.

FT290R charger, nicads, case, helical antenna, 30W Alinco linear, 8-el crossed Yagi, A40 rotator, 5λ/8 and λ/4 antennas, gutter mount, mobile, boom mic, all boxed, only six mths old, the ideal base and mobile stations, £300. G4SLG. Tel Lincoln 751920.

FR100B, FL200D, matched pair, £120. 12V pp, £15. Cowl gill motor with pp, £20. LPF, £5. AR88 cabinet, £3. FRDX400S, FL400, FL2000D, as new, £450. KW lpf, £6. Xtal calibrator tester AR58, £12.50. 75/75pF variables, £1.50. Record player, £3. G3IPM, QTHR.

Swap FT902DM, FC902, SP901 for TS820S or TS830S plus cash adjustment or £750 ono. Swap Eddystone EC10 with fm mod for scope suitable for tv work. G4MUZ, 28 Lumley Avenue, Skegness, Lincs PE25 2AT.

Exchange FT101 Mk1, perfect wkg order, EK150 keyer for 144MHz multimode. G3BGR, QTHR. Tel 0905 356576.

Yaesu FRG7700 comm rx, mint cond, new tx/rx imminent, £250. G6DOJ. Tel Southampton (0703) 55025.

KW2000B ac psu, Q-multi, manual, good cond, recently revalved, £200 or may exchange with a little cash for FT790, FT780. G4RVR, QTHR. Tel Sheffield (0742) 656880.

NVB44 tapes, VC60 tapes, N1500 video recorder, Advance constant voltage transformer, Advance

transistor tester, Elektor games computer, keyboard contact assemblies, 48in projector screen, 872B valve, 9·5V 3·5A stabilizing transformer, various mains transformers, transistors, resistors, capacitors, offers. G3XFW, QTHR.

FT707, used little, good cond, £350. G-whip, 10, 15, 20, 40, 80m, £15. G4EBX, QTHR. Tel 0773 812766.

Ham 4 rotator, comp with cable, used very little, approx one year old, in orig box, ready for collection, £165. Four-el beam for 4m, nearly new, £10. G4EUF NOT QTHR. Tel Markfield (Leics) 242378.

FT225RD, in exc cond, Mutek board, orig packing, has worked 21 countries, 106 QRAs, offers. Serious offers only please. Peter Crosland. Tel 0905 620041, evenings, or 021-454 8585, daytime.

Cambridge kits; tunable audio notch filter (unused), long wave converter, 100-600kHz, few hours use only, both factory assembled, the pair, £28. G3JIC, QTHR. Tel 0744 23916.

Yaesu FT225RD multimode, fitted Mutek front end, £475 ono. Icom IC451E multimode, £550 ono. Both vgc. Tel Groves (09277) 62201, after 7.30pm.

Icom IC2E, extra BP3, spkr mic, LC3 case, mobile charger, hb 10W pa, all vgc, £140. G6OBR. Tel Birmingham (021-) 353 5806.

National NC200 five-band tx/rx, in need of alignments, £25. Swan 240 three-band tx/rx, £80. Creed model 15B teleprinter, £30. Deliver reasonable distance. G3NJT, QTHR. Tel 0934 822397.

Property of the late GW3YPF: Trio TS130SE hf tx/rx, SP120 spkr, mic, almost unused, orig packing, £500 ono. GW3MZY, QTHR. Tel 0248 680034.

Trio TR9000, multimode, 2m, good cond, bracket, mic etc, £245. G3KCR NOT QTHR. Tel 0323 890726.

TS820S, rtty filters, as new, hardly used, £375. Racal RA117, set of spare valves, handbook, £200. FT101EX, new pa valves, good runner, £250. MM4001KB, psu, £225. Monacor swr/meter, £8. G5CRP, QTHR. Tel Macclesfield (0625) 614112, evenings.

Yaesu FT707, FP707, psu, exc spkr, FC707 atu, dummy load, power, swr meter, Datong speech processor, full station antenna, mic, Icom 720A, psu ICPS15, only a few hours use, HF5, G2DYM trapped dipole, 160 to 10, w.h.y? Would exchange part for 980 or 902. G4VLE. Tel Scarisbrick 880345.

Shack sort out: two Creed 444, 45-50 bauds respectively, very-low mileage inc manuals, two terms units, ST5, Catronics C100/1/2/3, paper, tape, etc, £199. HW8 QRP tx/rx, beautifully built, is much fun to use, 3·5, 7, 14, 21MHz, manual, £99. SAS Army 123 set tx/rx (1966), cw only, built-in key, 5-10-15-25W out, 2-21MHz continuous, 12 by 4 by 5in (spy set) 240 etc, ac, hand or foot generator, all new, boxed, £95. TR2300 144-146-/P, nicads, charger, case, boxed, never used, £115. Eddystone 730/4 gen cov rx, vgc, 550kHz to 30MHz, manual, £99. Will arrange delivery on any item. G4ILR. Tel Cromer 761612.

