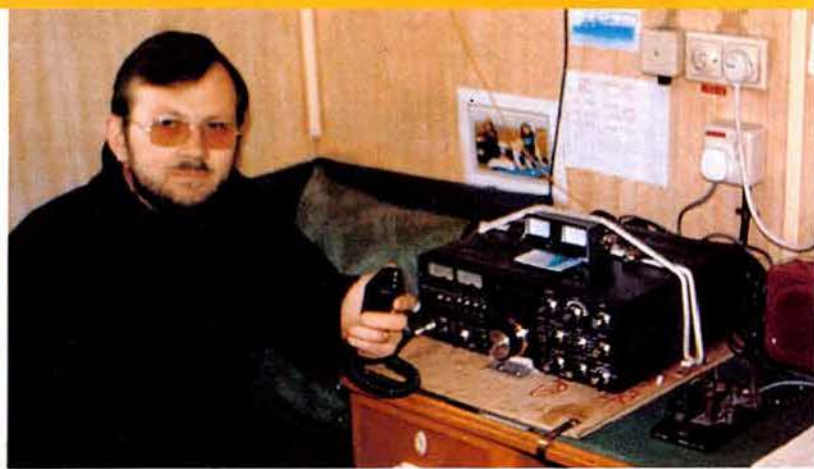


RADio COMmunication

August 1985

GB4DIS/MM IN ANTARCTICA



Dr Charles Fay,
GW4SBB, at the
microphone of
GB4DIS/MM



**A REPORT
ON THE
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613**

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

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

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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.

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The Trio TS430S . . . HF amateur band transceivers and general coverage receiver



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

- * The rig covers 160-10 metres, the amateur bands, plus 150 kHz-30 kHz as a general coverage receiver.
- * USB, LSB, CW, AM modes are provided. FM is also available by adding the optional FM430 receive/transmit unit.
- * A compact and lightweight design—270mm wide, 96mm high and 275mm deep, the TS430S weighs only 6.5 Kg (14.3lbs) and can be said to be a true portable transceiver, ideal for both shack and mobile use.
- * The TS430S has dual digital VFO's operating independently in 10 Hz steps. Both VFO's store frequency, band and mode of operation. The tuning dial torque is adjustable to suit the operator and a step switch provides a fast frequency shift for the VFO (100 Hz steps). An "A=B" switch shifts "B" VFO to "A" VFO frequency and mode, or vice versa. There is also a frequency lock switch, RIT for VFO or memory and an up/down manual scan facility from the optional up/down microphone.
- * An all solid state transceiver, the input is rated at 250W PEP on SSB,

200W DC on CW, 120W on FM (with optional FM board fitted) and 60W on AM.

- * The rig operates from a 13.8V DC source or by using the optional PS430, 240 volts AC supply.
- * The digital readout indicates frequency to 100 Hz (readout is internally modifiable to 10 Hz).
- * Eight memories store frequency, mode and band data. The eighth memory stores the receive and transmit frequencies independently.
- * An internal lithium battery having an estimated five year life is provided for memory back-up.
- * Memory Scan.
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YK88A 6 KHz AM filter.
MC42S up/down fist microphone.
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TR9180 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 . . . £499.00 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 . . . £948.00 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.

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R2000 . . . £479.47 inc VAT.



TS930S HF TRANSCEIVER WITH GENERAL COVERAGE RECEIVE

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 . . . £1295.00 inc VAT.



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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 . . . £258.00 inc VAT.

TR3500 . . . £270.00 inc VAT.



TS530SP HF AMATEUR BAND TRANSCEIVER

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

TS530SP . . . £698.00 inc VAT.



just a part of the range

The following TRIO models although not shown are still current and available.

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TS130S	Mobile HF T'ceiver	£633.06	TM211E	2M Mobile with DCS	£365.00
TR9300	6M Multi-mode	£569.97	TM411E	70cm Mobile with DCS	£399.00
TH21E	2M Micro h'held	£170.00	TW4000A	2M/70cm Mobile	£522.00
TH41E	70cm Micro H'held	£199.00	TS711E	2M Base Station	£768.00
TR2600E	2M H'held with DCS	£275.00	TS811E	70cm Base Station	£895.00
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FOUR WHEEL DRIVE



For as long as amateurs have used directive beams, be it either on the HF, VHF or UHF bands there has always been a need for a means of turning the array. Some have used string, the more fortunate amongst us have used a rotator. When buying a rotator, our advice up to now has always been, buy the largest you can afford. Our reasoning being that your aerial array will undoubtedly grow and sooner or later the overloaded rotator will break. Usually your aereals are also destroyed.

The new range of rotators from DAIWA, the MR series make this advice obsolete. They are designed so that additional motors can be added around a central core, each motor increasing the rotator's turn and braking capacity. The MR series will accept up to four motors being initially supplied with one. As the number and size of aereals increases, additional motors can be added, and both turning capacity and braking effort increased. Additional motors can be added at any time, each adding 700 kg/cm of torque and 5000 kg/cm of brake power. No additional cable runs are required, an internal harness for each motor being included, and, of course the main frame and reduction gear train have been designed to handle extremely large aerial arrays that would require the full set of four motors. There are four models, pre-set and standard and two high speed versions for the operator who can afford to sacrifice a degree of torque in order to increase the speed of rotation.

A full colour leaflet describing the rotators in detail is available on request.

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MR750PE pre-set model.....	£217.64 inc VAT
MR300E high speed version (39 sec).....	£193.00 inc VAT
MR400E high speed version (25 sec).....	£193.00 inc VAT
MR750U standard motor unit.....	£84.64 inc VAT
MR300U high speed motor unit.....	£84.64 inc VAT
LMC lower mast clamp.....	£14.00 inc VAT



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 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
NDH518.....96 channel memory unit.....	£264.00 inc VAT
NCM515.....remote frequency controller.....	£169.75 inc VAT
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RADIO COMMUNICATION August 1985

"as I said to John"

There must be a need for a half page of good commonsense advice on matters of general technical interest. Fortunately, we are doubly blessed by having two "Johns" on the staff—Messrs Wilson and Thorpe who, between them, combine experience and expertise at a level you may not encounter elsewhere. As a starter to the series, here is some advice written by John Wilson some years ago, but equally valid today. In subsequent articles, John Thorpe will be discussing "what do the specifications mean?"

Let's refresh our memories about SSB

From questions I am asked, and comments I hear on 2 metres, it seems clear that there are many newcomers (and some not so new) to SSB operation who find it strange after a heavy diet of FM, and who simply do not understand the basic principles.

Let's take a typical SSB transmitter. It starts out with a balanced modulator, in which audio from the microphone is combined with a carrier oscillator in such a way that the carrier is largely removed, leaving the two sidebands. The performance of the balanced modulator is normally measured by quoting the amount in dB by which the carrier is suppressed relative to peak sideband power. A good balanced modulator will achieve something like 40dB of carrier suppression. Remember this figure!

The double sideband signal from the balanced modulator is then passed through a crystal filter which selects one sideband. The suppressed carrier is further attenuated by the filter, and the unwanted sideband is also removed. The performance of the filter is normally measured by quoting the amount in dB by which the unwanted sideband is suppressed relative to peak wanted sideband power and is normally around 50–60dB. It is extremely difficult to obtain figures better than this due to signal leakage around the filter and also due to distortion products from the double sideband signal appearing. Having generated

the SSB signal, it is translated to the correct final frequency, say 144MHz, and amplified to the required power level. Leaving your aerial, you will have, therefore, the wanted sideband, the suppressed carrier at 40 to 50dB below sideband level, and garbage in the unwanted sideband at 50–60dB down.

NOW consider the man receiving your signal. He will, these days, have in his possession a very sensitive receiver which will happily resolve a signal less than 0.25 microvolts. The receiver will use a good AGC system to crank down the gain when you hit it with millivolts or even volts of RF from your high gain aerial system. The AGC range on a typical receiver will be 80 or 90dB which simply means that if you tune from a weak signal to a very strong signal, the receiver gain is reduced so that you don't blow the top off your head. Vice versa—if you tune from a strong signal to a weak one, the receiver AGC system cranks up the gain by 80dB so that you can hear the weak station.

NOW assume that your friend across town is listening to your SSB transmission peaking at 40 over 9 or so. Along with your wanted sideband, you are radiating carrier leakage and sundry garbage at 50 or 60dB down on the signal. If you pause for breath, the sideband signal vanishes, your friend's receiver promptly cranks up the gain, and your carrier leakage is suddenly as loud as your voice was.

SO if he is inexperienced, he will call you back and say that there is an awful noise in the background when you stop speaking and that if he were you, he'd return the equipment for repair under warranty!!

This noise is **not** "synthesiser whine" or "micro noise" or Concorde taking off, it's simply the carrier leak from your balanced modulator, and, the correct way to listen to SSB, certainly the most comfortable, is to back off the RF gain control until all the background noise has vanished, leaving the voice in solitary hi-fi splendour (if it's Trio gear of course).

Reports of "you are 20dB over 9 but when you stop speaking there's a nasty noise at 55", are absolutely correct and nothing to worry about. After all, SSB operation has been around a long time on the HF bands, but the operators on those bands have become accustomed to the "noises off".

LOWE SHOPS

In Glasgow the **LOWE ELECTRONICS** shop (the telephone number is 041-945 2626) is managed by Sim GM3SAN. Its address is 4/5 Queen Margaret's Road, off Queen Margaret's Drive.

In the North East the **LOWE ELECTRONICS** shop is found in the delightful market town of Darlington (the telephone number is 0325 486121) and is managed by Don G3GEA. The shop's address is 56 North Road, Darlington.

Cambridge, not only a University town but the location of a **LOWE ELECTRONICS** shop managed by Tony G4NBS. The address is 162 High Street, Chesterton, Cambridge (the telephone number is 0223 311230).

For South Wales, the **LOWE ELECTRONICS** shop is located in Cardiff. Managed by Richard GW4NAD, who hails from Penarth, the shop (the telephone number is 0222 464154) is within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff.

For South Coast Radio Amateurs, there's a **LOWE ELECTRONICS** shop in Bournemouth. Its manager is Colin G3XAS. The shop's address is 27 Gillam Road, Northbourne, Bournemouth. The telephone number is 0202 577760.

LOWE ELECTRONICS London shop is located at 223/225 Field End Road, Eastcote, Middlesex (the telephone number is 01-429 3256). The shop managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings.

Although not a shop there is on the South Coast a source of good advice and equipment—John G3IYG. His address is 16 Harvard Road, Ringmer, Lewes, Sussex. (Telephone 0273 812071).

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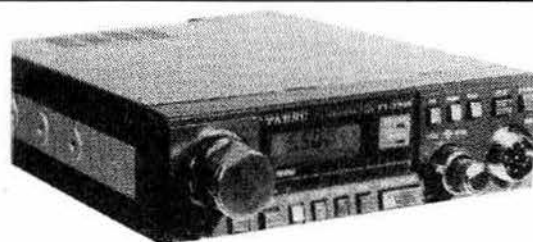
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After five seasons of attending rallies with our firm, I've developed considerable respect for most of the people who spend their weekends trying to make an honest crust by selling radio amateurs the goodies for which we all crave. I was a bit shocked, therefore, to hear the representative of another UK manufacturer trying rather hard to sell a 144MHz preamp to somebody who was actually looking for a preamp for a general coverage scanning receiver!

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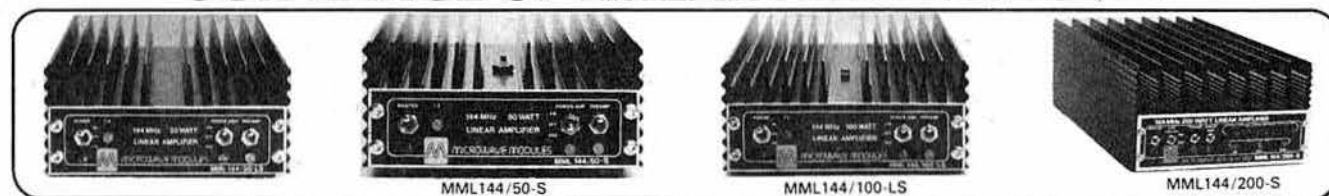
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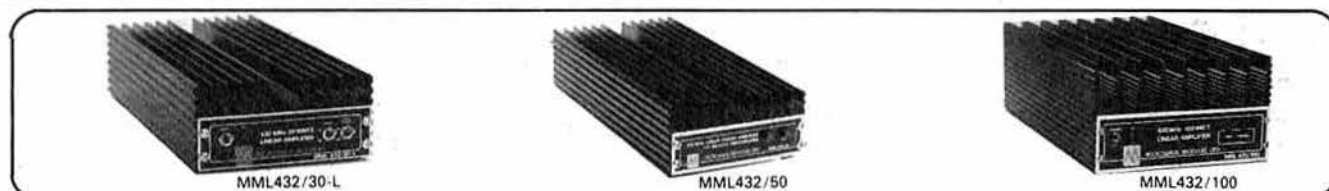
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FRG8800
£559 inc VAT

FRV8800
£90 inc VAT

Continuous coverage from 150kHz to 30MHz. Two speed spin tuned VFO plus keyboard plus computer interface control.

The FRG-8800 demodulates SSB (USB & LSB) CW, AM (Wide and Narrow) and FM narrow as standard. The FM narrow is useful for 10M, CB and for VHF with the optional VHF converter.

The FRG-8800 comes with twelve memories, programmed and scanned at the touch of a single button. Any of the memory channels will accept a frequency anywhere within the range of the receiver including VHF (with the optional VHF unit). The mode is also stored in the memory eliminating the need for inconvenient manual mode change, when hopping from one memory to the next.

Four filters are fitted as standard (SSB/CW, AM, AM-NAR and FM-NAR) with bandwidths chosen for optimum performance, with switchable AGC and variable tone control for maximum enjoyment.

The back-lit green LCD display incorporates easy to read "any angle" 10mm digits.

A twelve function display indicates the transceiver's status at a glance. It includes memory channel number, mode, and frequency to a resolution of 100Hz. Also included is a two dimensional LCD, graphical SIMPO and 'S' meter. A 12 button keyboard allows quick accurate changes of frequency and band, (MHz and KHz programmed individually). The keyboard also has nine control buttons to allow rapid changes from memory to VFO, memory to

memory and VFO to memory. Memory channels can also be recalled at the turn of a knob, ideal for storing calling/working channels or broadcast reception.

The keyboard is complemented by an opto-coupled two speed VFO drive; fast for rapid tuning of a band or slow for accurately tuning in a signal. In addition a fine tune control compensates for drift in the received signal.

Dual accurate 12 hour clocks, with AM/PM indicators are ideal for log keeping (GMT/Local). The clock uses the main digital display and features full back-up facilities in the event of a mains failure.

The timer can activate the receiver and/or tape recorder via the relay contacts provided. A snooze facility allows up to 59 minutes of listening.

The FRV-8800, extends coverage to include 118-174MHz all within the main frame, thereby allowing monitoring of, PMR, marine and air bands, as well as 2M. The FRG-8800 is operated as before via the keyboard or VFO, and the memory still holds any frequency and mode. The actual VHF frequency is displayed on the main LCD to a resolution of 100Hz. At 6.1Kg (excluding converter) the FRG-8800 is ideal for taking on any trip. The power supply is easily adjustable from 240-220VAC to 110-120V, 50/60Hz mains and 12VDC operation is optional.

The FRG-9600 is an all mode scanning receiver that provides features never offered before, covering 60 through 905MHz continuously, with 100 keypad-programmable memory channels.

In addition to FM wide (for FM and TV broadcasts), FM narrow and AM wide and narrow, the FRG-9600 also provides SSB (single sideband) reception up to 460MHz, allowing monitoring of amateur CW, SSB and ACSI (now used experimentally as the mode of the future for VHF). A front panel tuning knob is provided to simplify tuning of SSB and narrowband AM. Seven tuning/scanning rates between 100Hz and 100kHz assure fast and efficient scanning while still permitting easy tuning of narrowband signals.

The scanning system allows either full or limited (keypad programmed) band scanning as well as memory channel scanning, with auto-resume. In addition to carrier sensing scan stop, audio scan stop sensing is also selectable to avoid stopping on inactive "carrier-only" channels. Scanning steps are selectable, with the wide

FRG9600
£475 inc VAT



steps indicated on the front panel display. Signal strength is indicated by a two-color graphic S-meter on the display. A 24-hour clock/timer is included, along with a recorder output, for automatic power on/off switching and recording. Additional jacks provide cpu band selection outputs, multiplexed (FM wide) output, AF and RF mute and other control signals for maximum expansion potential with future options or for those who wish to provide their own add-on hardware for special applications.

The Yaesu CAT System provides a direct control link to the cpu in the FRG-9600, allowing operators with personal computers to add virtually unlimited customized control functions in software; such as multiple, organized memory banks; automatic tuning; and customised scanning systems; using almost any personal computer and a Yaesu FIF CAT Interface Unit.

The FRG-9600 requires 12 VDC, which may be provided using the optional PA-4B/C AC adapter from the AC line.

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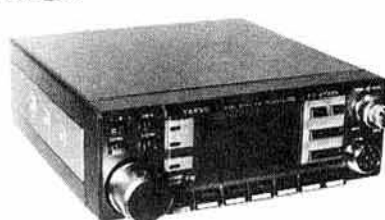
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FRG8800



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Region 12 M R Hobson, GM8KPH, tel 0796 2140

(Grampian, Highland, Island Authorities, Tayside)

Region 13 A Givens, GM3YOR, tel 0592 200335

(Borders, Fife, Lothian)

Region 14 T G Wylie, GM4FDM, tel 0505 22749

(Central, Dumfries & Galloway, Strathclyde)

Region 15 R R Parsons, G13HXV, tel 0232 612322

(Northern Ireland)

Region 16 A Owen, G4HMF

(Essex, Norfolk, Suffolk)

Region 17 T M Emery, G3KWU, tel 0703 812435

(I o Wight, Channel Is, Dorset, Hants, Wilts)

Region 18 I Gibbs, G4GWB, tel 0670 790090

(Cleveland, Durham, Northumberland, Tyne & Wear)

Region 19 R J Broadhurst, G3AAJ, tel 01-989 6741

(G London N of Thames, Herts)

Region 20 N F O'Brien, G3LP, tel 0452 34890

(Avon, Gloucester, Somerset)

HONORARY OFFICERS

Aerial Planning Panel co-ordinator: (c/o MSO, RSGB HQ)

Audio Visual Library co-ordinator: R G Auckland, G2PA

Awards managers: HF: P Miles, G3KDB; VHF: Jack Hum, G5UM

HF manager: E J Allaway, G3FKM

Microwave manager: D S Evans, G3RPE

Observation Service organizer: R J Osborne, G4FJN

Slow morse practice transmissions organizer: (Post vacant)

VHF manager: K A M Fisher, G3WSN

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

ANNUAL SUBSCRIPTION RATES

Corporate member: UK and overseas (Radio Communication by surface mail): £16.50.