Muirhead D330B RC oscillator, 20Hz, 20kHz, switched, metered output, attenuator, 1W, 10mW, £40 ono. Muirhead D134A ac mains stabilizer, £5 ono. G3SHS, QTHR. Tel Potters Bar 58058.

FT107M, exc hf tx/rx, grey, internal psu, digital memory vfo, mic, £580. Harris RF220 150W hf ssb tx/rx, hd psu, 3x 6146 pa, Collins mech filter, circuits, wkg cond, ideal conversion, spares, £45. MMC 144/28LO 144MHz converter, £20. HF beam TA32JNR, £55. AR40 rotator, £45. Nine-el 144MHz Tonna, £12. 2m 15W pa module, £10. *Rad Com* 1973-80, *SWM* 1972-76, offers. 144MHz collapsible four-el quad, £5. TR2300 with 25W pa, £135. House move forces shack clearance. G3TSO. Tel Coln St Aldwyns (028575) 532.

FT707, FP707, Datong rf clipper, YD148 mic, £550 ono. FRG7, KX2 atu, £150 ono. G4PWT, (QTHR as G8WVE). Tel 061-881 2970.

Trio 2200GX, S20-23, four repeater channels, no nicads or charger, hence £50. A1134B, good cond, offers, w.h.y? MM2000 rtty to tv converter, £80. G6MFS. Tel Northampton (0604) 881464.

TS520S, used little, good cond, £350. FT480R case scratched by mobile mount, psu, £250. G2DYM trapped dipole, approx 80ft feeder, £25. G4JVX NOT QTHR. Tel 0257 480970 (Lancs).

Mosley TD3JR 20/15/20 wire trapped dipole, good performer, worked all continents, best results as inverted-V, reason for sale, experimenting with verticals, £10. Buyer collects or deliver reasonable distance. John Hughes, G4KGT, QTHR. Tel 01-920 8142, day, 02406 4380, evening.

FT480R, mint, unused transmit, comp, £300 ono. FRDX400S rx, 2m, 6m manual, £100. SMC psu, 13·8V, 6A, £20. Jaybeam 5Y2M Yagi, £9. MM linear preamp, 144/25, £40. All ono. G3BRT, QTHR. Tel 0272 657997, after 7pm.

IC2E, LC3 case, £125. ICML1 10W matching booster, £40. Both with orig packing and instructions. G4RSR. Tel Dave, Yateley (0252) 873792.

FT101 exc cond, home brew linear, cw filter, fan etc, £350 ono. G4MIP. Tel Plymouth 336594.

Sony video recorders AV3620, £30; AV3670, editor, £35. 0·5in and 1in used video tape, £10 per doz. Pye Mk5 and Mk6 studio cameras, £25 each. 200ft Mk4 cable on drum, offers. Marconi V322 vidicon camera, £30. G8BPH, QTHR.

SX200 vhf/uhf scanning rx, a.m./fm on all frequencies, two speed scan, 16 memories, back-up clock, 12V/mains, exc cond, mains power pack, manual, orig packing, £155 or offers. Tel David, Barnstaple (0271) 78686, day, 42631, evenings.

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.

FRG7700, FRT7700, FRV7700, £280. KW swr meter, £15. Trio SP820 spkr, £30. Heath HM102 swr/pwr meter, £25. Heath GD1 gdo, £10. FRT7700 atu, £30. All items immac cond with manuals. G3RLU NOT QTHR. Tel 0202 475048, after 6pm, or 484211, daytime.

Shack clearance: Icom 251E 2m multimode, £370. FT902DM, FC301 transverter, as new, £750. RAIBC operator, cannot tune Sony rx FP8880, £80. Sony ICF6700W, £160. Both factory serviced. SEM Z-Match, £65. *Wanted:* S930S psu, and atu. Tel Bruce Taylor, 072278 396.

Yaesu FRG7000 gen cov rx, 0·25-29·9MHz digital frequency read-out, digital clock/timer, preselector, fine tuning, tone control etc, mint cond, used little, boxed as new, £195. Would exchange, with cash, for BBC microcomputer. G3RGJ, QTHR. Tel Parkstone (Dorset) 742142.

Tower, 32ft, Heathkit lattice, galvanized, dismantled, buyer collects, £150. Tel Canworthy Water 493.

FT101 Mk2, mint cond, hardly used, £300. Pye Westminster W30AM, high band, boot mounting, gwo, £35. G8JGF, QTHR. Tel Ripley (0773) 862289.

FDK Multi 2700, all modes base station, Oscar 10m converter, 2m, 10W, vfo, switched frequency synthesizer, vox, nb, rit etc, rx preamp fitted, 12V dc or 240V, £290 ono. G8PRP, QTHR. Tel Weston-super-Mare 516357, evenings.

Robot 400 pcb, nearly comp, well built, £70. UK101 8k computer, Basic, proper keyboard, £50. Palm 2 6ch 2m handheld, £70. Mr Slemp. Tel Chelmsford 266776.

Yaesu FT101ZD FM Mk3, fitted fan, mic, boxed, absolutely as new, faultless, used little, £525. G6IM, QTHR. Tel Leicester (0533) 712943.

Standard C8800 10W fm tx/rx, scanning from mic, five memories, 5/25kHz steps, exc cond, no mods, orig packing, £150. G6TRM NOT QTHR. Tel 02273 69454.

FT101ZD, fan, cw filter, 30m fitted, £400. FTV901R 2m transverter, £100. TenTec Century 21 cw tx/rx, 70W, £130. Calibrator unit, £10. Joystick antenna, atu, £10. MM 2m converter, £15. Equipment of G4MLU deceased. G4HMD, QTHR. Tel Howard, Northwood 22776, evenings.

Hitachi 14in tv TV75UK, as new cond, 12-240V operation, vhf single standard, bw, ideal atv computer monitor, £35. Daiwa SR9 monitor rx, 2m, S20, S19, R3-7 xtals fitted, vfo, £35. G6XKD. Tel Gravesend 24666.

Trio TS130S tx/rx, mobile mount, ac psu, not used mobile, £450. Pye Cambridge FM10D, Storno CQM39, both xtalled on 70·26 and 70·48MHz, £50 together or will split. G3PVX, QTHR. Tel Peter, 01-866 6432, after 7pm.

Datong D70 morse tutor, £25. GW6ETK, 41 Bond Street, Swansea SA1 3TU. Tel Swansea 470683.

FT101Z dc power pack, mint cond, £410. FT290R, nicads, charger, case, 11 months old, £200. Microwave Modules 144/30LS linear, 11 months old, £40. HQ1 minibeam hf antenna, £50. Could deliver reasonable distance. G4MPP, QTHR. Tel Crawley 884353.

FT101ZD Mk 3, WARC bands, a.m./fm boards available, prime order, incl mic, dc power supply, maintenance manual, etc, £500. Swop or sell FC902. *Wanted:* AT230. G4MXU, QTHR. Tel 0494 20639, evenings or weekends.

KDK Multi 2000, 2m fm, cw, ssb base station, duplex, simplex and synthesized, Radofin Prestel set with printer, each £150 ono. Edinburgh area. GM4JKT. Tel 0383 872846.

FT102FM offered again for the last time, due to time wasters: cw FAN101Z, mic, cw filter, handbook, 250W atu/swr meter, dummy load, a comp station for £500 ono. Might consider p/ex w.h.y? Must sell to make way for homebrew project. G4HWB NOT QTHR. Tel 061-653 7055.

Transistor modulator, all transistor 15Ω public address, pair OC35 output, suit QQV03-10, QQV03-20 pa, wkg, circuit, 12V, £5. Mains transformer, 5-0-5V ct thrice 5A Admiralty, another 500-0-500V 425mA, 2·5-0-2·5V, 6A, 3·15-0-3·15V, 4·2A, 3·15-0-3·15V, 300mA. G3MBL, QTHR. Tel 01-445 4321.

Racal RA117E professional coms 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.

FT200, psu, hf tx/rx, full 10m coverage, gwc, £175 ovno. DX302 digital synthesized rx, 10kHz-30MHz, as new, orig packaging, £125 or part exchange either for 2m multimode. *Wanted:* FT101E or similar. Cash waiting. G4TDA. Tel Rugby 70363.

PF1 Pye pocketphones, two pairs, unmodified, batteries, £8 a pair. G4MEO. Tel Sandy (0767) 80043.

FT224 2m mobile, fitted S20-23, R0-1, R5-7, accessories, boxed, £80. Daiwa CN620 1kW swr/pwr meter, £19. 70cm magmount colinear, £8. 2m Revco 5⅛ magmount, £8. Base station mic, new, £5. Stereo car cassette, £7. New axial blower, £5. Auto transformer, £3. 9V 50VA transformer, £3. Keynector block, £4. Dual switched mains sockets, £1.50. Project wire, 4p/m. Three-core mains cable, 15A, 9p/m. UR59 coaxial, 14p/m. New jack plugs, 10p. Metal, 20p. Portable mast, £7.50. 0-12/0-12 transformer, 10A, new, £6. 470pF 10V pcb capacitors, 10 for 20p. IN4148 diodes, 10 for 15p. Motorola 9418AT transistors, 10 for 30p. TC913P (44 pin), 60p. Mobile mic holders, 30p. XLR connectors, new, 60p. Mobile processor mic, new, £5. Miniature two-core double screened cable. 8p/m. Approx 500 new/used radio/tv valves, bargain, £20. Car interference suppression kit, £5.50. Stainless hf mobile whip spring mounts/bases, 75p. Extension telephone, £3. Texas scientific calculator, £5. Wireless servicing manual, £5. Mullard rf power databook, £4. Theory/design magnetic amps, £4. Stanley Gibbons 1984 coin book, £5. *Clayton Operational Amplifiers,* hardback, £6. 150MHz freq counter, built-in i.f. offsets with info, great for rx etc, £15. Technical books—*Logic CCTS, Industrial Electronics, Advanced Industrial Electronics,* Dec computer books, Mullard technical series handbooks (latest)—analogue ics, locmos, digital, linear ics, ttl logic, rf power devices, transistor data, fraction of cost at £5 each-first come first served! Computer/radio mags, loudspeakers, moving coil meters, switches, components, all new, VIC20 software (going 64) project books etc. G8MAG NOT QTHR. Tel Milton Keynes 676221.