UK associate member under 18: £6.20. **Family member:** £6.60

UK students over 18 and under 25: £9.30 (Applications should give applicant's age at last renewal date and include evidence of student status)

Affiliated club or society/registered group (UK): £16.50 (including Radio Communication); £9.90 (excluding Radio Communication)

(Subscriptions include VAT)

EDITORIAL

NOMINATIONS FOR THE 1986 COUNCIL

On page 606 of this issue is the annual call for nominations for the election of new Council members to replace those who have come to the end of their term of office for one reason or another. The nominations received will, after checking, form the basis for the election that will take place in November.

Each year, many of those members who take these elections most seriously, complain about the difficulty they have in deciding which, if any, of the candidates should receive their vote. Their point is simple: if they do not know the candidate, or only know him or her in an amateur radio context, how can they judge whether or not she/he will make an effective Council member? Because of this difficulty, many, when in doubt, quite rightly refuse to vote.

Here we must recognize the value of the nominators. What is hoped for is that candidates will seek nomination from people throughout the country (or zone in the case of zonal Council members) who are themselves well known and whose opinions are respected by the voters in their locality. At the same time, it is hoped that the nominators will consider their role most seriously: whether the candidate, however nice a person, however enthusiastic an amateur, has the right other qualities, especially good old-fashioned wisdom, to enable him or her to make a significant contribution *within the timescale of his/her term of office*. If he/she has not got these qualities, quite simply the effectiveness of Council and, as a result, the Society, will suffer, and those better qualified may be prevented from contributing at Council level.

To assist candidates, nominators and voters, Council has made three changes in this year's election. First, it has produced a short statement which includes the way in which the RSGB is organised and the role of Council and Council members. This, within the limitations of its scope, is intended to provide a preliminary "job spec" for Council members.

Second, it gives an opportunity for nominators to supply details for publication on how long they have known the candidate closely, and whether the nominator can speak from a position of authority in amateur radio (for example as a club chairman) or as someone who knows the professional capabilities of the candidate. The third change is the introduction of new standard nomination forms of which candidates may wish to take advantage; these are available from RSGB HQ.

We hope members will find these changes of value: it hardly needs emphasizing that a strong Council is more than ever necessary to cope with the ever-increasing complexity of amateur radio both nationally and internationally.

David Evans, G3OUF

Nominations for election to the 1986 Council of the RSGB

The Society's Articles of Association require that members who are entitled to vote be notified of those Council members who retire at the end of each year. The Council members who retire on 31 December 1985 are:

ORDINARY MEMBERS

R G Barrett, GW8HEZ, who is not eligible for re-election under Article 26.
H M Holmden, G4KCC, who is eligible for re-election.
G R Jessop, G6JP, who is not eligible for re-election under Article 26.
D M Pratt, G4DMP, who is not eligible for re-election under Article 26.
K E V Willis, G8VR, who is eligible and willing to accept nomination for re-election.

ZONAL MEMBER

Zone E. E J Case, GW4HWR, who was co-opted on to Council in 1985, and who is eligible and willing to accept nomination for election.

Election of the 1986 Council

The role of Council and Council members

To assist candidates and those making nominations, the following notes are intended to summarize very briefly the main functions of Council and Council members.

The size, complexity and long-term nature of the Society's activities makes it necessary for the day-to-day control of its affairs to be in the hands of a stable administration. As organized at present, the workload is divided between the fulltime staff, approximately 30 in number, and the volunteer effort represented by the 16 sub-committees of Council and its honorary officers. Of the HQ effort, roughly half can be regarded as being concerned with the normal administrative tasks. Responsibility to Council for the working of HQ is primarily with the Finance & Staff Committee, with the Licensing Advisory Committee being heavily involved with licensing aspects. The work of the other committees is mainly concerned with amateur radio matters, although there may be major financial implications.

The main work of Council is that of monitoring the work of HQ and the committees to ensure their effectiveness in handling the commercial aspects of the Society's operation (an income of over £1 million per annum), together with those

matters it has identified as important to amateur radio on both the national and international level.

The main duty of Council members obviously is to play an active part in this operation. This will involve, *inter alia*: the attendance at, typically, seven Council meetings each year; the critical review of the 200 or so sets of committee minutes and working documents produced during the same period; and the capacity to react constructively to this and other information. Zonal members are required to be members of the Membership & Representation Committee. Council members are also expected to deal with individual members' problems: their duty is to ensure that these are dealt with by the responsible committee or other body.

Candidate's qualifications and details

- The candidate must have been a corporate member for at least three years at the time of nomination.
- Candidates for zonal members must be resident within the zone (see page 605 for definition of the zones).
- The candidate must also submit the following statements:
 - A letter denoting whether he is standing as an ordinary or zonal member of Council.
 - Written, signed consent to accept office, if elected.
 - If appropriate, a statement that she/he is over 70 years of age or will become so during the term of office if elected. Under the Company Acts, it is necessary for her/his election to be confirmed by the annual general meeting.
 - A statement declaring any commercial interest in the field of amateur radio.

These declarations, together with nominations, may conveniently be made by using the "Candidate's Form for the Election of Ordinary or Zonal Members of Council" available on request from: The Secretary (DAE), RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW.

Nomination procedure

- The nominators for each candidate, at least 10 in number, must be fully-paid-up corporate members at the time of nomination.
- Members nominating candidates as zonal members must be resident in the appropriate zone.
- The nominations may be made on the "Candidate's Form" referred to above, the associated

"Nominator's Form" or on any sheet of paper. Each nomination must be signed by the nominator, who should include the name of his town.

Additional information on candidates

In order to assist the membership in voting, a candidate may enclose a maximum of 200 words as a cv or statement describing pertinent experience which will be circulated with the ballot forms. This must be confined to biographical facts. Clearly, involvement with decision-making in organizations of similar size to the RSGB (or larger) would be relevant, and this should be stated. Prospective candidates will find it useful to have had experience of RSGB procedures, including committee membership, duties as regional or area representatives, writing for Society publications or organizing events. This experience should be quoted, together with details of participation in amateur radio at the local level. Bona fide statements will receive the minimum of editing consistent with good style and factual accuracy; however, statements exceeding 200 words are likely to be cut to that number.

The candidate may also supply a recent black and white head and shoulders photograph for publication with the cv, if she/he wishes.

Information on nominators

Nominators are required to give details of their place of residence. It is to be noted that voters may place higher value on nominations if they are seen to have come from many parts of the UK in the case of ordinary members, or many parts of the zone in the case of zonal members, rather than a restricted area.

Nominators may also supply for publication details of how long they have known the candidate and of relevant positions that they hold or have held; for example, as the chairman of an amateur radio club, a member of Council etc, or who can indicate management experience. The standard nomination form referred to above is designed to facilitate the supply of this information.

The candidate's declaration together with the completed nominations should be sent in a single closed envelope and addressed to: The Secretary (DAE), RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW. Please mark the envelope "1986 Council Nomination". Nominations for all candidates will be acknowledged by return of post.

Amateur Radio News

Who's on which band

Headquarters is often asked which countries have access to the new WARC bands at 10, 18 and 24MHz: there is apparently also some confusion about which countries have access to the 1.8MHz band. The following list was up-to-date as of 15 June 1985.

1.8MHz

Region 1

As a result of WARC 1979, the Table of Frequency Allocations now allocates the segment 1,810-1,850kHz to the amateur service, with the exception of the countries mentioned in Footnotes 490, 491 and 493 to the Radio Regulations. The following seven countries, however, allocate the whole band, ie 1,800-2,000kHz, to the amateur service subject to the restrictions given in parentheses: Bahrain; Cyprus (phone permitted only on 1,900-2,000kHz); Gibraltar; Ireland; Lesotho (up to 10W); Nigeria (up to 10W), and Oman (cw up to 10W only). It is

likely in all cases that some or all of the 200kHz allocations is shared with other services.

Amateurs in the following 11 countries also have access to more than 40kHz: Andorra (1,810-1,875kHz, phone permitted only in the upper 50kHz); Austria (cw up to 100W output at 1,850-1,950kHz); Czechoslovakia (up to 10W output at 1,750-1,950kHz, phone permitted only at 1,820-1,950kHz); Finland (up to 10W at 1,820-1,845 and 1,915-1,955kHz); German Democratic Republic (up to 10W at 1,810-1,950kHz, phone permitted only in the upper 50kHz); Federal Republic of Germany (1,815-1,835 and 1,850-1,890kHz, ssb permitted in 1,832-1,835kHz); Malta (up to 10W at 1,810-2,000kHz); Norway (cw up to 15W at 1,802-1,850kHz); Poland (1,750-1,800 and 1,810-1,930kHz, up to 10W input except for 1,830-1,850kHz); USSR (low power at 1,830-1,930kHz, phone permitted only in the upper 70kHz; and UK (up to 10W at 1,810-2,000kHz).

Frequencies allocated to the amateur service in Djibouti, Senegal, South Africa, Switzerland and Turkey are 1,810-1,850kHz. In the case of Turkey, power is limited to 30W erp.

The segment 1,830-1,850kHz is available, with the restrictions mentioned in parentheses, to the amateur services of: Denmark (cw up to 10W only); Faeroe Islands (cw up to 10W only); France; Luxembourg; Portugal (cw and rtty up to 60W only); San Marino; Spain, and Syria.

Amateurs in the Netherlands and Sweden have only 25 and 10kHz respectively: those in the former country may use cw and ssb with a maximum output of 10W at 1,825-1,835kHz and cw at 1,835-1,850kHz. Those in the latter may operate only 10W cw at 1,830-1,845kHz.

Access is still denied in the following nine countries: Belgium, Hungary, Italy, Lebanon, Liberia, Monaco, Morocco, Romania and Sierra Leone.

50MHz

A NEW UK AMATEUR BAND

After many years of negotiation with the UK licensing authority, the RSGB was pleased to hear that on Friday 28 June 1985, Mr Geoffrey Pattie, Minister of State for Industry & Technology, announced in Parliament that the band 50 to 50.5MHz was to be allocated to the UK amateur service.

The Society immediately contacted the DTI, and is at present negotiating with that department in order that this new allocation might become effective as soon as possible; hopefully before the end of 1985.

If any later information becomes available before publication of this issue, it will be included in the August *RSGB News Bulletin*.

Region 2

The ITU allocates the segment 1,800-1,850kHz exclusively to the amateur service while the segment 1,850-2,000kHz is shared by the amateur, fixed, mobile, radiolocation and radio navigation services, with the exception of the countries mentioned in Footnote 494.

The following 20 countries give their amateurs access to the whole band, ie 1,800-2,000kHz: Antigua and Barbuda; Bahamas; Belize; Canada; Columbia; Costa Rica; El Salvador; Grenada; Guatemala; Honduras; Mexico; Montserrat (cw and ssb only); Netherlands Antilles; Nicaragua; Panama; Paraguay; Peru; Surinam; Trinidad and Tobago; and USA.

Amateurs of Bermuda may operate cw and phone respectively at 1,800-1,825kHz and 1,875-1,900kHz.

The administrations of Argentina, Bolivia and Brazil allocate only the first segment, ie 1,800-1,850kHz, to amateurs. In Argentina this segment is divided into two: 1,800-1,810kHz for cw only, and 1,810-1,850kHz for cw and phone.

Region 3

The band 1,800-2,000kHz is shared by the amateur, fixed, mobile, radiolocation and radionavigation services.

Amateurs of the following 10 countries have access to the entire band with the restrictions mentioned in parentheses: French Polynesia; Hong Kong (cw only); Indonesia (cw only at 1,900-2,000kHz, phone permitted at 1,800-1,900kHz); Malaysia; Pakistan; Singapore (up to 10W input); Solomon Islands; Sri Lanka; Vanuatu, and Western Samoa (phone permitted only at 1,850-2,000kHz).

The administrations of Australia, New Zealand and Papua New Guinea give their amateurs access to parts of the band. UK amateurs may operate at 1,800-1,866 (phone permitted in 1,825-1,866) and 1,874-1,875kHz. New Zealand amateurs

may use 1,803-1,857 and 1,863-1,950kHz. The segments 1,800-1,866 and 1,874-2,000kHz are available to P2 stations.

Amateurs of the Republic of Korea have access to 1,810-1,825kHz. The segment 1,907.5-1,912.5kHz is the Japanese top band (cw only).

There is no 1.8MHz amateur band in Bangladesh, Fiji or Philippines.

The 10, 18 and 24MHz bands

The member societies of the following countries have notified the International Secretariat of the International Amateur Radio Union of the availability of the new bands for their use.

10,100-10,150kHz

Algeria, Andorra, Antigua and Barbuda, Argentina, (10,100.5-10,103, 10,119-10,121.5 and 10,143.5-10,146.5kHz), Australia (less 10,126-10,134 and 10,137.5-10,145.5kHz), Austria, Bahamas, Belize, Bermuda, Botswana, Canada, Cayman Islands, Colombia, Costa Rica, Cyprus, Czechoslovakia, Denmark, Djibouti, Commonwealth of Dominica, El Salvador, Faeroe Islands, France, German Democratic Republic, Federal Republic of Germany, Gibraltar, Greece, Grenada, Honduras, Indonesia, Ireland, Israel, Japan, Republic of Korea, Luxembourg, Malaysia, Malta, Monaco, Montserrat, Netherlands, Netherlands Antilles, New Zealand (10,100-10,127 and 10,133-10,150kHz), Nicaragua, Nigeria, Norway, Panama, Papua New Guinea, Peru, Portugal, San Marino, Senegal, Solomon Islands, South Africa, Spain (10,107.5-10,113.5kHz), Sri Lanka, Sweden, Switzerland, Syria, Tonga, Trinidad and Tobago, Turkey, UK, USA, Vanuatu, Western Samoa and Yugoslavia.

18,068-18,168kHz

Algeria, Andorra, Antigua, and Barbuda, Argentina (18,073-18,076.5, 18,083.5-

SARCON

Scottish Amateur **85** Radio Convention

College of Education, Gardyne Road, Dundee

Saturday 21 September 1985

Doors open: 1030 (RAIBC 1015) Admission: £1

All major traders represented

RSGB HQ stand

Junk stall

Displays by RN, RAF and others

PROGRAMME

1100 Opening by Mrs J Heathershaw, G3CHH, RSGB President

1130 RSGB Forum/Zone G meeting

"Amateur radio and astronomy", Dr F Price, GM1NDF

1230 Lunch break

1400 "Satellite broadcasting", H Price, BBC Engineering Information

1530 "Packet radio", John Sager, G8ONH.

1645 Raffle

1930 Dinner (Tickets in advance only, £10. From GM8KPH, Region 12 representative, asap please)

Further information from GM8KPH

18,089.5, 18,096.5-18,108.5 18,121.5-18,149 and 18,151.5-18,167.5), Australia (less 18,071-18,079, 18,101-18,109, 18,121-18,134, 18,141-18,149 and 18,156-18,164kHz), Austria, Bahamas, Botswana, Cayman Islands, Colombia, Costa Rica, Cyprus, Denmark, Djibouti, El Salvador, Faeroe Islands, France, German Democratic Republic, Federal Republic of Germany, Grenada, Honduras, India, Ireland, Malaysia, Monaco (less 18,103-18,116, 18,129, 18,135 and 18,165kHz), Netherlands, Netherlands Antilles, New Zealand, Nigeria, Norway, Oman, Panama, Peru, Portugal, San Marino, Senegal, South Africa, Sri Lanka, Sweden, Switzerland, Syria, Tonga, Trinidad and Tobago, Turkey, UK, Vanuatu and Yugoslavia.

24,890-24,990kHz

Algeria, Andorra, Antigua and Barbuda, Argentina, Australia (less 24,896-24,904kHz), Austria, Botswana, Cayman Islands, Colombia, Costa Rica, Cyprus, Denmark, Djibouti, El Salvador, Faeroe Islands, France, German Democratic Republic, Federal Republic of Germany, Grenada, Honduras, India, Ireland, Malaysia, Monaco, Netherlands, Netherlands Antilles, New Zealand, Nigeria, Norway, Oman, Panama, Papua New Guinea, Peru, Portugal, San Marino, Senegal, South Africa, Sri Lanka, Sweden, Switzerland, Syria, Tonga, Trinidad and Tobago, Turkey, UK, Vanuatu and Yugoslavia

Amateur Radio Certificate age limit lowered

Following various activities by the Society aimed at encouraging young people to become involved in amateur radio, the minimum age limit for the holding of an Amateur Radio Certificate has been reduced from 14 to 10. This means that any person aged 10 or over who has passed

both the Radio Amateur's Examination and the amateur morse test may apply for an Amateur Radio Certificate: they may then operate the station of a licensed amateur under direct supervision.

It should be noted, however, that before a Class A licence can be issued, from the age of 14 onwards, a morse test pass must have been obtained no more than 12 months prior to the date of issue of the licence.

President at RAF Waddington

The Society's President, Mrs Joan Heathershaw, G4CHH, visited the special event station GV2RAF at RAF Waddington last May by invitation of the RAFARS. RAF Waddington has a long association with Bomber Command and the station made a substantial contribution to the events leading to VE-Day; it is currently awaiting the arrival of the Nimrod AEW3 early-warning aircraft.

QSL Bureau news

The following QSL Bureau sub-managers have changed their addresses:

G3IAA-KZZ series. Mr P Lumb, G3IRM, 2 Briarwood Avenue, Bury St Edmunds, Suffolk IP33 3QF.