FT102, fm/a.m. option, as new, reluctant sale due to family commitments, still under warranty SMC, can deliver reasonable distance, £635 ovno. G4OXQ. Tel Basingstoke 28561.

Eddystone 750 rx, gen cov rx, 500kHz, 32MHz, clean cond, £40. Tel Oxted 4718.

Bench psu, 0-30V, 2A metered, factory built, £30. Audio sig gen (Advance Instruments), 10-100kHz sine square, output, built-in attenuator, £25. AVO 8 Mk5, mint cond, comp with leads, handbook, £75. G3WCY, QTHR. Tel Ruislip 32341, evenings/weekends.

Comp hf and vhf ssb, cw, a.m. station, comprising grey colour FT107M tx/rx with memories, internal psu, FC107 atu, FV107 ext vfo, FTV107R transverter, two meters fitted, SP107 spkr, MH1 mic. G4ITG, QTHR. Tel Brian, Fareham 234904.

FT225RD 2m multimode, £460. 9-el Tonna, £12. 2-el Tonna, unused, boxed £24. Mutek front-end board for FT221/225, £50. G4JNZ, QTHR. Tel 01-868 2159.

HF and 70cm equip: Trio TS120V mobile, £295. Transverter MM 432/28S, £115. PS20 psu, 4A, 13·8V, £35. AT120 atu, £39. 29·6MHz fm rig, £24. 70cm fm Trio TR8400, £180. Hygain 12AVQ vert, £25. All ono. G4TBF. Tel Ted, Blackpool 700637.

Amtor rom and interface cable, made by ICS for the VIC20 and their AMT1, half price, £28. (I now use the COM64). *Wanted:* Cubic Astro 103. GM4SID. (GM4KGJ, QTHR). Tel 0224 24774.

Eimac 4CX250B tubes, unused, four available at £32 each. (QRO project aborted). G3OOK. Tel Bawdeswell (Norfolk) (036288) 506.

Kenwood TR8400 mobile, 70cm fm rig, 10W op, mobile mounting bracket, boxed, vgc, £175. Jaybeam 8-over-8 144MHz slot Yagi, unused, £25. Tonna 21-el 432MHz Yagi, £15. G4MUT. Tel Reading (0734) 693766.

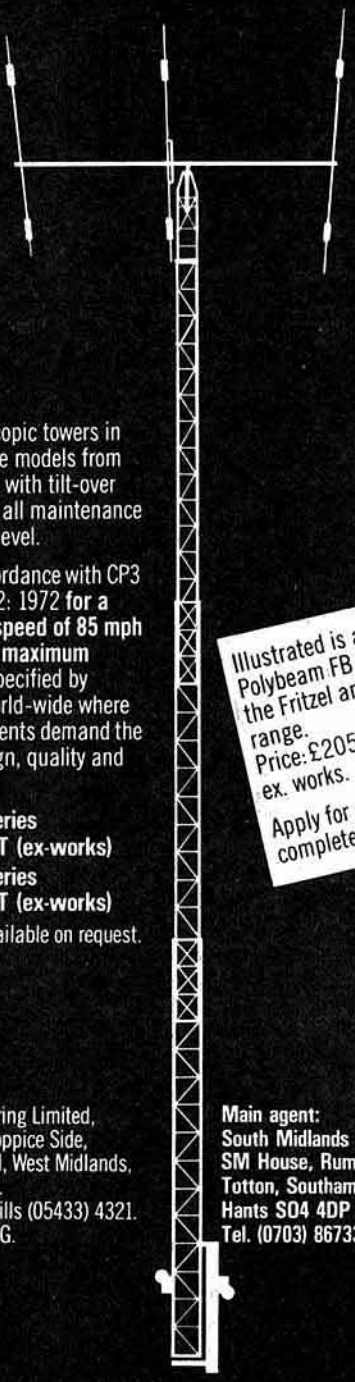
SB200, KW max p.e.p., good cond, spare pair good 572Bs, £200. Reason: I no longer use ssb. Class A holders only please. Buyer collects. G8DV, QTHR. Tel Cheltenham (0242) 520195.

Shack clearout: Pye 70MHz base station, Pye Cambridge 170MHz mobiles, Pye 470MHz tx, rx separate units, valve power supply, various lt and ht outputs. All cond unknown, offers. G6LDK. Tel Graham, Wakefield 270770.
Yaesu FT480R, FT780R, mounted on station console, accept £550 the lot. Yaesu FT77 and tuner, hf, £380. Sommerkamp 767DX hf, £250. All nearly new. Shack clearout. G4PSC. Tel Chesterfield 201521, after 5.30pm.
Trio TS930S, fitted AT930 auto antenna tuner, current list price £1,357, this superb tx/rx for £1,150 ono. G4RPV NOT QTHR. Tel Ken, 021-459 7041, after 6pm.
Yaesu FL2100Z, brand new, £350. Trio 9000, vgc, £210. Yaesu FC102 atu, two months old. G4TIM. Tel 07073 32166.
Sperry Univac paper tape punch, reader type 0925-01, five and eight level, £10. CRT VCR139A, £5. Watson, G3WMQ, QTHR. Tel 01-903 4363.