G0BAA-BZZ and G4BAA-BZZ series. Ms L Harper, G4FNC, Three Oaks, Braydon, Swindon, Wilts SN5 0AD.

G0AAA-AZZ series. Mr K J Plumridge, 23 Wilmington Close, Townhill Park, Southampton SO2 2RD.

Raynet zonal representation

At its meeting on 11 May the Raynet Committee confirmed the appointment of John Arrowsmith, G4IWA, as representative for Raynet Zone 9. John has been acting as caretaker zonal representative since Dave Lankshear took over the post of zonal co-ordinator earlier this year and, following the completion of the formalities set out in the April issue of *Radio Communication*, John is now looking forward to further developing the work of groups in the zone which covers an area from Staffordshire and Shropshire through the West Midlands to Hereford and Worcester.

Following the sad death of Bill Colclough, G3XC, in May, there is a vacancy for a representative in Raynet Zone 7, which comprises the counties of Avon, Cornwall, Dorset, Devon, Gloucestershire, Somerset, Wiltshire and the Channel Islands. Members of Raynet who are resident in Zone 7 may forward nominations for the post to "the Secretary (Raynet)" at RSGB headquarters. Nominations should be supported by five currently-registered Raynet members who are resident within the zone, and must be received no later than 5.15pm on 30 August 1985. They should be accompanied by a declaration that the nominee is: normally resident within the zone; a currently-registered Raynet member; a member of the RSGB, and willing to serve. The period of appointment is normally three years. Where more than one valid nomination is received by the due date, an election will be held during the month of November 1985.



The President at RAF Waddington. L to R: Sergeant E Knight, principally responsible for organizing the event; Group Captain M J Bettell, OBE, ADC; Mrs Joan Heathershaw, and an unidentified gentleman. Photo: Crown copyright.

Raised in the House

On 20 May Mr Teddy Taylor, MP for Southend East, asked whether the Secretary of State for Trade & Industry would introduce legislation to make it an offence to advertise the existence of a pirate radio station. In reply Mr John Butcher stated, among other things, that powers were available under the Wireless Telegraphy Act 1949 enabling action against the unlicensed use of radio. These powers had been significantly strengthened in the Telecommunications Act 1984, particularly with the introduction of the power to seize and detain, for the purpose of legal proceedings, apparatus used by unlicensed stations. The effectiveness of action aimed at removing the nuisance of unlicensed broadcasting stations had been considerably improved by use of these powers, and the Secretary of State for Trade & Industry did not propose to seek further powers at present.

Mr Taylor asked another question concerning pirate broadcasting on the same day: part of Mr John Butcher's reply related to other forms of spectrum abuse, and he stated that he was "... determined to take effective action to stop the unauthorized use of radio which causes interference, annoyance and sometimes danger to authorized radio users. To illustrate this determination I have pointed to our record of activity. Since the start of 1985 the Department's Radio Investigation Service has taken action on 75 occasions against 41 unlicensed broadcasting stations. In the same period 37 people have been prosecuted and convicted for their involvement in the operation of unlicensed stations."

On 10 June Mr Barron, MP for Rother Valley, asked the Secretary of State for Trade & Industry if his department had received proposals from the Radio Society of Great Britain for a new novice amateur licence. In reply Mr John Butcher referred Mr Barron to his reply on 15 February. He added that since then the only discussions between his department and the RSGB on

licensing categories had been in respect of proposals very recently put forward by the Society for an intermediate licence. These draft proposals envisaged Class B licences operating morse on certain hf frequencies after passing a 5wpm morse test. His department was considering these proposals.

Mr Barron asked the Secretary of State whether he had any plans to introduce a new novice amateur radio licence and whether he would make a statement. Mr Butcher referred Mr Barron to his reply on 30 January. (See *Rad Com* April 1985, p255 —Ed.)

Wireless Telegraphy Act prosecutions

In the first quarter of 1985 there were 242 prosecutions leading to conviction of illicit users of wireless telegraphy apparatus. For comparison, the figures in recent years have been as follows: 1979, 174; 1980, 509; 1981, 889; 1982, 2,325; 1983, 1,506; 1984, 1,201.

Under new arrangements it is expected that comparable statistics will be received from the DTI on a quarterly basis.

"Radio Hams Run Higher Risk of Killer Disease"

So ran a recent headline in the *Daily Express*, based on two short papers in *The Lancet* relating to death from leukaemia. The National Radiological Protection Board was asked by the Society to comment, and the salient part of the NRPB's response was as follows:

"NRPB scientists keep all the harmful effects of non-ionizing radiation under continual review, and it is still our opinion that electromagnetic fields are not carcinogenic. However, we would repeat our previous warnings against excessive exposures to the thermal effects of electromagnetic fields: in amateur radio, such exposures can always be avoided."

The RSGB at professional conferences

The Institution of Electronic & Radio Engineers has invited the Society to be associated with two forthcoming conferences. The first is the Third International Conference on Land Mobile Radio, taking place in Cambridge between 10 and 13 December 1985. The second is an International Conference on Radio Receivers and Associated Systems, which will be held in July 1986. Both have relevance to amateur radio, and a copy of the draft Call for Papers for the Land Mobile Radio Conference has been sent to all committee chairmen.

Lithium batteries and rig memories

Many modern equipment containing micro-processor technology rely on a lithium battery for powering the ram containing initialization instructions: most current lcom equipment falls into this category, for example. If the battery becomes temporarily disconnected for some reason, the equipment will not operate when it is again switched on. The moral of the story would seem to be: don't disconnect the battery since otherwise the equipment will have to be returned to the distributor for reprogramming of the ram.

Lithium batteries are stated as having a life of about seven years under normal circumstances, which would argue that the equipment will have to be returned to the distributor after approximately this time for reprogramming. Presumably the symptoms would be complete failure to operate. (See *Technical Topics* December 1984—Ed)

Help hospital radio

The National Association of Hospital Broadcasting Organizations has asked the Society to publicise its need for volunteers to provide technical assistance to hospital radio stations. There are some 300 in various parts of the UK and radio amateurs with some spare time could well provide valuable assistance in engineering and administrative capacities.

Those interested in helping this worthy cause are asked to contact the vice-chairman of NAHBO, Mr A C Partridge, 56 Fleet Road, Benfleet, Essex SS7 5JN.

"Putting the clock back 45 years"

The following item was submitted by one satisfied user of a GV-series call sign:

Well—why not use the 40th anniversary of VE-Day for a spot of nostalgia, as well as letting the modern generation of amateurs hear what a typical 1939 rig sounded like? No need to search in the junk box or visit the attic either. I had the very thing already in use—and it has been since the end of World War 2.

A triet crystal oscillator and power amplifier with 10W input: a type 59 valve in the exciter stage with a 6L6 pa, although the original power amplifier bottle has been a 42, very much the sort of rig most amateurs cut their teeth on 40 years ago. The receiver an HRO circa 1946, and the antenna a good old W3EDP (84ft of single horizontal wire). Indeed, the very set-up that landed me VK5KO and ZL4IE on 3.5MHz with 8W around 1950. Headphones ex-Army DLR...

My own military connection was via service with RAOC and REME as a Desert Rat in the 8th Army—plus the fact that the Royal Signals 2nd STC was stationed at my home town, Prestatyn, during

the war. The call sign GV2TOP was used under the auspices of the TOPS CW Club.

GV2TOP operated cw only and had 119 contacts, mainly on 3.5MHz apart from a few on 7MHz and OK1GL on 14MHz. I gather that most GV stations made much larger scores than that, rattling off rubber-stamp contacts (to each his own) but GV2TOP spent time chatting since it was my view that this was what the occasion demanded. Anyway, it brought several interesting contacts. One was with G4MYG, who had done training with the 2nd STC and who had kind words to say of the local folk. ON4IE at De Panne, near the French border, recalled the Dunkirk evacuation. F5EB lives at Caen, prominent name in the memories of many people. G3SWO and his xyl both saw service in War Office Signals. Alf, GM3KPD, was ex-Merchant Navy and had been on "fuel runs" supplying the 8th Army.

Obviously there were plenty of contacts with ex-Army, Navy and RAF types; there were also three special event stations raised—GV2VED, GV4AYM and GB0IOM. Although not raised, I gather ON4PAX operated from the old World War 1 battlefield at Ypres, and OZ5MAY used a B2 that had actually been "dropped" by the RAF in World War 2.

Some operators commented that it was nice to hear a special event station using cw, although in fairness I heard others on the key. In any case, ssb was probably better suited to stations open to the public.

All in all a most enjoyable week, and I trust contacts with GV2TOP and the historic rig brought back happy memories to old-timers and possibly opened the eyes of some of the new boys in the fraternity! Somehow I doubt whether the black boxes of today will still be working in 40 years' time. Incidentally, if any reader wants to hear what an old-style rig sounded like, watch for GW8WJ (or GW6AQ) on 3.5MHz cw.

J P Evans, GW8WJ.

HF Convention

A reminder that this year's HF Convention will take place on 29 September 1985. There will be two lecture streams dealing with contests, propagation, tv, dx, satellites, QRP atus and antenna planning, together with the usual committee and affiliated society stands. The venue is the Belfry Hotel and Conference Centre, Milton Common, Oxford, and further information is available from Martin Atherton, G3ZAY, QTHR.

News from the USA

The ARRL is discussing proposals to enhance operating privileges for novice class operators. The proposals include a plan to permit novices to operate between 28.1 and 28.5MHz, whereas novice operators in the USA were not previously permitted to use the 28MHz band. CW and data communication privileges are proposed in the lower 200kHz of the proposed allocation and cw and ssb in the upper 200kHz. In addition, ARRL is proposing to allow novices to use voice, cw and data modes in the 220MHz and 1.3GHz band.

The intention behind the proposals would appear to be to attract younger people who are interested in computing and digital communications into amateur radio, and the ARRL believes that a suitable band plan can be developed for the 28MHz band to accommodate the new privileges. The league feels that, with the additional privileges, the novice licence would become more attractive to their target audience—in keeping with their stated desire to increase the number of licensed radio amateurs—without significantly reducing or eliminating the incentives to

upgrade to the higher classes of licence. There would also be no disruption to the present activities of higher class licensees.

In order to accommodate the proposed expansion, the ARRL is developing a plan to replace the existing world-wide network of 28MHz beacons operating between 28.2 and 28.3MHz with a single-frequency time-sharing network similar to the one currently operating at 14.1MHz.

The ARRL has sought the agreement of the Federal Communications Commission to allow for the automatic control of all amateur stations above 29.7MHz, with a view to the increasing interest in computer-based communications. A decision from the FCC was awaited as we went to press.

Dud chips

Mitsubishi Electric Corporation is keen to trace a series of reject M5K4164ANP15 64k dynamic ram ics illegally released on to the world market by a Japanese toy manufacturer. Some 500,000 were sold unbranded, allegedly for a decorative application, having failed to meet the necessary quality-control requirements; however, they were overprinted with the Mitsubishi logo and part number and resold. The ics concerned carry 841809 and 842015 batch numbers. No doubt Mitsubishi would be glad to have any information.

GB2IWM

An amateur radio station with the special call sign GB2IWM has been established at Duxford Airfield, Cambridgeshire. Duxford is the home of part of the Imperial War Museum's collection of historic aircraft and the amateur radio station is associated with that.

Crunch, snap, tinkle

A member has written to the Society giving details of an incident involving the inadvertent "telescoping" of a tower which he was preparing to wind down: a cable parted and the tower telescoped at high speed, fracturing the antenna boom on both sides of its mounting and damaging the tower itself. The member points out that had he been in the process of climbing the tower, he would have suffered serious injury. This incident prompts the Society to remind its members to take the greatest possible care when working on towers. Telescopic towers should **never** be climbed when they are raised, and the possibility of a cable breakage should always be borne in mind when carrying out, or about to carry out, work involving or adjacent to the tower. The manufacturers' stipulations should **always** be carefully followed, and if there is any doubt whatsoever the manufacturer of the tower should be contacted before work is commenced.

Gloomy year for BREMA

The 1984 annual report of the British Radio & Electronic Equipment Manufacturers' Association conveys in several places the message that 1984 was, in the words of their president: "A year which the industry would be happy to forget". Much of this was apparently due to squeezed margins and

lack of profits: also, "... the much-hoped-for introduction of a direct broadcasting by satellite (dbs) service receded while the broadcasters considered the economics of the service and ... the expansion of cable television services suffered a severe shock from the withdrawal of capital allowances in the Budget, causing a number of consortia to think again. Even ... teletext faltered ... meanwhile the home-computer market managed to prosper, but not for all ..."

BREMA gratefully acknowledges the involvement of the Radio Society of Great Britain with its Interference Sub-Committee, which has continued to monitor the introduction of standards and regulations relating to electromagnetic compatibility.

On a related topic, an international seminar on cable television and satellite broadcasting was held in London during March 1985. One interesting point was made by Mr Giles Shaw, Minister of State at the Home Office, who pointed out that a European commission had forecast a need for 500,000 hours per annum of television production to fill the proposed dbs channels. He reminded the seminar that the current average production rate of European countries was some 1,000h/yr.

RAIBC changes

The following changes have recently taken place in Radio Amateur Invalid & Blind Club. Frances Woolley, G3LYW, who has been RAIBC honorary secretary for many years, has retired, and her place is taken by Cathy Clark, G1GQJ. The new vice-chairman of RAIBC is George Jessop, G6JP.



Mrs Frances Woolley at this year's RAIBC Picnic, holding the British Empire Medal she was awarded in the New Year Honours for her 23 years' service to RAIBC.

Staff holidays

The Chelmsford editorial office will be closed from 8 to 18 August inclusive.

JOTA '85

This year's Jamboree on the Air takes place over the weekend of 19/20 October 1985. It is understood that specific frequencies will be recommended for Scout operation, although these were not available as we went to press.

MRUA Conference 1985

The 1985 Mobile Radio Users' Association conference took place in Oxford during March 1985. Little of interest to radio amateurs was discussed or revealed at the conference: there is still a good deal of disquiet in the mobile radio industry over the delay in releasing parts of Band 3 to the land mobile service, and there was no news on the future use of Band 1.

The Federation of Communications Services will hold its annual exhibition, COMEX, on 12-13 November this year. The venue will be the Chesford Grange Hotel, Kenilworth, Warwickshire.

Sidebands

The Gloucester Amateur Radio Society, acting for the Cheltenham and Gloucester branches of the Burma Star Association, will be commemorating the anniversary of the end of World War II on 15 August 1945 by putting on GB0VJD on the same day this year.

For technical reasons, "Members Mailbag" has been held over this month; there will be an extra page next month.

RAE Courses 1985-6

Basingstoke. The Basingstoke ARC will run an RAE course starting in September. Details G4WIZ, tel 07356 5185.

Brighton. Brighton College of Technology, Pelham Street, Brighton BN1 4FA. Enrolment 4pm-8pm 9, 10 September. Details R A Bravery, G3SKI, at the college, tel 0273 685971.

Cheltenham. Gloucestershire College of Arts & Technology, The Park Campus, The Park, Cheltenham GL50 2RR. Tuesdays 6.30-8.30pm. Details Terry Adams, G4CHD, at the college, tel 0242 28021.

Fleetwood. The Nautical College, Broadwater, Fleetwood FY7 8JZ. Thursdays 7-9pm, commencing 26 September. Enrolment 7-9pm 17 September; postal enrolments accepted at the college. Additional courses on specialist areas of amateur radio also available. Details N Watson, at the college, tel 03917 79123, ext 28.

Hoddesdon. East Herts College, Turnford, tel Hoddesdon 466451. Details Mr France or Mr Norman, at the college, or G3OJI, tel Ware 4316.

London. Brixton College, Ferndale Road, London SW4 7SB. Wednesdays, commencing 11 September, 6.30-9pm. Enrolment 2-5 September. Details from college, tel 01-737 2323.

London. Hendon College of Further Education, Williams Building, The Burroughs, Hendon NW4 4BT. Tuesdays 7.30-9.30pm, commencing 17 September. Enrolment 2-8pm 10 September. Details C Holford, tel 01-202 3811, ext 224.

Manchester. North Trafford College, Talbot Road, Stretford, Manchester M32 0XH. Monday or Thursday evenings or Wednesday afternoons. Details J T Beaumont, G3NGD, tel 061-872 3731, ext 53.

Manchester. Pendlebury High School, Cromwell Road, Swinton. Mondays, 7.30pm. Commencing end of September. Details G4HYE, tel 061-794 3706, or from Swinton Adult Education Centre, tel 061-794 5798.

Nottingham. Arnold & Carlton College of Further Education, Digby Avenue, Mapperley, Nottingham NG3 6DR. Full course for May 1986 exam: Wednesdays 6.30-9pm, commencing 18 September; fee £29. Short courses; for December exam,

Thursdays 6.30-9pm, commencing 19 September, fee £9.70; for May exam, Thursdays 6.30-9pm, commencing 6 February, fee £9.70. Enrolment 2-8pm 9, 10, 11 September.

Stoke on Trent. Stoke on Trent Technical College, Moorland Road, Burslem, ST6 1JJ, tel 0782 85258/85599. Details K L Jones, G6ZBL, Electrical & Electronic Engineering Department.

MORSE CLASSES

Birmingham. Selly Park Evening Institute, Pershore Road. Wednesdays 7.15pm. Enrolment 11 September. Details G4IUX, tel 021-475 8403.

Bromsgrove. Rigby Lane School. Mondays 7.15-9.15pm, commencing 16 September. Details G4IUX, tel 021-475 8403 or G4OHJ, tel Redditch 41985.

Cheshunt. Cheshunt & DARC hopes to start a beginners class in September, subject to demand. Details G3OJI, tel Ware 4316.

Glasgow. College of Nautical Studies, 21 Thistle Street, Glasgow G5 9XB. Thursdays, 7-9.30pm. Two courses: September-December, January-May. Details and course bookings N A Matheson at the college, tel 041-429 3201, ext 48.

Manchester North Trafford CoFE. Tuesday evenings or Wednesday mornings. Enrolment 9, 10, 11 September. Details as under "RAE Courses".

Manchester Pendlebury High School. Tuesdays 7.30pm. Details as under "RAE Courses".

Nottingham Arnold & Carlton CoFE. Wednesdays 6-7pm, commencing 25 September. Fee £1/week plus £7/term. Details and enrolment as under "RAE Courses".

Mobile Rallies Calendar

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

4 August

RSGB National Mobile Rally, Woburn Abbey. See panel on this page for details.

11 August

Derby Mobile Rally, Lower Bemrose School, St Albans Road, Derby (off Derby ring road). Open 10.30am. Talk-in GB3ERD. Details G4EYM or G3SZJ, tel 0332 556875.

11 August

Hamfest '85. Organized jointly by RAIBC and Flight Refuelling ARS. Details Miss E K Howard, tel 0202 671191.

11 August

Wythall Radio Rally.

18 August

West Manchester RC "Red Rose Rally", Haydock Park Racecourse, Newton-le-Willows, one mile from M6 junction 23. Talk-in on S22, GB2RRR. From 10am. Details G6TYB.

25 August

18th Preston Annual Rally, Lancaster University. Leave M6 at junction 33 and proceed N on A6 for two miles. Talk-in on 144MHz fm. Entry 50p. Opens 11am. Details G3DWQ, tel 0772 53810.

25 August

BARTG Rally, Sandown Park, Esher, Surrey. Details G8VXY.

25 August

Torbay ARS Mobile Rally, STC Social Club, Old Brixham Rd, Paignton. Talk-in on S22. Details G1 EUA.

1 September

Cambridge Amateur Radio Rally, Kelsey Kerridge Sports Hall, Gonville Place, Cambridge. 10.30am-5pm (disabled, 10am). Adjoining multi-storey carpark. Details G6MIF, tel 0298 6174.

8 September

Lincoln Hamfest, Lincolnshire Showground, on A15 four miles north of Lincoln. From 10.30am to 5.30pm. Talk-in on 144 and 432MHz (S22 and SU8). Details G4STO.

8 September

Telford Mobile Rally, Town Centre, Telford, Shropshire. Open 11am (disabled 10.30am). Arrive via M54 junction 10A off M6) or via A442 from N or S. Morse tests available; apply in writing to G3YCP, QTHR (Burnham). Details G8UGL, tel Telford 584173; or G3UKV, tel Telford 55414.

8 September

Open Day organized by Galashiels & District ARS, Focus Centre, Livingstone Place, Galashiels. Open 11am. Details GM3DAR.

15 September

Vange Mobile Rally, Nicholas School, St Nicholas Lane, Basildon, Essex. From 10am to 5pm. Talk-in on 144MHz, GB4VMR. Details G4OJN, QTHR.

15 September
Peterborough Mobile Rally, Wirrina Sports Stadium, Bishops Road, Peterborough. 10.30am-5pm. Details G3EEL, tel Peterborough 62881 after 6pm.

21 September
National Amateur Radio Car Boot Sale. Shuttleworth Collection, Old Warden Aerodrome, Nr Biggleswade, Beds. From 10am to 5pm. Talk-in on GB4SC. Details G6EES, tel Dunstable 607623.

22 September
Harlow Mobile Rally, Harlow Sports Centre, Hammarskjöld Road, Harlow, Essex. Open 10.30am. Talk-in on S22. Details tel 0279 725876 or 0279 22365 (daytime).

6 October
Great Lumley ARES Rally, Community Centre, Great Lumley, Nr Chester-le-Street, Co Durham. Open 11am. Talk-in on S22. Details G4OCQ, tel 0385 40827.

24 November
West Manchester RC Mobile Rally, Pembroke Halls, Walkden, Worsley, Gtr Manchester. Details G6YIO, West Manchester RC, Astley & Tyldesley Miners Welfare, Meanley Road, Gin Pit Village, Astley, Tyldesley, Manchester.

16 March 1986
South Essex ARS Mobile Rally, Paddocks Community Centre, Canvey Island, Essex. Open 10.30am. Talk-in on S22. Details G4FMK, QTHR, tel 0268 683805.

23 March 1986
19th White Rose Rally, University of Leeds. Details G4NDU, QTHR, or Box 73, Leeds LS1 5AR.

22 June 1986
Denby Dale Mobile Rally, Shelley High School, nr Skelmanthorpe, Huddersfield. Talk-in on S22 and S8. Details G3FQH, tel 0484 862390.

3 August 1986
Rolls Royce ARC Mobile Rally. Details G4ILG, tel 0282 812288.

Special Event Stations

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

27 July, GB2HT; 10/11 August, GB4HT; 31 August/1 September, GB2HT
To commemorate the 500th anniversary of the House of Tudor, Pembroke and DARS will operate these stations from: the Dale Peninsula on 27 July; Haverfordwest on 10/11 August; and Pembroke Castle on 31 August/1 September. All on hf, mainly 3-5 and 14MHz, plus 144MHz from Pembroke Castle. Special QSL card. Certificate for contacting all three events. Details GW4VRO, tel 0646 686536.

August, GB8NTS
GB8NTS will operate from Rugby radio station throughout August. Special QSL card. Stations who worked GB6NTS in June and who also work GB8NTS can apply for the "Newbold Association of Target Sports" Award. There will be a charge of £2.50 for the full colour certificate and all proceeds will be donated to the association's building fund, which is going towards Britain's, first purpose built, international target sports centre, Newbold, Nr Rugby. The station will be active mainly on 144MHz ssb and fm, and is being sponsored on the number of contacts achieved. Details G6ZZE, tel 0533 768181.

August, GB2BR
Swindon & D ARC will operate this station during August from the railway workshops at Swindon, during an exhibition to celebrate the 150th anniversary of the GWR. Details G8SFM, tel 066 689 307.

3 August, GB2PF
Thanet RC will operate from Ramsgate's annual Phoenix Fair celebration, on hf ssb and 144MHz ssb or fm. Special QSL card. SWL reports welcome. Details G4SBD, tel 0843 33213.

3 August, GB2FAA
Yeovil ARC will operate this station from the RN Air Station, Yeovil, as part of the International air day, on hf and vhf, cw and ssb. Details G4JBH, tel 0935 23873, or G3BEC.

9, 10, 11 August, GB4YHA
Licensed members of the Croydon Local Group of the Youth Hostels Association will operate this station on hf/vhf, cw/ssb, from the Youth Hostel, Radnor Lane, Holmbury St Mary, Dorking, Surrey, to celebrate 50 years of the hostel. Details G1LKJ, tel 01-688 4075.

10/11 August, GB2YFT
Operated at the Yeovil Festival of Transport,

Yeovil Showground on A37, by Yeovil ARC on hf/vhf/uHF, cw and ssb. Details G4JBH.

15 August, GB0VJD
Operated by Gloucestershire ARS for the Cheltenham and Gloucester Branches of the Burma Star Association to celebrate the 40th Anniversary of VJ Day. From 0001 to 2359 on all hf bands and 144MHz. Details G3LP.

17 August, GB2MSS
At the Mid-Somerset Agricultural Show, Shepton Mallet, Yeovil ARC will operate this station on hf/vhf/uHF, cw and ssb. Details G4JBH.

17-18 August, GB4PFF
Swansea ARS will operate this station at the Pontardawe Folk Festival, near Swansea on hf and vhf. Details GW4HSH, tel Swansea 404422.

17-18 August, GB2TC
To celebrate the 500th anniversary of Henry Tudor's visit to Tamworth prior to the Battle of Bosworth, the Tamworth ARC will operate at Tamworth Castle, on 3-5 and 144MHz from 10am to 8pm on 17 August, and from 10am to 5pm on 18 August. Special QSL card. Details G4SRI.

18 August, GB2TS
York ARS will operate this station from the village show at Tollerit, nr York, on hf and 144MHz fm. Special QSL card. Details G3WVO.

18 August, GB0LFS
This station will operate from Lutterworth Fire Station, Gilmorton Rd, Lutterworth, to run in conjunction with the station's annual gala day. Special QSL card. Details G4WES, tel Lutterworth 2295.

23-24 August, GB4BSA
In connection with the 40th anniversary of VJ Day, the Exeter ARS will operate this station on 3-5 and 7MHz on behalf of the Exeter branch of the Burma Star Association from St George's Hall, High St, Exeter. Contacts with members of the association or those who also served in the Far East most welcome. Skeds arranged through G3YBK, tel Exeter 78710, or the RSARS Net on 3-5MHz. Details G4KXR, tel 0392 68065 (78315, work).

23-26 August, GB4MOC/GB6MOC
Operational by local clubs to celebrate the Mobil Oil Co centenary at the Pegasus Social Club, Herd Lane, Corringham, Essex. Details Mrs D Thompson, 10 Feering Row, Basildon, Essex SS14 1TE.

23-26 August, GB2FI
On their annual visit to Flat Holm Island, Barry College of FE ARS will operate this station on hf, vhf and uHF. Special QSL card. WAB sq ST26. Skeds arranged for Marconi Award. Details GWOANA.

5 September-2 October, GB4HB
Exmouth RC will operate this station at Hayes Barton, East Budleigh, Devon on hf bands, 144 and 432MHz, Oscar 10 and RS satellites. Hayes Barton is the birthplace of Sir Walter Raleigh who was born here in 1554, and established a colony in North Carolina in 1585, and it is hoped to contact the Raleigh ARS in the city of Raleigh, as part of their 400-year celebrations. It is also hoped to contact the Operation Raleigh ship *Sir Walter Raleigh* callign GB0SWR/MM on her round-the-world mission. Special QSL card will feature the Elizabethan farm house. Details M Newport, tel 0395 274172.

7 September, GB2BOB
Doncaster & D Raynet Group will operate this station at RAF Finningley, where they hope to meet anyone interested in joining Raynet. Details G4ZWQ, tel Doncaster 857526.

21 September, GB2ME
Supported by the Cheshunt and D ARC, this station will be operational on hf and 144MHz from the annual exhibition at the Royal Ordnance Model Railway Club, Enfield Lock, Enfield, Middx. Details G4YYL or G6WIT.

22 September, GB8SOT, GB4SOT, GB6SOT, GB0SOT
Operated by North Staffordshire ARS from Stoke-on-Trent to mark the 75th anniversary of the amalgamation of the six towns of the potteries, and the 60th anniversary of the granting of city status to Stoke-on-Trent. From 9am to 6pm on hf, vhf, rtty, fstv and cw. Details G6MLI, tel 0782 332657.

11-25 November, GB2ACC
Dunfermline RS will celebrate the 150th anniversary of Andrew Carnegie's birth, operating on hf and vhf, cw, ssb and rtty. Skeds welcomed. Special QSL cards. Details G4WYR, tel 0383 736401.

29 (or 22) December, GB4OLD, GB8OLD, GB4NEW, GB8NEW
Radio amateurs throughout Europe (and the rest of the world!) are invited to join in the Lutterworth

New Year celebration. Active on as many bands as possible, GB4OLD and GB8OLD will be used until midnight on New Year's Eve, and GB4NEW and GB8NEW after midnight. The stations will operate from St Mary's Church, Lutterworth, Leicestershire. Details G6ZZE, tel 0533 768181.

13-14 March, 1986, GB4PHT
Operating from the Portland Heritage Trust during Portland Carnival, operation will be on 3-5, 14 and 144MHz ssb, cw, rtty, Amtor. A special effort will be made to contact amateurs in the other Portlands worldwide. Details G4RAK, tel 0305 822753.

Other Events

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

2 September
Scottish Amateur Radio Convention, SARCON 85, Dundee.

29 September
RSGB HF Convention, Belfry Hotel and Conference Centre, just outside Oxford on the M40.

6 October
Welsh Amateur Radio Convention. Details later.

12 October
Midlands VHF Convention, British Telecom Training School, Stone, Staffordshire.

13 October
Second Yeovil QRP Convention. Details G4JBH, tel 0935 23873.

16 March 1986
Pontracft & DARS Components Fair, 11am-4.30pm, Carleton Community Centre, Pontracft, mid-way between Pontracft and Darrington on the A1.

OBITUARIES

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

Mr W J Beer, G4RMF
Bill Beer died on 14 May. He came to amateur radio late in life. Bill had been a wild life warden and naturalist, and was a member of the Chiltern ARC, where he was always ready to help members.

Mr D A Billet, G6BSD
Denzil Billet died on 22 May. He was a founder member of Southampton RC. He passed his RAE in 1949, and retained interest as an swl. Just before his retirement he obtained his licence and was active until just before his death. He will be missed on 144MHz, where he would discuss computer programming and help with various repair problems.

Mr W J Colclough, G3XC
Bill Colclough died on 20 May. An appreciation appears in "Raynet" in this issue.

Mr B H Garbett, VO1BG, (ex G3OPZ)
Brian Garbett died on 14 March, in a helicopter accident off the Newfoundland coast. He was a keen hf and vhf enthusiast and kept regular skeds with many friends in the UK.

Mr J A Mann, GU3AAM
Jack Mann died on 20 March, aged 65. Licensed in 1946 he was active in the Birmingham area for many years where he established a high reputation for skilful cw operating and antenna expertise. For many years he held a top position in the DXCC honour roll. Jack retired to Guernsey in 1982 but growing ill-health restricted his activities.

Also:
Mr W J Bull, GW1LNB, in March;
Mr A W Gethin, RS17771, on 25 February;
Mr C D Maddock, G8EPT, on 29 April;
Mr E Salisbury, G3AVT, on 16 May;
Mr J A Sey, GM8MJ, on 17 May;
Mr A C Stanton, RS48955, on 17 May;
Mr A Stedman, G3DOR;
Mr G W Sweet, G6WWP.

COUNCIL PROCEEDINGS

A brief report on the Council meeting held on 4 May 1985

Present: Mrs J Heathershaw, (President, in the chair), Dr E J Allaway, Messrs J T Barnes, E J Case, Dr D S Evans, Mr G R Jessop, Dr J N Gannaway, Messrs F D Hall, H M Holmden, W J McClintock, H S Pinchin, D M Pratt, B O'Brien, D S Smith, K E V Willis (members of Council), D A Evans (secretary/general manager), A W Hutchinson (editor), Ms H M Norman (minutes secretary).

The President welcomed Mr John Case to the meeting, as co-opted member for Zone E. The resignation of Mr G R Smith was noted, and Council agreed not to co-opt anyone to fill this casual vacancy.

Honorary treasurer's report

In the absence of Mr Cornish, Mr O'Brien drew attention to the sales figures for the first nine months of the current financial year.

There was considerable deliberation on the subject of the advertising content of *Radio Communication*, which was presently at a very low level, averaging 34 pages per month. Mr Hutchinson made a comparison with the advertising content of similar magazines. The absence of advertisers of small components was noted with regret.

A discussion on the Society's annual convention took place, and Mr O'Brien said that the Finance & Staff Committee would produce a discussion paper for Council.

Secretary's report

The secretary spoke briefly of the need to put the financial position of the Society into the context of the UK economy as a whole. He outlined the progress being made on reprints and new books, and commented on the three new publications produced in time for the 1985 Convention; the 1985 *Call Book*; *Operating manual* (3rd edn), and the *IARU Locator map of Western Europe*.

Mr Evans spoke in detail about the Society's membership and of various techniques for analysis.

Mr Case enquired the breakdown of Class A, Class B and swl membership of the Society. This

was noted to be approximately one-third in each category.

Recommendations arising from committee minutes

HF Contests Committee

Taking account of the views expressed by UK entrants to the CW NFD (June) and the SSB FD (September), the committee recommends:

1. That the RSGB maintain (CW) NFD as a national event to be held annually during the first weekend of June.
2. That in view of the changes in the date and concept of the IARU SSB FD, the RSGB withdraw from this event and revert to organizing a national event to be held annually during the first weekend of September.

Council approved both recommendations.

IARU Committee

1. "That Mr Colin Thomas, G3PSM, be appointed co-ordinator of the UK Intruder Watch System and that he attend a meeting of the IARU Monitoring Service Group, as an observer in Geneva in August."

The cost-effectiveness of the IWS was questioned and, after some discussion, it was agreed that the recommendation be referred back to the IARU Committee, with a request for more information.

Concern was expressed about the voluntary Intruder Watchers, who had continued their work in the absence of a co-ordinator for some considerable time.

2. "That a representative from the RSGB IARU Committee attends the Region 3 Conference in Auckland on 13-17 November 1985."

This was referred to the Finance & Staff Committee for consideration.

Presidential Advisory Group

1. In view of the fact that Mr Pinchin had completed his temporary term as chairman of the Membership & Representation Committee, the group recommends that Mr McClintock should become chairman of the committee from 1 July 1985. Further, that in future the executive vice-President shall, on taking up office, become the

chairman of the Membership & Representation Committee.

Mr Hall proposed acceptance of the recommendation, this was seconded by Mr Willis and carried with 1 against.

2. "Chairman's reports to Council...procedure for this year's review."

This recommended procedure was approved with one minor amendment.

VHF Committee

"That in order to recognise the current activity on 50MHz, and in order to correspond with the VHF/UHF Newsletter, the name of the column 4-2-70 in *Radio Communication* be renamed VHF/UHF News."

After a short discussion the recommendation was referred to the Editorial Board, which was currently considering titles and content of all regular columns.

Membership and representation

Council noted:

(i) that reduced subscriptions had been granted to 10 members;

(ii) that subscriptions in respect of 12 members had been waived;

(iii) that the following had been granted affiliation: Borehamwood-Elstree ARS

University of Bristol ARS

Daventry ARC

Ellesmere Port District ARS

Holyhead & DARS

Moroni Amateur Radio Association (UK)

West Midlands Police ARC

(iv) that the following area representatives had been appointed:

D R Grey, G8TFL—Berwick on Tweed

D Mavin, G4OIV—Morpeth & Ashington

B E Pearson, G1GLP—Thanet.

Raynet Limited

The Finance & Staff Committee suggested that the Raynet logo be registered to protect items sold by the Society; ie badges, clothing and stationery.

This was approved by Council.

75th anniversary of the formation of the Wireless Society of London

Council noted a letter from Mr Scarr, G2WS, drawing attention to the above anniversary. The matter was passed to the Presidential Advisory Group for consideration.

SPECTRUM ABUSE

The following is a copy of a letter sent to the Prime Minister. An acknowledgement has been received and a reply is awaited.