WANTED

English-French QSO language instruction. G4KME, QTHR. Tel 0782 503444.
Old call books, up to £1 each depending on cond, pre-1980. G4RYX (G8TAK, QTHR).
Video heads for Philips N1700, or scrap recorder for spares. G3KEP, QTHR. Tel 0532 860439.
Radio Communication Handbook, 5th edn, vol 1, new copy preferred or secondhand copy in mint, unmarked cond. Jim Coggins, Flat 1, 12 Colville Gardens, London W11 2BB. Tel 01-727 2141, evenings.
Vacuo junctions for Cambridge thermal milliammeter. PO type resistance box. J. E. Fairfax, 9 The Ball, Bratton, Wiltshire BA13 4SB.
Acorn Atom owners: I would really like to buy or exchange programs, especially for radio application, although any will be appreciated. Information on the vintage No 19 set greatly appreciated. Kevin Lewis, BRS52361, c/o 32 Victoria Road, Salisbury, Wilts SP1 3NG.
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.
TR9, top price. Interested in any parts T1083. W.H.Y? Second world war airborne. D. Parsonage, 52 Bramble Lane, Mansfield, Notts NG18 3NR.
Exchange Yamaha 175DT motorcycle, exc cond, for KW100 linear hf rig, KW109. W.H.Y? G3PQC. Tel Farnborough (Hants) (0252) 544268.
1934 Official Short Wave Radio Manual, editor Gernsba, published by Radio Craft. G4IMT, QTHR. Tel Bath 891254.
Codar AT5, mic, psu, by new callsign, urgent. Tel Middlesborough (0642) 221199, evenings after 6pm, ask for Arthur, G4UTV.
Circuit diagram, suitable 1920s radio case, 10 by 8 by 7in, any information whatsoever on vintage rx Chakophone No1B, three valve, desperate collector, all costs refunded immediately. Humphriss, 21 Gould Road, Hampton Magna, Warwick CV35 8TU.
Morse keys: any pre-war types. QSL cards, British and foreign, up to 1950s. *Radio Communication Handbook*; 1st, 2nd and 3rd editions. Hot jazz, 78rpm, records. Cash waiting! G4LQF, 14 Regent Road, Harborne, Birmingham 17. Tel 021-426 3663.
Redifon xtal oven type A4260, Edn C or Edn A. G3NMJ, QTHR. Tel Bexhill 215556.
Have you a faulty and unwanted HRO rx? Reading School ARC is looking for one as a re-building project. Any coils or handbook would be welcome. Will collect. G4RSC, QTHR. Tel Reading (0734) 61406, daytime, 871330, evenings.
Army tx No 33, will buy or exchange tx No36. Linear amp using pair 813s. Single 813 amp like KW500 ok. G4GEN, QTHR. Tel 082571 2205.
FLDX500, FRDX500 manuals. Will buy or willingly pay for opportunity to copy. G2HNO, QTHR. Tel Poole (Dorset) (0202) 708405.
QRO 2m linear, commercial, or home brew considered. Have 10W of drive available. G3XKN, QTHR. Tel 05255 2207, any time.
FT290R or similar 2m rig. Antennas, rotator etc for base/mobile use. AR88 in good cond, preferably unmodified. GW3POM NOT QTHR. Tel Llantrisant (0443) 224532.
'He-alp to cure FDK 750 Multi of synthesizer hum. No component layout. Unhelpful circuit. Any suggestions welcome. G3KPW, 78 Tregrea, Beacon. Tel Camborne (Cornwall) 71712.
Buy or borrow circuit diagram and any information for Barlow Wadley XCR30 xtal controlled portable rx, all expenses will be paid. G3RNU, QTHR. Tel Glos (0452) 24900.
Help needed urgently: very sick Textronix scope, RM35 handbook circuit diagram, plug-in amp etc. Willing to part with cash. G8DGU, QTHR. Tel Derrick, 0229 26280, evenings, 0229 26169, day.
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.
812A valve, urgently needed. Watch timer (Tickoprint or similar unit). Book by D. Pagan: *Micrometeorology.* Radio control for models. Info on memory map for Elektor's Junior Computer. Microscope accessories, slides, polariser, phase contrast equipment. G3AZI, QTHR. Tel 077237815.
Fax equipment for Paris/Bracknell weather. Slides/accessories for microscope. VIC20. Thruline elements particularly, 250H (other in exchange). YO901P. SP901P. Commodore 64. *For sale:* Basic-Basic course, two cassettes of programs for Commodore computers, £12.50, post free. G3AZI. QTHR. Tel 0772 37815.
For the Wireless Museum: pre-1950 radio books, magazines, catalogues, service sheets, manuals, QSL cards, components, valves, morse keys, knobs! Manual for AVO valve tester. Gamages 'twenties catalogue. Collection arranged. Details please to hon curator G3KPO, QTHR. Tel Ryde 62513.
Drake 2B rx, would collect, condition not material but sound specimen preferred. Electroniques i.f. strip, Minimitter converter, for amateur bands. Tel Scunthorpe 720794.
FP200 psu for FT200, can anyone help? G4PAC, QTHR. Tel Kingsclere (0635) 298537.
Buy or loan: copy of instruction manual for Telequipment D53 oscilloscope, incl cd and hd amplifiers, any expenses refunded. G3YHY, QTHR. Tel Watford (0923) 25633.
KW EZee-Match or similar atu, squeeze keyer, dummy load, ant switch, low pass filter. G4AEI. Tel Reading 883508, home, or Reading 875123, ext 7631, office.
Strumech Versatower P40 or P60. Jaybeam 14-el Parabeam, hf 10-20m, three-el beam, or similar. G4NRR. Tel Nigel, 021-744 8672.
Mirage 3016 rf power amplifier for 2m, would collect up to 100 miles distance. G8BIH, QTHR. Tel John, Alton (0420) 82739, anytime.
Magnesyn aeronautical compass. Magslip/Selsyn indicator. 19 set variometer. Infra-red monocular/binoculars. Infra-red source eg ex-WD night driving equipment. Varactor diodes BXY27, BXY28, BXY35, BXY39, BXY40, BXY41. TX twts. G4MBS, QTHR. Tel Alton 62316.
Suitcase tx/rxs, any spares, incomplete or damaged sets, any connecting cables or spares for WS (Canadian) No 29, well regulated and stabilized 12 or 13V psu, capable of providing 50A continuous. Taylor, G3UCT, 8 Government House Road, York. Tel 0904 29777.
HQ1 mini beam in good cond. G4KHT, QTHR. Tel Tony, 0482 852216, after 6pm, or 0482 223141, ext 3457, between 9am and 4.30pm.
AR88, must be in good cond, ideally pvc wiring, S-meter, Manchester area preferred but not essential. G3NYE. Tel 061-863 6263, between 8am-4pm.
Yaesu FTDX401, information on mods, rit, extra bands, factory mods, anyone fitted fm? Can photocopy or camera copy, all documents, articles returned A1 cond, costs returned. G6MVM, 24 Seaview Road, Herne Bay, Kent CT6 6JA.
Heathkit power unit HP23C-PS23, with illustration booklet and circuit diagram. Tel Cheltenham 35856.
Redifon hf or vhf marine equipment. Circuit, handbooks for GR674, GR470, Eagle Star SR600. Inverter 12V dc to 24V dc at 3A. *For sale:* Eddystone 880/2, vtm, Pye Cambridge, Westminster, high band. Cain, 18 Oaky Balks, Alnwick. Tel Alnwick (Northumberland) 602487.
Buy, borrow, copy workshop manual or alignment info for Uniden 2020. Any other mods, info, etc for school radio club. Interested in defunct 2020 for spares. G4HYY, QTHR. Tel Todmorden (070 681) 5342, after 5pm.

Versatower: The only way to top it is with a Fritzel antenna!



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Illustrated is a Polybeam FB 33 from the Fritzel antenna range.
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Similar to the previous TS530S
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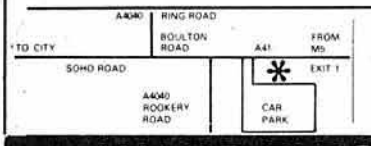

RSGB books, morse keys, practice oscillators

All items subject to availability, prices currency dependent

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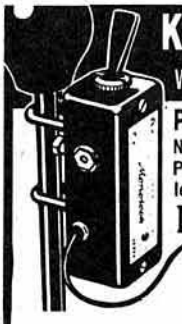

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Thats exactly what the Datong Morse Tutor can do for you, as thousands of satisfied users will confirm.

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)

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HATELY ANTENNA TECHNOLOGY

GM3HAT  GM3HAT/A

DIPOLE of DELIGHT

SUMMARY OF STORY SO FAR

The Dipole of Delight is the familiar name for the recently invented antenna which is the subject of Patent Applications in the UK and other major countries. It has the following five attributes simultaneously. It is:

(i) Multiband (ii) No-tune (iii) Quiet (iv) Efficient (v) Coax fed.

The December RAD COM page 1114 has the full details of the device and its attractions.

NEW SMALL DX ANTENNA

As stated in the January advertisement, a new version was being prepared and we are happy to announce that this is now available.

This antenna should be of particular interest to city dwellers because it is only 10.7 metres (approx 35ft) overall and is ideal for inconspicuous support at a chimney with extension over a roof or erection within a loft space.

DD 14/21/28 is a three-band antenna for the conventional DX phone and CW bands. The capacitive BALUN at the centre is no bigger than a small paper-back book and only 3 mm thick. Like all DD's the new member of the family is well behaved and produces a 50 ohm VSWR of less than 1.5 to 1 over the whole of the two lower bands and through the populated part of the 28 MHz band. No Antenna Tuning Unit is required. If operation with VSWR of 1 is necessary at the upper part of the band, a conventional ATU can be used, of course.