Rt Hon Margaret Thatcher MP
Prime Minister
10 Downing Street
London.

4 June 1985

Dear Prime Minister,

Recent events have brought football violence and hooliganism to the attention of the Government and public, with predictable reactions. However, vandals and hooligans do not confine their activities to the football stadium; they exist also on the airwaves and affect all manner of radio communications: military, governmental, broadcasting, private mobile radio and the Amateur and Amateur Satellite Services. It is with particular reference to the latter two that I am writing to you.

As I am sure you know, amateur radio is a marvellous form of self-training which also provides both service to the public and a pool of experts ready to assist the civil and military powers in times of emergency. The 1982 Falklands War, for example, demonstrated yet again the ability of radio amateurs to provide emergency communications when all other "professional" means of radio communication had become non-operational. Even as I write, Radio Amateurs are assisting with the state of emergency in Ohio and Pennsylvania, USA, following the recent devastating tornadoes.

The unlicensed "hooligans of the air", for want of a better name, cause interference to the legitimate activities of licensed radio amateurs in the UK; it is regrettable to have to report that such abuse of the radio spectrum is as prevalent in the United Kingdom as it is anywhere else in the world. The problems thus caused are serious, widespread, on the increase and do little good to our overseas image.

The point has been made that effective policing could have prevented last week's tragedy in Brussels and many, including

yourself, have indicated that appropriate punishments for offenders can be seen as a positive deterrent.

Why is it, therefore, that the equivalent policing of the airwaves—which is the duty of the Department of Trade and Industry's Radio Investigation Service—is totally inadequate for the nature and scope of the problem of abuse of the radio spectrum? In the Report of the Independent Review of the Radio Spectrum (30-960MHz) presented to Parliament in July 1983 (Cmd 9000), the Chairman of the Committee, Dr J. H. H. Merriman, acknowledged that proper policing was an integral part of the radio regulatory process, and yet the Radio Investigation Service is understaffed by a factor of at least ten!

Why is it also that when the limited effort of the Radio Investigation Service to bring the "hooligans of the air" to justice, the DTI refuses to issue press statements which would enable justice to be seen to be done, and which in turn would help provide the deterrent effect considered so important in other areas of our lives.

I trust that you will not find the parallel fanciful, but the problem of radio-related vandalism is as bad in its own way as that of the football hooligan since the use of radio has many "safety to life" implications. Preventive medicine is surely a far less expensive approach to the problem of spectrum abuse than to have to "pick-up the pieces" when something catastrophic goes wrong.

The problem of abuse to the radio spectrum is one in which the position is deteriorating. Little appears to be happening to change this state of affairs and our 37,000 members would be most interested to know why.

Yours sincerely,

David A. Evans, G3OUF
General Manager/Secretary

THE VOYAGE OF GB4DIS/MM IN ANTARCTICA

Dr Charles Fay, GW4SBB*

WHILE MOST OF BRITAIN was in the grip of winter, and all keen radio amateurs were in snow-covered shacks glued to their headphones, the Royal Research Ship *Discovery*, operated by the Natural Environment Research Council, was heading south across the equator to the summer waters of Antarctica. In this context "summer" is relative, as the temperature there is around 0°C. On board was a party of scientists from the University of Birmingham who were going for five months to study the geophysics of the seabed around the Antarctic peninsula and the Weddell Sea, supported by technical staff from the Research Vessel Service and the Institute of Oceanographic Sciences of NERC. Departing from the UK in November 1984, *RRS Discovery* called at Gibraltar en route for Port Stanley in the Falkland Islands. From there she went on south for the first half of the expedition to work just southwest of the South Shetland Islands, ending at Punta Arenas.

RRS Discovery is the largest of the NERC's general-purpose research ships, being 260ft long and 2,500 gross tons. She is now 23-years-old and carries a complement of up to 20 scientists and technicians and 35 crew, including a doctor on long voyages. Inside she is fitted out with a number of scientific laboratories equipped with a wide range of instrumentation for most branches of oceanographic research. For this expedition she had been fitted with a new multichannel digital seismic data acquisition system using airguns as the seismic source for surveying the seabed some thousands of metres below the sea surface.

We arrived at Punta Arenas in southern Chile by air from the UK to man the second half of the expedition, and to set up the special event amateur radio station GB4DIS/MM on board—"we" being John, GW3RNP; Dave GW4JAD; and myself. During the three months on board we were to work many stations worldwide from February till early May as *RRS Discovery* surveyed the earth beneath the Weddell Sea, stopping at South Georgia and Montevideo, and then home to the UK.

Before getting the special event station on the air there was a fair bit of preparatory work to be done. Obtaining the special call sign was surprisingly painless, and I'm sure this was due to the considerable interest and help from the RSGB in collaboration with the DTI. Because ours was an unusual request—a special event call sign for a foreign-going expedition—the authority and allocation of the call sign came from the DTI and not the RSGB. As we were calling at South Georgia, we wrote to the Superintendent of Posts and Telecoms at Port Stanley to see if we could get a VP8 call sign, and in less time than it sometimes takes to get a reply back in this country, a letter arrived back allocating us VP8DIS.

GB4DIS/MM was not a single station as such; it was in fact three separate stations scattered around the ship in cabins or in a scientific laboratory (for the rtty). The line-up was FT102 and FT77 for cw and ssb and a Ten-Tec Argosy linked to a BBC microcomputer for rtty. The antenna farm comprised of a number of vertical dipoles and a horizontal long wire for 7, 14 and 21MHz. Along with the ship's antennas they made an impressive spider's web of wires aloft! Despite three operators and all the gear, the periods of activity were considerably limited, both in frequency and in time, by a number of factors. It was most important that we did not interfere with the scientific work or the safety of the ship; but almost as important was the need not to interfere with the ship's social life.

For example, at the weekend the ship's staff liked to listen to sports broadcasts on the BBC World Service. During survey runs when the very sensitive magnetometer was towed behind the ship, ssb transmissions on 14MHz were out because of interference. The ship's radio officer had regular listening watches to keep and occasional traffic to send on the ship's transmitter—most of the ship's business goes via the Inmarsat moon phone, so fortunately only rarely did the 1,500W beastie spring into life and breath kilowatts of rf fire down our antennas—only to blow the front-end fuse of the FT102! When the seismic listening equipment was being trailed behind the ship, all transmissions were prohibited; in effect we were towing a 3,000m long antenna feeding faint signals into a bank of 48 very-sensitive high-impedance low-noise preamplifiers! This happened for 15 days of the cruise. Only when we were "on station", ie stopped to deploy seabed sampling equipment over the side, could we operate on all frequencies. And then of course there was some work to fit in as well.

Weather conditions in the Antarctic region, although being summer, were far from the gentle UK weather patterns. High winds, big swells and ice-forming snow took their toll on the antennas. After a couple of Force 11 storms they were transformed into tattered bits of wire strewn around

the upper decks. We soon learned to over-engineer their mechanical strength and to allow sufficient slack for the high winds not to snap them. Ice build-up was another problem that we could do little about (except to try melting it with a blast of rf); sometimes I think we were working stations on a vertically-polarized snowball! Operating conditions were far from ideal. *Discovery* rolls and pitches badly in the big swells of the Antarctic seas, and it was mildly entertaining (but not perhaps for the unfortunate stations who were listening) to slide from one side of the cabin to the other, dragging the Morse key with you. Speech was a bit easier in this respect; you jammed yourself into a corner clutching the microphone and let the ptt switch take the strain.

The only landfall made around the Antarctic waters was a two-day stop (8-10 March) at Grytviken in South Georgia for refuelling. It was also a mid-term break for the scientists and crew to go ashore, stretch our legs and savour the silence and magnificence of the spectacular landscape. Grytviken is an old disused whaling station, now derelict and sadly vandalized. It is a most beautiful anchorage partially surrounded by magnificent high mountains, reminiscent of the highlands of Scotland. But for radio propagation those mountains were a disaster. We operated as VP8DIS, but it was most disappointing. "Sparks" on the ship's 1,500W transmitter could not get out at all. We made less than 20 contacts, and those were mainly with South America—including CX5RV (G5RV). Subsequently listening to the chat on the airwaves, there seemed to be some scepticism about our being there at all; but we really were. To get any signals out from there one would need to backpack the transceiver, antenna and batteries up the nearest 1,500ft mountain, together with tent and climbing gear. As soon as we cleared South Georgia the signals all came back again.

A pattern to the propagation conditions emerged as the cruise progressed. At first 21MHz was dead except for some local VP8s and South American stations. From about the end of February it started to open, with the occasional evening contact with the USA, including an enjoyable ragchew with G3MHV/P/W6, an expatriate professor at the University of Southern California. By 14 March we had repeated contacts with G8HW, G4WMP and G4SCA. On St Patrick's Day we stumbled upon the "Soggy Watering-hole" hosted by the ebullient Julian, ZD7CW, on the Isle of St Helena; this is a meeting place on 21,335kHz from 1500gmt onwards for the catching of rare dx. From then-on the band was open till 1800gmt to Europe, USA, Canada (VE7VK) and South America. Towards the end of the trip, and as we moved northwards to Montevideo, the 21MHz band became less open to the UK and more open to southern Europe and Africa (5N3BHF). The 14MHz band was consistent but with day-to-day variability. VS6CP (Hong Kong) appeared at 1345gmt and VU2GMC (Bombay) at 1600gmt. Then Europe and Scandinavia came up at 1930gmt followed by many Gs around 2000gmt. Stations from America followed during our evening (ship's time was 3h behind GMT).

It was our great pleasure to talk with so many G stations, and particularly the regular contacts with the omnipresent Les, GM3ITN, on his Falklands Net. One notable contact was with the Barry Radio Club, GW4BRS, successful despite my ropey Morse; the NERC Research Vessel Base (my office) is just next door in Barry Docks. The most unusual contact was with G3UML, who wanted an "across-the-air" interview for BBC; the FT102 was wound up to its maximum 150W and a more than half-an-hour link-up was maintained 5+8 both ways on 21MHz. Many contacts were made on the key with John's much more professional Morse; Dave and I stuck mainly with phone. A few rtty contacts were established, with perhaps the most exciting one to G3HJC—Antarctic to Hull on 50W.

It was interesting to observe, "from the other end" for a change, which stations were successful in getting through the QRM. Those with beams and linear amplifiers working "maximum power" stood head and shoulders above the standard 100W plus dipole. The strongest signal was from EI8H with 400W plus V-beam, followed closely by the apparently ever-listening Mel, G4WMP. The occasional station, in an effort to put through a punchy signal, had the speech compressor turned up too far so that it was unintelligible and therefore unworkable. As well as working the kilowatt kings, it gave us a lot of satisfaction to work G4NDL and GM4FVQ who were Q5 on 45W and 50W respectively, and G4WSB/M with 80W into a whip on the car on his way home from work!

We wish to express our thanks and appreciation to all the amateur radio stations to whom we talked on phone, key and rtty. It gave us a lot of fun on our Antarctic expedition on *RRS Discovery*. To those who spent hours listening but were unsuccessful in contacting the ship, we also express our appreciation and hope that next time you may make it through the QRM.

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Computer-aided design of a multiband dipole

—based on the G5RV principle

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Introduction

Probably the single most limiting factor in hf operation is the narrowband characteristic of all simple antenna structures. This is particularly true now that radio transceivers use broadband power amplifiers which offer no facility for tuning and matching and will only produce their rated output power into nominally 50Ω loads over a vswr range up to 2 to 1. As a matter of course, therefore, some form of impedance matching network is then incorporated between the transmitter and the transmission line to effect the required match. What really has happened is that the pi-coupler of an earlier era has now been moved from the transmitter to an external unit, and so the term "broadband transmitter" is then really something of a misnomer. Broadband antennas such as the log periodic array solve this problem, but for amateur use they are hardly practicable. A multiband antenna though, which covers only the necessary bands and which is of simple construction, would be particularly useful, hence the popularity of trap-loaded dipoles.

In this article a description is given of a computer-based procedure which was developed to analyse and then synthesize a multiband wire dipole antenna without traps which operates on five of the eight allocated amateur bands between 3 and 30MHz. In addition the results are also presented of a series of experiments performed to test the design theory for the antenna at different heights and in both horizontal and inverted-V configurations.

Background

The design concept is based on the G5RV principle [1, 2]. In this discussion that antenna will be considered only in the form which used 10·37m (34ft) of open-wire matching section between the 31·1m (102ft) dipole and the transmission line to the equipment. More recently, W5ANB [3] described a similar antenna which is claimed to produce a vswr of less than 3 to 1 on

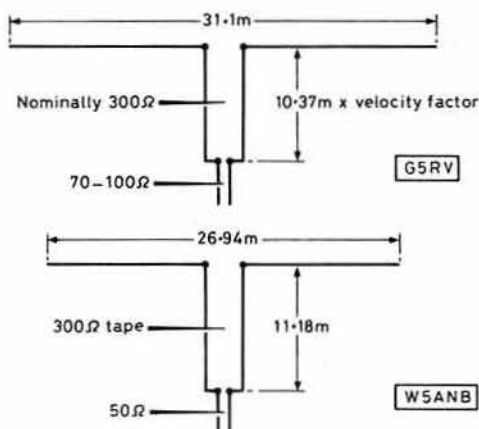


Fig 1. The G5RV and W5ANB antennas

Brian Austin obtained his amateur radio licence in 1963, in Johannesburg. He is now a senior lecturer in the Dept of Electrical Engineering at the University of the Witwatersrand, in that city, teaching and doing research in the field of electromagnetic engineering. Prior to becoming an academic he worked as an electronics engineer in mining research and was very involved in the development of a medium frequency, portable ssb transceiver for use underground. For many years he conducted classes for aspirant radio amateurs and now gets most of his satisfaction from the hobby by working QRP. He is a member of the SARL, ARRL, RSGB and RSARS.



the 7, 14 and 28MHz bands. Both antennas are shown in Fig 1. Now that the computing power available, even to the amateur, has increased so many fold over that offered by the slide-rule, it became quite feasible to subject the well-proven G5RV to critical analysis in order to attempt to optimize or possibly even extend its performance. In addition the allocation to the amateur service of three new bands of frequencies (10, 18 and 24MHz) meant that simple, effective multiband antennas, covering as many of the eight bands between 3·5 and 28MHz as possible, would soon be a requirement. The G5RV was an obvious candidate for consideration.

The first results of such a computer study, done by the author, appeared in *Technical Topics* [4], and it is the intention here to present details of the approach which was used and the results obtained from a further series of experiments designed to check the computer predictions.

The computer model

The antenna structure used can be characterized in terms of the dimensions and impedances shown in Fig 2. As originally conceived by G5RV, the matching section L2 would function approximately as a $n\lambda/4$ transformer, where n is an integer (1-4) from 7 to 28MHz, while at 3·5MHz it behaved as additional reactive loading to the dipole flat-top, L1. G5RV stated that the characteristic impedance, Z_2 , of L2 was not critical if it were of open-wire construction. This implies that Z_2 would lie between about 350 and 750Ω if constructed of wire with spacing no less than about 25mm or no greater than 250mm. Any open-wire transmission line with dimensions much beyond these limits clearly becomes impracticable.

However, the function of L2 is to transform the particular value of Z_1 , which is the dipole input impedance at the operating frequency, to some value Z_3 which would yield a vswr of less than, say, 2:1 on the transmission line Z_4 . These inter-relationships between Z_1 , Z_2 and Z_3 are most easily expressed mathematically by the well-known equation for a lossless transmission line:

$$Z_3 = \frac{Z_2 (Z_1 + j Z_2 \tan \beta L_2)}{Z_2 + j Z_1 \tan \beta L_2} \quad (1)$$

where $\beta = 2\pi/\lambda$ and Z_3 is the impedance seen "looking in" to L2 at the point where it is connected to the transmission line Z_4 . Clearly the value of Z_2 is dependent upon Z_1 and L_2 at any given frequency and length L_1 .

Z_4 is determined largely by the requirements of the transmitter connected

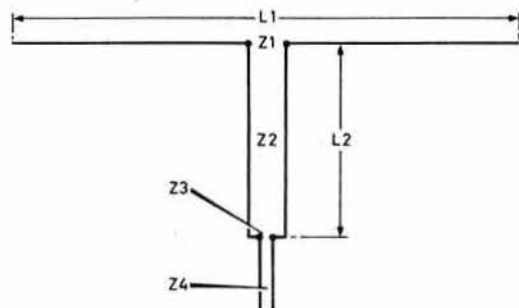


Fig 2. The antenna geometry defined

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to the antenna. G5RV suggested 72 to 100Ω line because at 14MHz his value of L1 yielded about 100Ω resistive for Z1, and L2 was a half-wave, one-to-one transformer thereby providing an acceptable match. Nowadays almost all amateur and commercial-grade transmitting equipment is designed to operate into a load of nominally 50Ω, at a maximum vswr of 2:1. Hence it seems logical to select 50Ω as the value of Z4. As this characteristic impedance immediately implies coaxial cable rather than two-wire line, the question arises of asymmetry or unbalance at the junction of the two lines. This problem has not been addressed here, however, because the natural unbalance which exists in most practical hf antenna installations due to trees, buildings and so on would dominate anyway and could not be overcome by a balun. Considerable flexibility exists within computer software though, so both 50 and 75Ω cases for Z4 were considered in the analysis.

The use, in (1) above, of the simplified (lossless) expression for Z3 is justified because over the hf range the losses on any well-constructed open-wire line are minimal even though it may support substantial standing waves of voltage and current.

The computer program

A computer program to analyse the situation described in (1) is very simple as long as the values of Z1 which exist at the feedpoint of L1 are known. Generally speaking though, this can present serious problems because the variation of Z1 with respect to L1 at a constant frequency f, or conversely with respect to f with L1 fixed, is by no means straight forward. Various complicated analytical procedures do exist from which these values of Z1

may be calculated, but they involve the use of sophisticated numerical techniques to evaluate the defining integral equations. Fortunately, however, tabulated data is available [5] which lists $Z1 = R1 \pm jX1$ for values of $\beta L1/2$, which is a useful way of handling variations in either f or L1. These data also cover the cases of thin-wire antennas or thick tubular structures because their relative performance as regards impedance change with frequency differ markedly, as shown in Fig 3.