ANTENNA TECHNOLOGY

We are often asked if the DD antennas can be made to radiate on 80 metres. The answer is YES. It is always possible to operate a DD on bands below its lowest working band by tuning it against Earth as a T (or Marconi) antenna. Given with each antenna is the USER's INSTRUCTION sheet which describes how this can be done using a normal ATU. The document also describes how to construct an inconspicuous 3 El Yagi fixed beam in a conventional garden. Inexpensive, safe, and innocuous, the DD plus two wires will give enhanced gain towards a chosen part of Europe or Scandinavia on a selected band from the three in the system. We cannot say that this is a method of getting low angle gain but it is nevertheless useful. Tests on scale models in the an-echoic chamber show that for low angle gain the directors and reflectors must be up at the dipole height, and may there cause visual problems unless high telephone wires or trees can give some conservational camouflage.

Returning to the question of tuning antennas, no ATU is needed with NO-TUNE PA's as has been said before, but with tunable PA's the DD will be found to load so well that there is no need to retune anywhere in a single band. If for any reason an ATU is felt to be necessary with the NO-TUNE PA's (such as added protection against TVI) there is no reason why one cannot be used. The loading of the DD is so bland that it will not demand retuning in most examples.

ACTION FOR THE FUTURE

Further versions are being planned all the time. If there is a band combination that you feel you would like to be able to purchase, please let us know when you ask for the DD Data sheet (SAE UK please: 2 IRC's for DX Air Mail reply).

We do not supply coax cable. Types UR76 or UR43 are the recommended 50 ohm coaxials to feed any Dipole of Delight. Large 10mm cables can be used with a DD in the inverted V support arrangement, or if it is acceptable to tolerate the appearance of slack tension in the dipole.

PRICES

For UK orders the price includes DD (state which version) packing, post and VAT.

For DX orders the price includes DD (state which version) packing and post (Air Mail outside Europe). Enclose cheque with order, written in ANY CURRENCY. Rate of exchange is that ruling on date of signature.

DD 7/14/21	length 21 m	UK **£56.46**	DX **£56.00**
DD 10/18/24	length 15 m	UK **£56.46**	DX **£56.00**
DD 14/21/28	length 10.7 m	UK **£46.75**	DX **£46.50**

GUARANTEE

Money back if purchaser is dissatisfied with his or her Dipole of Delight and the antenna is returned in undamaged condition within one month.

HATELY ANTENNA TECHNOLOGY, 1 Kenfield Place, ABERDEEN, AB1 7UW, SCOTLAND, U.K.

Proprietor:—Maurice C Hately, BSc(Eng), MSc, MIEE, Chartered Electrical Engineer. (GM3HAT) ANTENNAS MADE in SCOTLAND

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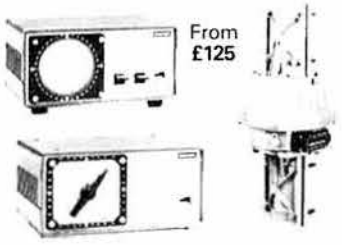

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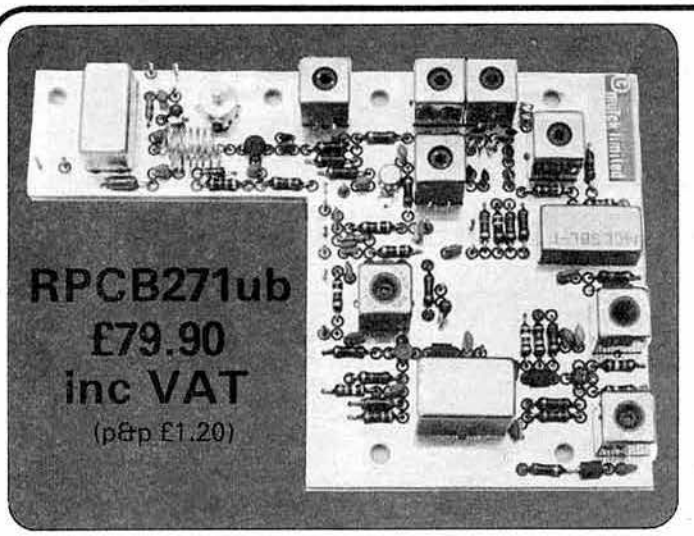

We've done it again! The new replacement front-end for Icom's superb new IC271 transceiver is shown above. It has been designed to fit in the position normally occupied by Icom's optional 'preamp', and if you are wondering why the board is a funny shape, Icom didn't give us quite enough space and we 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.
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The person ideally suited to our requirements would be a licenced radio amateur who is currently engaged in pursuing a wide range of activities associated with this hobby, eg operating, constructing and keeping abreast of the recent developments in amateur radio.

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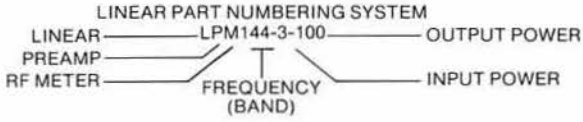

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THE FT77

A milestone in simplicity, economy and reliability in HF radio.