The thin-wire antenna has much the sharper characteristic indicative of the higher Q structure and hence narrowband device that it is. Typically wire antennas at hf fall into this category and so the computer model made use of the thin-wire impedance data stored in a look-up table. Typing it in accurately was tedious, but once done the program has considerable flexibility because the data contains 249 values of Z1 from $\beta L1/2$ of 1 to 25.9 in steps of 0.1. Linear interpolation between these was used to provide a continuous range of impedance values for the frequency- and dipole-length combinations under investigation.

The analytical program using this approach was called "G5RV" and calculated Z3 for a given set of L1, L2 and Z2 for any frequency between 3 and 30MHz. From Z3 it then determined the reflection coefficient at the junction between Z3 and Z4 transmission lines and, from that, the value of vswr for any specified value of Z4. It was thus possible to input the dimensions of the G5RV antenna, for example, and determine the resulting vswr on Z4. Likewise the antenna, designed by W5ANB [3] was also tested on the computer to assess its performance.

Computer-aided design

Logically the "G5RV" program could be extended to actually design such an antenna by changing L1, L2 and Z2 with both 50 and 75Ω cable as Z4 until a set of these values was obtained which yielded the maximum number of amateur bands on which the vswr on Z4 was less than 2:1. To do this by hand would be virtually impossible, with even a small personal computer it would be quite feasible as long as there was sufficient memory to accommodate the look-up table. "G5RV" was thus modified and became "ZS6BKW", for want of a better name, and produced the results reported previously [4] and which are repeated here for convenience in Table 1.

Table 1. Results produced by the "ZS6BKW"

$L1 = 27.9m$ $L2 = 13.6m$ $Z2 = 400\Omega$ $Z4 = 50\Omega$		Not corrected for velocity factor	
Frequency (MHz)		VSWR	
3.65		11.8	
7.05		1.8	
10.13		88.0	
14.2		1.3	
18.1		1.6	
21.2		67.0	
24.9		1.9	
29.0		1.8	

In theory then, these dimensions and impedances yield an antenna which will operate with a vswr of less than 2:1 on at least parts of the 7, 14, 18, 24 and 28MHz bands. It should be noted that Z2 of 400Ω produced this particular theoretical result. The actual values of Z2 tested in the program were stepped in 25Ω increments, which, from a practical point of view, is about the minimum change in Z2 that can easily be achieved when constructing such an open-wire line.

Fig 4 shows the comparative predicted trend between L1 and L2 with Z2 as

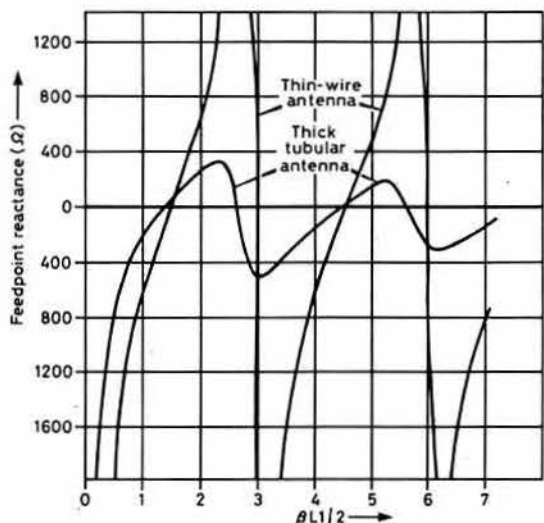
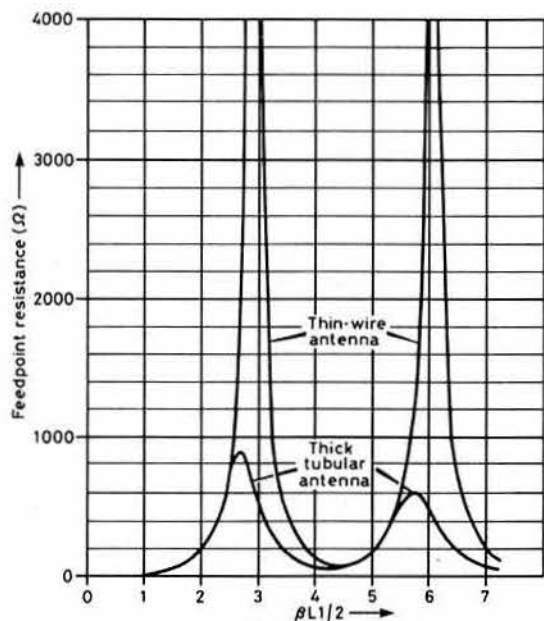


Fig 3. Feedpoint resistance and reactance of dipole antennas

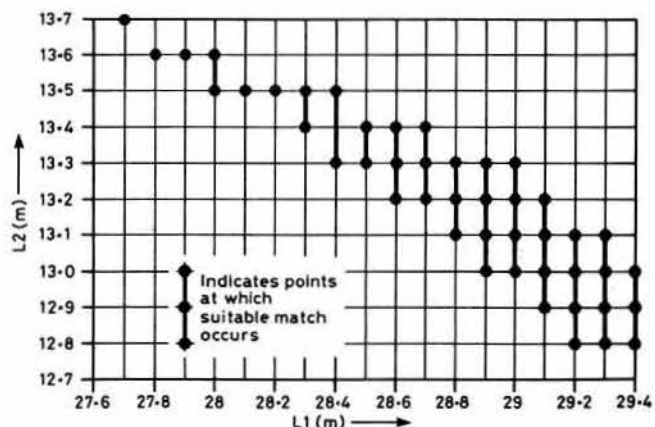


Fig 4. The ranges of L1 and L2 yielding an acceptable match

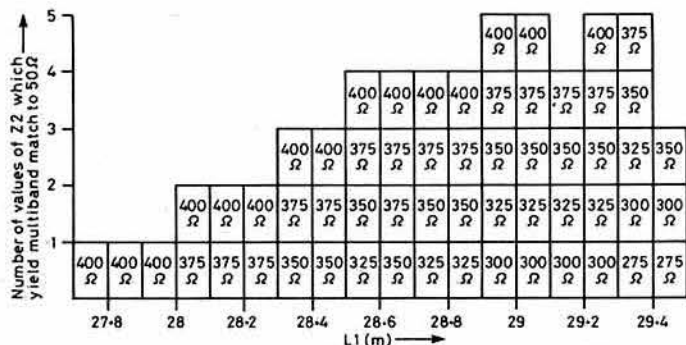


Fig 5. The distribution of Z2 values over the range of L1

the parameter when a minimum of five of the hf amateur bands had to yield an acceptable match to Z4. The program stepped both L1 and L2 in 100mm increments, and Z2 in 25Ω increments as it searched for the best combinations.

It is evident from Figs 4 and 5 that the characteristic impedance Z2 also changes with L1 and L2, as expected from equation (1). For example, when L1 = 27.7m and L2 = 13.7m a suitable match is obtained on all five bands only when Z2 is 400Ω. However, as L1 is increased and L2 decreased, so the number of values of Z2 increases such that at L1 = 29m and L2 = 13.1m, for example, then values of Z2 from 300 to 400Ω will produce the required match. As L1 is increased still further, so the value of Z2 again becomes more critical. It will be noted that Z2 increases as L1 decreases and that there is a definite optimum length of L1 such that both L1 and Z2 are at their least critical. This occurs when L1 is between 28.9 and 29.3m. Note that in all cases in this discussion so far, all the dimensions are electrical, no corrections having been made to allow for either end-effects in L1 or velocity factor in L2.

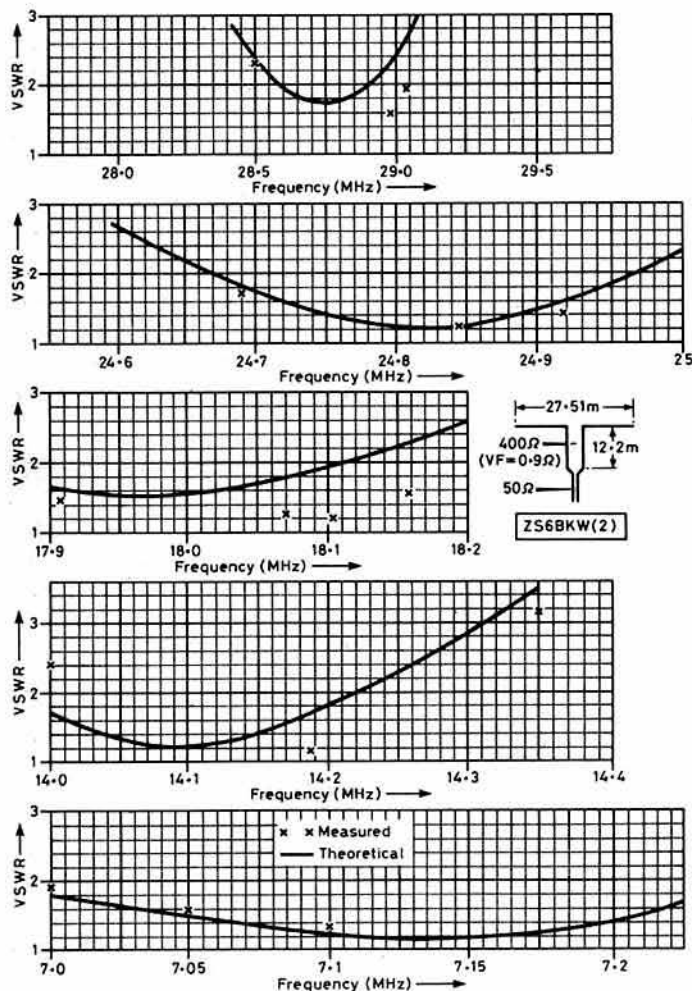


Fig 6. The performance of the ZS6BKW(2) antenna

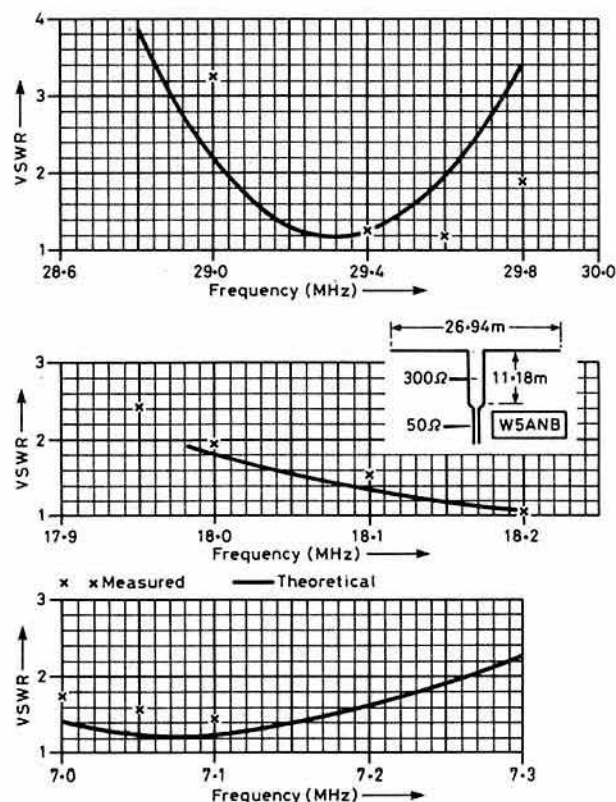


Fig 7. The performance of the W5ANB antenna

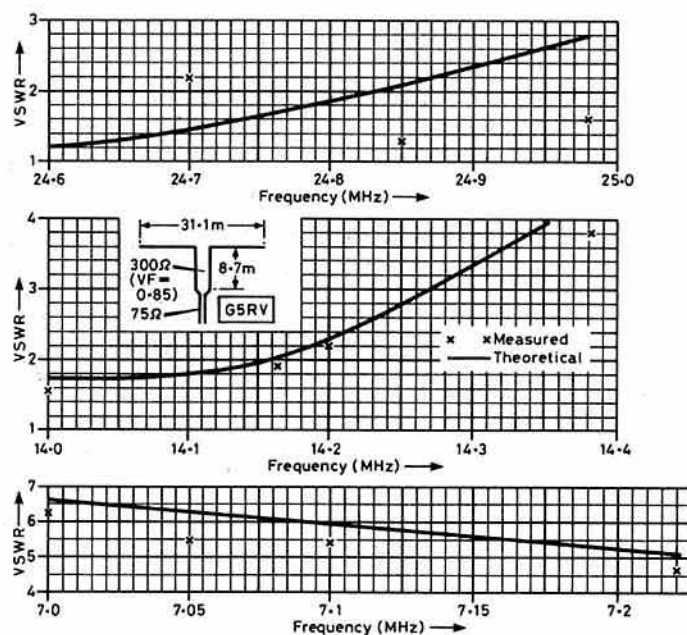


Fig 8. The performance of the G5RV antenna

Table 2. Summary of the measured swrs of Figs 6-8

Antenna type	Frequencies in megahertz on which vswr ≤ 2:1
ZS6BKW (1)	7.0-7.1 14.0-14.34 18.068-18.168 24.89-24.91 28.4-29.3
ZS6BKW (2)	7.0-7.1 14.05-14.29 18.068-18.168 24.89-24.99 28.6-29.2
G5RV	14.0-14.18 18.068-18.168 24.89-24.99
W5ANB	7.0-7.1 18.068-18.168 29.15-29.8

Table 3. Physical dimensions of the ZS6BKW (1) and (2)

Antenna	L1(m)	L2(m)	Z2(Ω)	Velocity factor
ZS6BKW (1)	28.1	11.2	300	0.85
ZS6BKW (2)	27.51	12.2	400	0.9

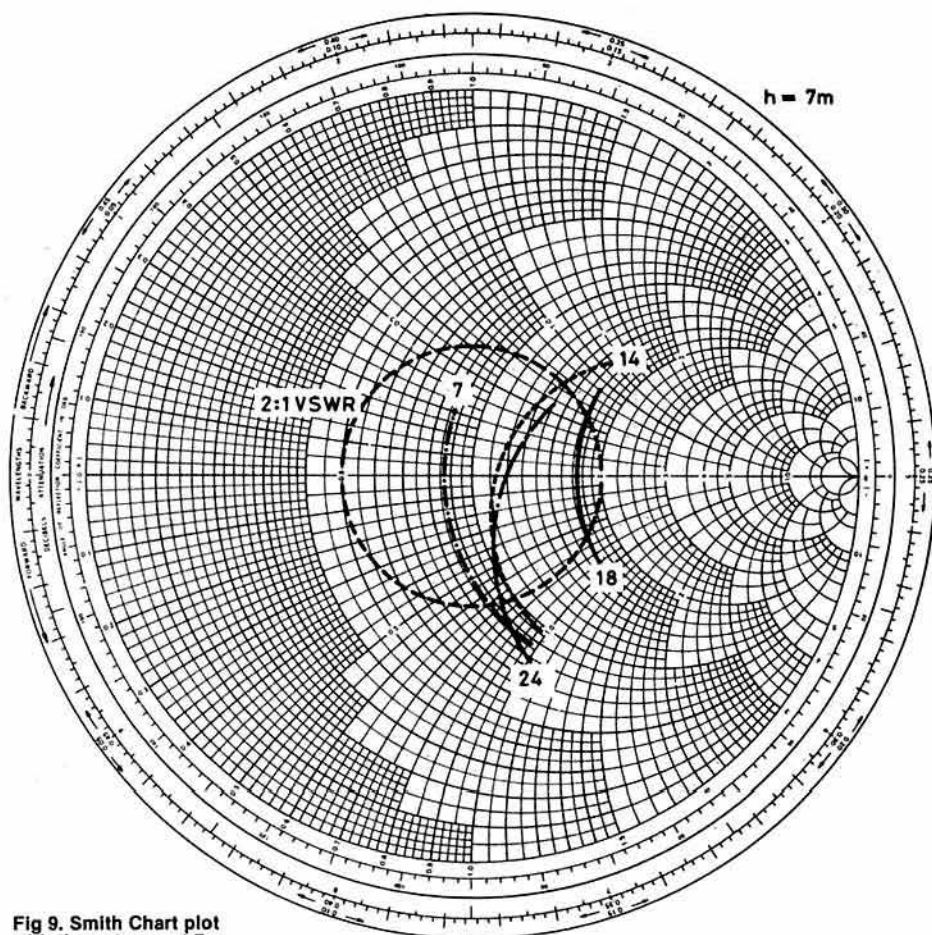


Fig 9. Smith Chart plot with the antenna at 7m

Measured results and comparisons

In order to test the theoretical results from the previous section, a number of antennas were constructed using commercial 300Ω transmission line with a velocity factor of about 0.85, and a homemade line of 400Ω characteristic impedance with a measured velocity factor of about 0.9. Values of L1 and L2 around those predicted were used in the tests when the antennas were erected between two isolated steel towers at heights from 13 to 3m above ground and from a 12m glass-fibre mast for tests in the popular inverted-V configuration. In addition, the conventional G5RV antenna was built, as well as its relative designed by W5ANB. In all cases the impedance Z3 (see Fig 2) was measured using an HP4815A vector impedance meter, and the vswr on either the 50 or 75Ω cable connected to it was then calculated.

Figs 6 to 8 show these measured swrs and the predicted results taking into account both end-effects and velocity factors, plotted for the various bands on which an acceptable match is possible. In addition, the severe mismatch which occurs on 7MHz with the G5RV is also shown in Fig 8, by way of an example. These results are summarized in Table 2, with the two antennas resulting, from the computer program, designated ZS6BKW(1) and ZS6BKW(2). Table 3 gives the physical dimensions of both antennas.

From Table 2 and Figs 6 to 8 it is evident that both the antennas resulting from the computer analysis yield considerably better results in terms of the impedance presented to the transmitter than do either of the G5RV or W5ANB designs. The W5ANB antenna, surprisingly, did not match on 14MHz but redeemed itself by matching very well on 18MHz!