The FT77 is an all solid state no tune transceiver for SSB and CW operation on ALL amateur bands between 3·5 and 30MHz. FM operation is possible with the optional FM unit. Nominal power output for SSB and CW is 100 watts (85 watts on 10 metres, 50 watts on FM).

Employing all the latest engineering and manufacturing techniques the FT77 is intended to offer the essential modern operating features in the most economical, reliable and compact HF transceiver available today.

Reliability and quality control have been increased to a degree beyond that previously attainable in amateur equipment, while production costs have been reduced considerably, due to the new CAD/CAM (computer aided design/computer aided manufacturing) system. Computer-designed circuit board layouts ensure the high level of reliability in the smallest possible space, while automatic (robot) parts insertion and soldering vastly improve quality control and reduce costs.

The front panel layout and operation are actually simpler than some VHF FM transceivers, while the simple circuit design leaves fewer parts that could cause problems. Nevertheless, all of the essential modern operating features for HF SSB and CW are included, along with extras such as dual selectable noise blanker pulse widths (designed to blank the woodpecker or common impulse noise), full SWR metering and capabilities for an optional internal channel crystal*, narrow CW filter*, and FM unit*.

The extremely compact size and simple control layout make the FT77 ideal for mobile operation, or as the heart of a complete base station with the optional FP700 AC Power Supply, FV700DM Digital Scanning VFO and Memory System, FTV700 V/UHF Transvertor and the FC700 Antenna Tuner.

The low price of the FT77 coupled with the expansion capabilities presented by these accessories, make this transceiver the perfect choice for those new to amateur HF communication, or as a practical second rig for old timers.

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/Tx; 10-80M (*All* 8 bands)

FREQUENCY RESOLUTION
100Hz (Digital Readout)

FREQUENCY STABILITY
Better than 100Hz/½ Hr A.W.U.
Better than 300Hz during ½ Hr W.U.

MODES OF OPERATION
J3E (USB/LSB), A1A (CW), G3E* FM (Tx & Rx)

POWER REQUIREMENTS
13·5VDC; 1A Rx, 20A Tx

DIMENSIONS (EX/INC Projections)
250/340D × 245/248W × 100/115H, mm 6Kg (13·3lb) Nett

RECEIVER

SENSITIVITY
J3E/A1A (SSB/CWW) @ 10dB S + N/N; 0·3μV (2·4KHz)
A1A (CWN)* @ 10dB S + N/N; 0·15μV (600Hz)
G3E (FM)* @ 12dB SINAD; 0·7μV (12KHz)

CIRCUIT TYPE
J3E/A1A (SSB/CW); Single Conversion (8987·5KHz)
G3E (FM) ; Double Conversion (8981·5 & 455KHz)

SELECTIVITY (all @ −6dB & −60dB)

J3E/A1A (SSB/CWW);	2·4-5KHz,	2.08:1 SF
A1A (CWN)	; 0·6-1·3KHz,	2.17:1 SF
G3E (FM)	;12-24KHz,	2.00:1 SF

SPURIOUS REJECTIONS
Better than; −70dB image, −50dB IF

AUDIO
4W-16 Ohms, 3W in 4 ohms (@ 10% THD)

TRANSMITTER

POWER OUTPUT
J3E/A1A (SSB/CW): 100W PEP (80-12m)
: 85W PEP (10m)
G3E (FM) : 50 WATTS

AUDIO RESPONSE
350-2700Hz (@ −6dB)

SPURIOUS SUPRESSIONS
Carrier; Better than −40dB
General; Better than −40dB
Sideband; Better than −50dB (W/R 1KHz)

MICROPHONE IMPEDANCE
600 Ohms Nominal

OUTPUT IMPEDANCE
50 Ohms Nominal, Unbalanced

ACCESSORIES

FC700	*Antenna; tuner, load, SWR etc*
FP700	*Power Supply (mains to 12VDC)*
FV700DM	*Synthesized external VFO/memory*
MMB16	*Mobile bracket (accepts FT & FV & / or FC)*
MR7	*Rack Unit*
FTV700	*VHF/UHF monoband transvertor frame*
**TV*	*6m, 4m, 2m, 70cms module*

INTERNAL OPTIONS

D3000233	*FM Board (TX & RX)*
D3000234	*Crystal Marker (25KHz)*
XF8·9KC	*Crystal Filter (600Hz)*

ADDITIONAL ACCESSORIES

The FT77 (FT775) is electrically compatible with the FT707 accessories eg. FC707, FP707, FV707DM, FTV707 etc.

MICROPHONES

MD1B8	*Desk, 'Lift Out', c/w scanning*
YM38	*Desk, 'Swan neck' c/w scanning*
YM34	*Desk 'Swan neck'*
MH1B8	*Hand, 'Tone switch' c/w scanning*
YM35	*Hand, 'Standard' c/w scanning*
YM36	*Hand, 'Noise cancel'*
YM37	*Hand, 'Economy'*

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