The effects of height and antenna geometry

During this experimental programme the effect of changing the height of the antenna above ground was examined by running a full set of measurements every 2m from 3 to 13m, above well-grassed, sandy soil. Figs 9 and 10 show, on the Smith Chart, how the impedance Z3, normalized with respect to 50Ω, varies with frequency and antenna heights of 7 and 13m. It is evident that the effect of such a variation in height is not too significant as regards vswr. It would of course affect the radiation characteristics of the antenna somewhat, but from these data it is clear that an effective match is still possible at this low elevation, typical of portable installations.

The use of only a single mast and the inverted-V configuration is frequently very useful. The effect on the vswr of changing the included angle at the apex of the antenna was examined with a 12m glass-fibre mast supporting the antenna. The frequency at which the lowest vswr occurred on the 14 and 24MHz bands was measured as the included angle was changed in steps from 60°-150°. This change in frequency is shown plotted against the included angle θ in Fig 11. It will be noted that the frequency at which the best match occurs decreases with the decrease in the included angle. At $\theta=90^\circ$ the change in frequency is about 0.6 per cent for both 14 and 24MHz, rising to between 1.3 and 2 per cent for $\theta=60^\circ$. The greater change at

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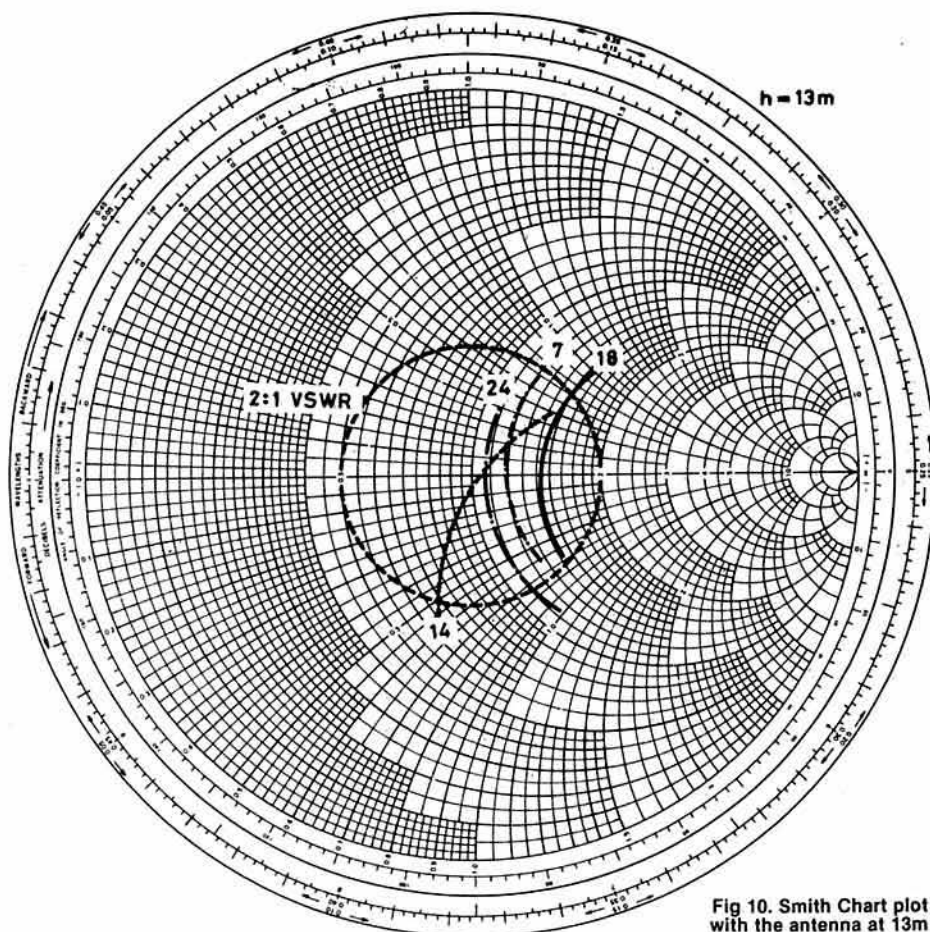


Fig 10. Smith Chart plot with the antenna at 13m

A Solidstate 30W SSB Transceiver for 1.8MHz

(Part 2)

M J GRIERSON, MRIN, AMITD, G3TSO*

Lowpass filter and swr unit (Figs 17, 18, 19†)

Before being connected to an antenna, any broadband transmitter must be filtered to remove unwanted harmonics. A seven-pole filter is used, comprising three toroidal inductors and four silver mica capacitors. The values were calculated from ARRL tables, and the completed filter performed correctly first time. However, the inductor cores can vary by up to 10 per cent and, should the cut off frequency be too low, one turn removed from each inductor should solve the problem. The filter is used on both transmit and receive with the antenna changeover relay on the receive side of the filter.

Some indication of output power is required, and for mobile use swr indication is almost essential, so an swr bridge is added. The design is fairly conventional except that the meter is connected to the 8V positive rail. This is because the S-meter circuit required the meter in the positive supply and insufficient relay contacts were available to change things over. The circuit still performs in the normal way.

The filter board and RLC are mounted in a screened compartment under the chassis.

CW tone oscillator, microphone amplifier and S-meter amplifier (Figs 20†, 21, 22)

This unit represents a collection of all the odd bits that do not fit anywhere else, and has undergone continual change since the transceiver was first built.

A tuning signal is generated by a phaseshift oscillator TR603 and fed to the microphone input of the transceiver in order to generate a carrier for tuning up a mobile whip. The inclusion of a keying circuit would then make cw operation possible if it should ever be required. Keying a phase-shift oscillator usually results in considerable chirp, so the circuit used clamps the output of the oscillator by effectively shorting the output with C607, a

100µF capacitor. TR602 is turned on and off by the cw key, which should be shorted when removed from the jack to enable the tune-up facility. Sidetone is fed to the audio output ic which is also provided with a 13V supply via D601.

The cw switch is wired so as to activate the ptt line and produce a carrier output varied by the drive level.

TR601, a 2N3819, serves to match a medium impedance microphone to the relatively-low impedance of the voga. A Yaesu 600Ω microphone is normally used.

TR604, a BC108, drives the S-meter from the age line; this normally swings from +2V to +4V on reception, and will drop to 0V if the antenna is removed. The +2V threshold is removed by the voltage drop across the junction of TR604, and the diodes D604 and D605. RV601 is adjusted for full-scale deflection at maximum age voltage. The meter used is a 200µA S-meter from Cirkit. The scale is not accurate but is as good as most commercial S-meters.

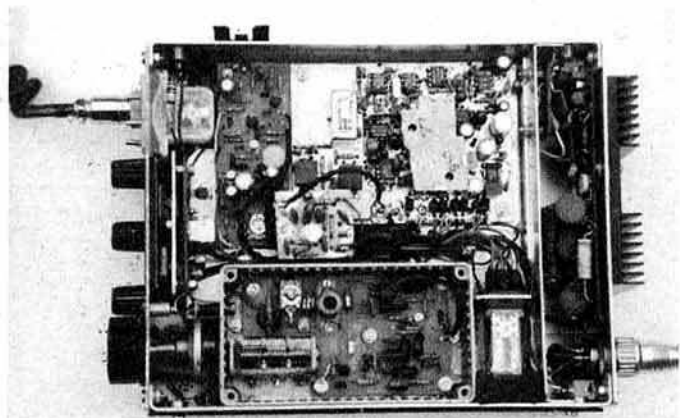
The transmitter power amplifier (Figs 23, 24, 25)

The pa has been left until last as the rest of the transceiver can be used QRP without it. Solidstate hf power amplifiers seem to be shrouded in mystery and deemed as something to be left alone by many, but in practice the building of a solidstate pa proved delightfully simple—a mere weekend's work. First we should forget ideas of using cheap power transistors, proper rf devices are required and there aren't that many for 13V use. A pair of TRW PT9795 devices were obtained from Homebru Radio for around £16 a pair. The circuit is from a TRW applications note—what more could one want? The PT9795 is capable of an output of 15W per device and can stand an infinite swr (or so it says, and they have, at full output).

Fig 23 shows the pa details. T701 is a ferrite-loaded transformer, and the secondary consists of two brass tubes passed through two rows of ferrite rings; pcb end-plates hold the assembly together. The primary is wound through the brass tubes and the whole transformer is soldered directly to the pcb. Bias is derived from an LM317K regulator and fed to the base of TR701 via R702 and R703. Output transformer T702 is a longer version of T701, while T703, a phasing transformer, is mounted directly above T702, using common end plates. The winding consists of two lengths of pvc-covered stranded wire twisted together and passed through the brass tubes. Numerous disc ceramic decoupling capacitors are used, and are soldered to the pcb with leads kept to a minimum length. The network RFC701 and R701 serves to linearize the gain over the range 1.5 to 30MHz; for single-band operation it is not necessary, and the extra gain on 1.8MHz is useful (less drive required).

The pa has been operating successfully for three years, and a number of different ferrites have been tried; all worked satisfactorily. Ideally they should have an initial permeability of 800, though devices as low as 150 have been tried with equal results. The original ferrites cost £9; a great saving can be made by using cheaper types. Slight changes in transformer size can easily be catered for by adjusting the pcb layout rather like a concertina.

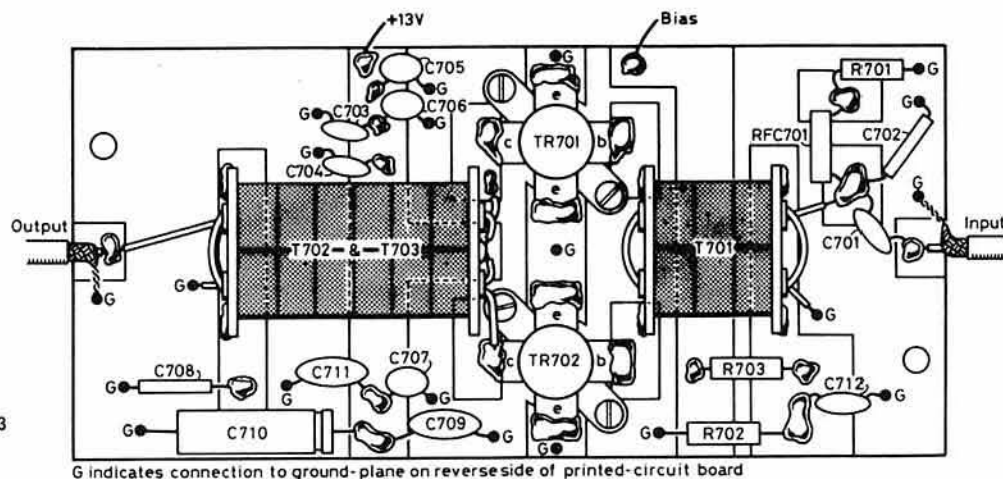
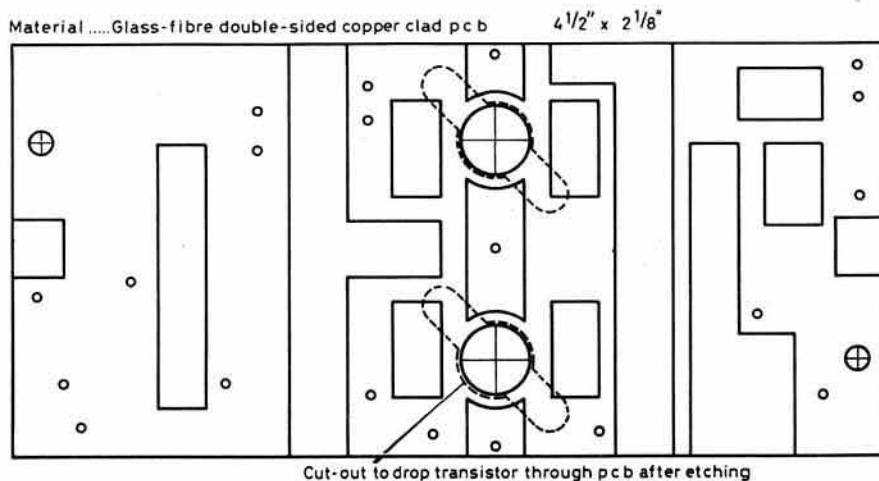
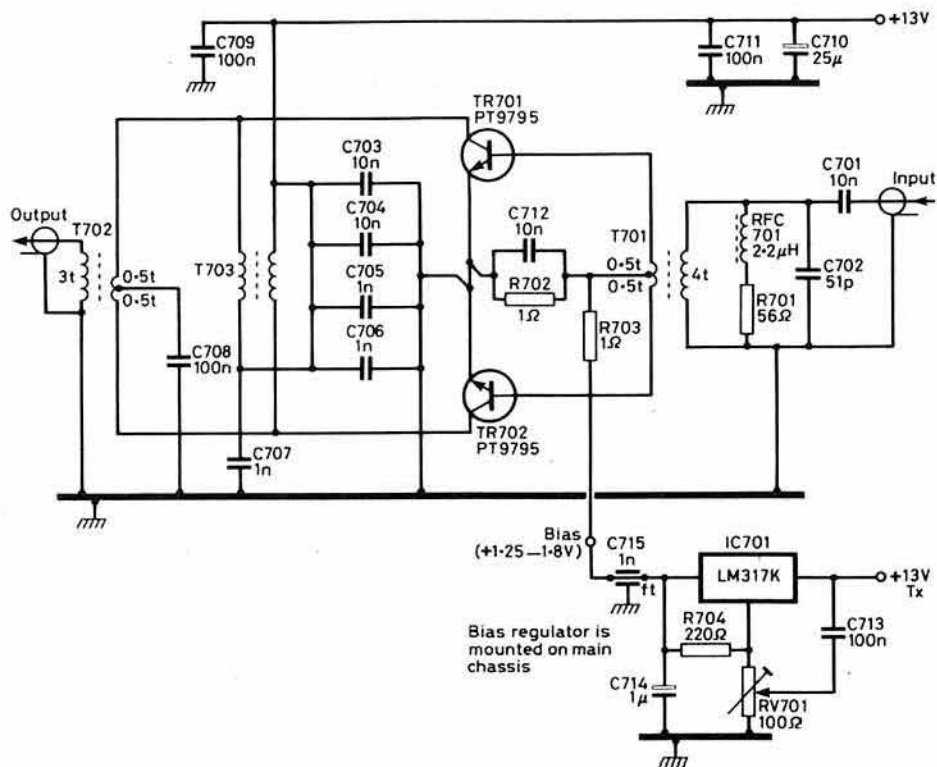
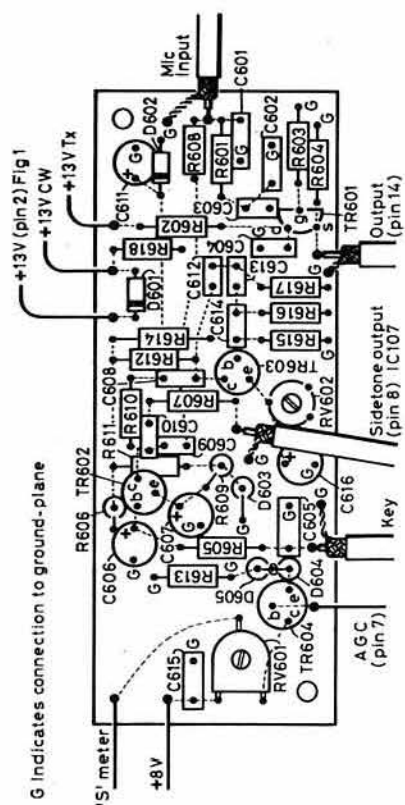
Construction is on a double-sided pcb with components mounted on the etched side. The transformers should be constructed first, and the main pcb etched after the transformers have been checked for size. Holes should be cut through the pcb to allow the transistors to pass through unimpeded so that they rest on their fins on the pcb. First solder all resistors and capacitors



Top view of the transceiver, including vfo

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†Published in Part 1 (*Rad Com* July 1985).



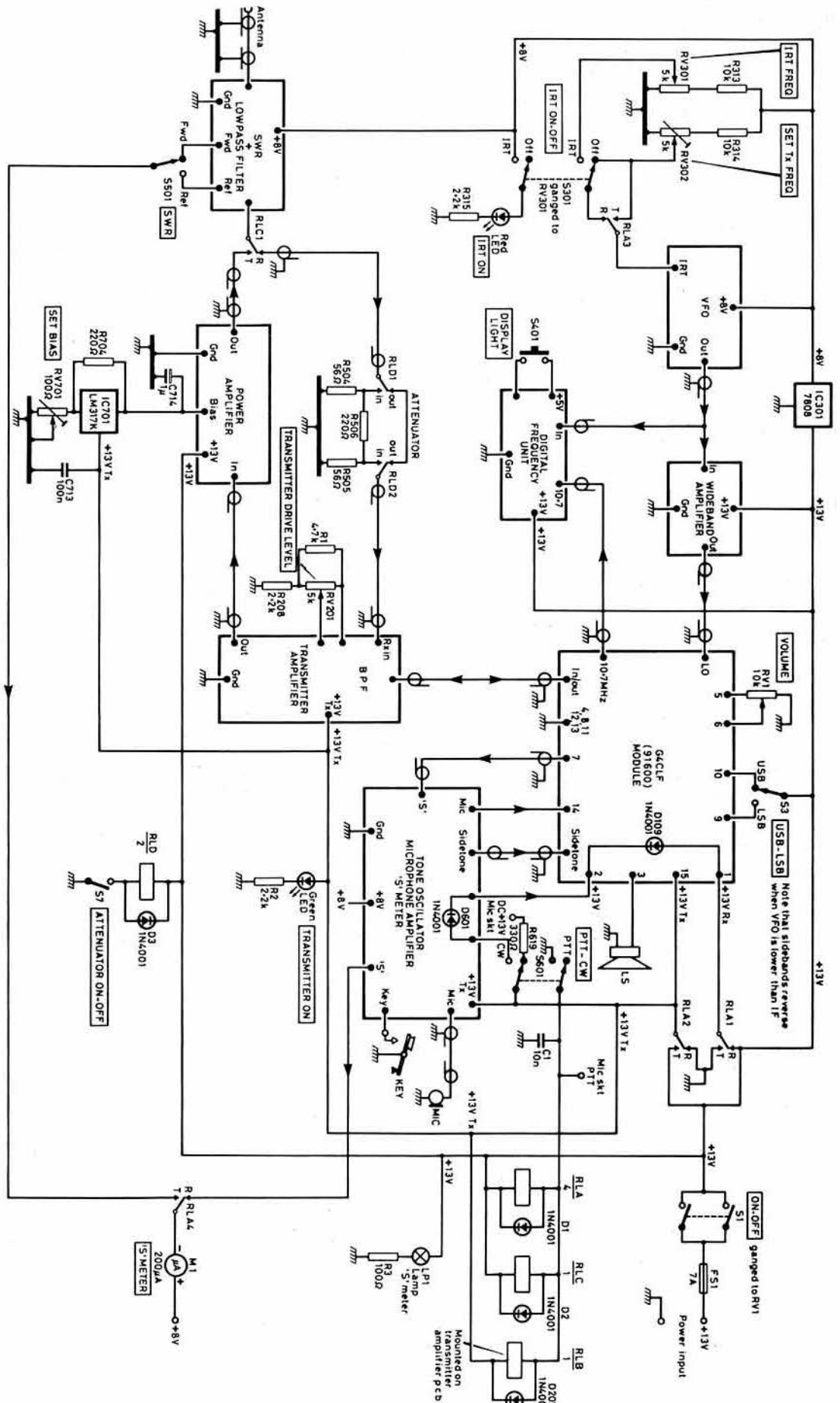


Fig 26. Chassis wiring diagram

to the pcb; earth contacts pass through the board and are soldered to the underside. Mount the pcb on the heatsink; a 16swg aluminium panel is used between the sink and the pcb, and 6BA countersunk screws are mounted in the aluminium and the pcb mounted with one nut between them, a 6BA nut having the same thickness as the transistor mounting flange. The transistors should be positioned and the heatsink and panel drilled to mount the transistors. Check that the fins are flush with the pcb, and screw down the transistors before attempting to solder them to the pcb. It is important that no mechanical stress is placed on the transistors. (Note: tin the underside of the fins before finally soldering the transistors in place.) Last of all, the transformers can be mounted onto the pcb. The LM317K regulator is mounted on the main chassis inside the pa compartment with the set bias potentiometer reachable from the outside.

When complete, the pa should be tested. Terminate with a 50Ω resistor and apply 13V dc; only a small standing current should flow. Apply bias (+1.25V to +1.8V) and the pa current should be variable up to 2A. Bias is set for 150mA with the transistors at operating temperature; this figure will vary considerably, but it has not proved necessary to provide thermal compensation. The circuit is crude but adequate. The pa will draw about 5.5A at maximum output with efficiency of around 50 per cent. The efficiency will drop rapidly as the power out is reduced.

Constructional details

It is not intended to give precise constructional details but rather to indicate techniques used. Fig 27 shows the layout of major components and overall dimensions. Fig 28 shows front and rear panel layouts. Buying a case is the easiest solution, but few come with the right shapes and sizes. All metalwork is made from sheet 16swg or 18swg aluminium, cut with a hacksaw and bent in a vice between hardwood bars. Beware "dural", which looks like aluminium until you try to bend it, it is much harder and cannot be bent satisfactorily by hand.

The main chassis is a 16swg aluminium plate with 0.5in bends at either side and at one end; the fourth side is bent to allow mounting of the controls and frequency counter. The side plates, also 16swg, hold the main chassis centrally and have 0.5in bends at either end to accommodate front and rear panels. Captive nuts are sunk into the sides at an early stage to facilitate mobile mounting and final case fitment. An 18swg panel is used to screen

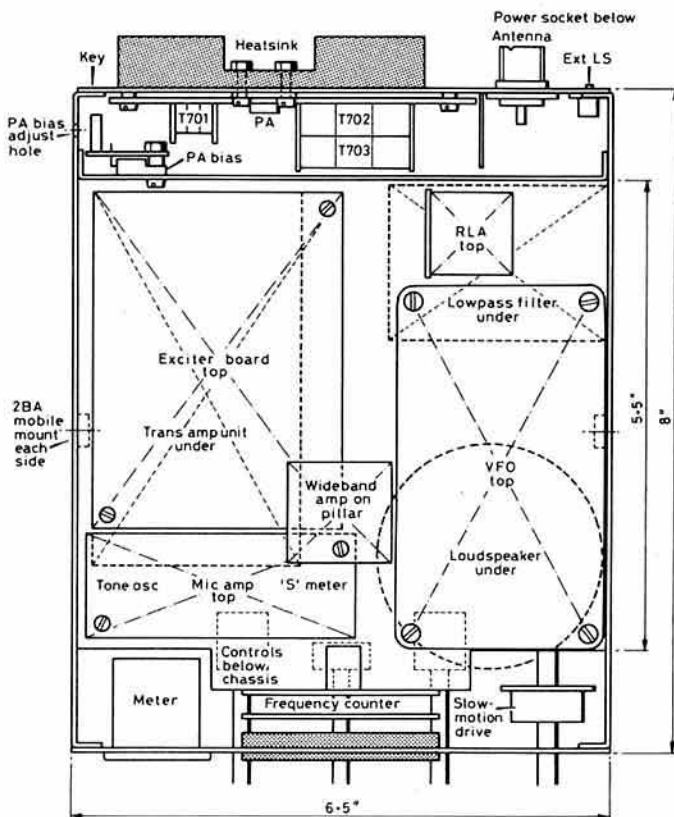


Fig 27. Chassis layout

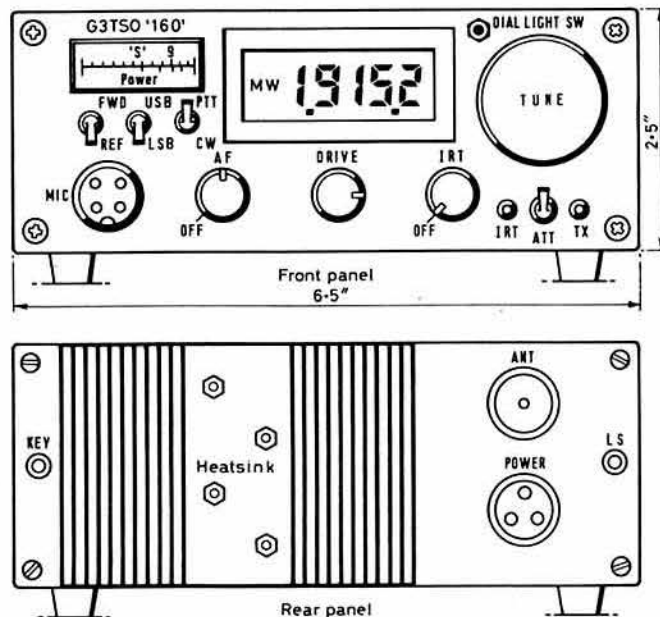
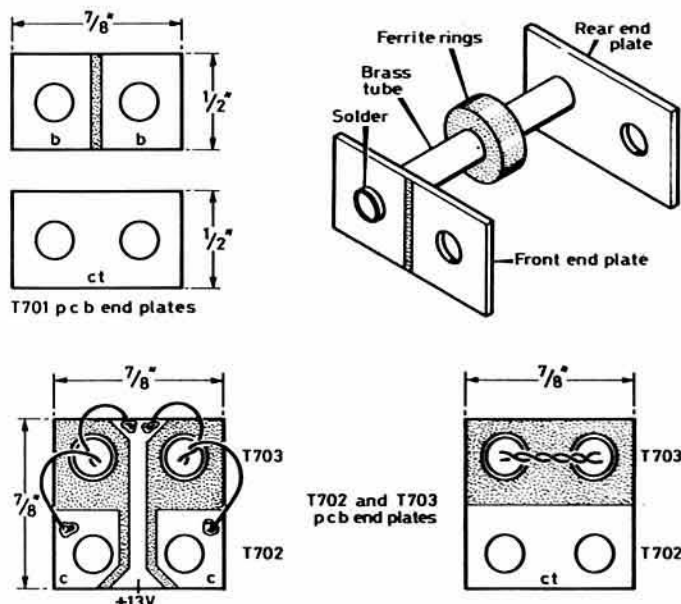


Fig 28. Front and rear panel layouts

the pa compartment from the rest of the unit. The diecast vfo box is mounted directly onto the chassis, while all pcbs are mounted using 6BA bolts, nuts and pillars. The rear panel is an integral part of the pa unit and mounts between the pa pcb and the heatsink.



	Primary	Secondary	Notes
T701	4 turns of 20swg enam or pvc covered wire	1/2 + 1/2 turn 2 x 4-8mm dia or 3/16" brass tube	2 endplates 7/8" x 1/2" 6 x CN20 C1-2 ferrite rings or 2 x Fairite 26-43006301
T702	1/2 + 1/2 turn 2 x 4-8mm dia or 3/16" brass tube	3 turns of 20swg enam or pvc covered wire	2 endplates 7/8" x 7/8" 12 x CN20 C1-2 ferrite rings or 6 x Fairite 26-43006301
T703	1 pair of twisted stranded pvc covered wires (to carry 3 Amps) 1 turn through brass tubes		Shares endplates with T702 12 x CN20 C1-2 or 6 x 26-43006301 on 2 brass tubes, mounted above T702. Brass tubes for support only

Fig 29. Construction details of T701, T702 and T703

Components list

MAIN BOARD				Components list			
R101, 102	4-7k Ω	C101, 102, 107,		RFC301	100 μ H	TR301	T1S88A or
R103, 106	560 Ω	114, 130, 131,		RFC302, 303	200 μ H	TR302	2N3819
R105, 115	47 Ω	139, 148, 149,		RFC304, 306	1mH	TR303	2N3819
R107, 108	100 Ω	152	1nF C	RFC305	2-2 μ H	TR304	2N2222
R109, 110	10k Ω	C103	6-8pF C	IC301	7808		BFY51
R111, R132	3-3k Ω	C105, 111, 116,		L301	24t, 26swg enam on former (ceramic or Alladin)		
R113	6-8k Ω	118, 121, 123,		T301	7t bifilar, 22swg on Amidon T37-6		
R112, 128	100k Ω	124, 141, 143,					
R118	5-6k Ω	156	100nF C				
R124	2-2k Ω	C153	220 μ F A or T				
R114, 130	22k Ω	C108, 109, 112,		R401	3-9k Ω	C401, 402	10nF C
R121, 123	27k Ω	120	10nF C	R402	1k	C403, 405, 406	100nF C
R116, 117, 119,	1k Ω	C110, 113	100pF C	R403	330 Ω	C404	150pF P or SM
120, 125		C115	10 μ F T	Counter	PC1M 177	C = ceramic. SM = mica.	
R122	56 Ω	C119	2-2nF C		(FC177) Cirkit	P = polystyrene.	
R104	220 Ω	C117, 125, 126,		L401	Toko	IC401	SL641 (surplus type)
R126	1M Ω	154, 157	100 μ F T		KANK3333R	IC402	78L05 Regulator
R127	47k Ω	C106, 127, 144,		ZD401	6-1V zener		
R129	1-5 Ω	147	47 μ F T				
R131	330 Ω	C129, 146, 150,					
IC101, 110	78L06 regulator	151	2-2 μ F T				
IC102, 103	SL1612	C136, 137	22pF Var				
IC104, 108	SL1640	C132, 133, 134,		R501, 502			
IC105	SL1621	135	39pF C	R503			
IC106	LF351	C128, 142	1 μ F T	RV501			
IC107	ULN2283	C140	4-7 μ F T				
IC109	SL6270	C145, 155	47nF C	D501, 502	OA79		
TR101	J310	C122	220nF C				
TR102, 103	BF256	C138	68pF C	C501	10pF airspaced	L504	
TR104	BF441	C104	4-7pF C		trimmer		
TR105	2N3904	C = ceramic. T = tantalum.		C502	250pF SM		
TR106	BC214	A = aluminium foil. Var = variable.		C503, 504	10nF C		
FB	3 $\frac{1}{2}$ t, FX 1115	T101	2t:6t 28swg enam—FX2249	C505, 508	1,200pF SM		
	(seven required)	T102	3t:6t 28swg enam—FX2249	C506, 507	2,500pF SM	RLC	SPCO (surplus Elliot type)
L101	33 μ H			C509, 510, 511	10nF C		
D101, 102, 103,	BA244	F101	10M-22D or 10M-02DS				
104, 105			(10-7MHz, 8-				
D106, 107	IN4148 or 1N914		pole 2-4 or				
D108	SBL1 or MD108 mixer	F102	2-2kHz				
D109	1N4001		10M-15A				
X101	10-6985MHz		(10-7MHz, 6kHz)				
X102	10-7015MHz	Note: some values differ from Cirkit 91600 kit					
BANDPASS FILTER AND TRANSMITTER AMPLIFIER				Components list			
L201, L202	13 μ H Toko	C201, 204	820pF P or SM	R601, 604	1k Ω	C601	220pF C
	215PN0839X	C202, 205	1500pF P or SM	R602	220 Ω	C602	470pF C
L203	380 μ H Toko	C203	15pF P or SM	R603	47k Ω	C603, 604, 605,	
	RW06A6408	C206, 209, 211	10nF C	R605, 606	12k Ω	609, 610, 612,	
		C207, 210, 213,		R607	5-6k Ω	613, 614, 615	10nF C
R201	1k Ω	214	100nF C	R608	33k Ω	C606	4-7 μ F A
R202	2-2k Ω	C208	47nF Cmono-lithic	R609	2-7k Ω	C607	100 μ F A
R203	150 Ω			R610	27k Ω	C608	1nF C
R204, 209	100 Ω	C212	22 μ F T	R611, 618	470 Ω	C611	47 μ F A
R205	470 Ω 0-5W	C = ceramic. SM = mica.		R612, 615, 616,	10k Ω	C616	1 μ F A
R206, 207	2-2 Ω	P = polystyrene. T = tantalum.		617		C = ceramic. A = aluminium foil.	
R208, 212	4-7k Ω	RLB	KUIT 1B spco (Cirkit)	R613	1-5k Ω	D601	IN4001
R210, 211	1-2 Ω	FB	3 $\frac{1}{2}$ t, FX1115 (2 req'd)	R614	56k Ω	D602	7-5V zener
RV201	5k pot			R619	330 Ω	D603	3-9V zener
IC201	SL610			RV601	470 Ω pot preset	D604, 605	1N914
TR201, 202	BFY51	T201	8t:8t + 8t FX2249	RV602	10k Ω pot preset		
D201	1N4001	T202	6t:8t + 8t FX2249	TR601	2N3819		
D202	1N4002			TR602, 603, 604	BC108		
ZD201	6-1V zener						
VFO, IRT AND BROADBAND AMPLIFIER				Components list			
R301	47k Ω	C301, 308, 309,		R701	56 Ω	C701, 703, 704,	
R302, 305	100k Ω	312, 314, 316,		R702, 703	1-0 Ω 1W	712	10nF C
R303, 306	100 Ω	317, 318, 319,		R704	220 Ω	C702	51pF SM
R304	68 Ω	320, 323, 325,		RV701	100 Ω preset	C705, 706, 707	1nF C
R307	330 Ω	327, 329	10nF C	TR701, 702	TRW PT9795	C708, 709, 711,	
R308	33k Ω	C302	5pF SM	IC701	LM317K regulator	713	100nF C
R309	6-8k Ω	C303 (see text)	140pF P			C710	25 μ F A
R310, 320	15 Ω	C304	6-8pF npo trimmer	RFC701	2-2 μ H	C714	1 μ T
R311, 318	3-3k Ω					C715	1nF feedthrough
R312	270 Ω	C305	30pF variable	Heatsink		C = ceramic. SM = mica.	
R313, 314	10k Ω	C306	10pF air-spaced	T701	3-75 by 2-5in flat-backed with 0-5in fins	A = aluminium foil. T = tantalum.	
R315	2-2k Ω	C310, 311	330pF P		Pri 4t, 20swg enam through secondary		
R316	680 Ω	C313	33pF P		Sec Two 4-8mm brass tubes		
R317	1k Ω	C315	100pF SM		Core—Six CN20 C1-2 ferrite toroids (TMP Electronics)		
R319	47 Ω	C307, 324, 328	100nF C		or two Fairite 26-43006301 ferrite toroids (Cirkit)		
RV301	5k pot + dp switch (S301)	C326	2200pF P		Pri Two 4-8mm brass tubes		
RV302	5k pot, preset	C321	220pF SM		Sec 3t, 20swg enam through primary		
D301	BB119 varicap	C322	390pF SM		Core—Twelve CN20 C1-2 or 6 x 26-43006301		
D302	1N914	C = ceramic. SM = mica.		RV1 Volume (RV301) IRT (RV201) Drive	10k Ω log with dp switch (S1, on-off)		
		P = polystyrene.		S3, 501, 601	5k Ω lin with dp switch (S301)		
				S401	5k Ω log (shunted with R1, 4-7k Ω resistor)		
				S7	Miniature dpdt switches		
					SP spring-loaded switch		
					SP switch		

RLA	Four-pole changeover relay with 0.5A contacts
LEDs	One red, one green
M1	200 μ A S-meter scale (Cirkit)
VFO drive	Jackson 6:1 epicyclic
LS	2in dia, 8 Ω , loudspeaker
Socket	PL259 antenna
Socket	Power three-pin Jap mic
FS1	Fuse, in-line holder 7A
JK1	Key jack, 3.5mm with switch
Ext ls	3.5mm with switch if required

R1	4.7kΩ	C1	10nF
R2	2.2kΩ		
R3	100Ω	D1, 2, 3	1N4001
SK1	Mic socket, four-pin Jap type Die-cast box for vfo		
Box LP1	12V Bulb fitted in S-meter		
G3TSO TRANSCEIVER			
Switch functions:			
S1	On/off switch dp ganged to volume control RV1		
S301	IRT on/off switch dp ganged to irt control RV30		
S3	USB/LSB selector		
S401	Dial backlight		
S501	FWD/REF selector		
S601	PTT/CW selector Note: PTT allows normal ptt operation. (CW activates cw osc and ptt line)		
S7	Attenuator switch (operates RLD)		

The case is finally made of two 16swg aluminium "U" sections requiring accurate measurement and bending for a neat appearance. Car touch-up spray paints and "Finigans Hamerite" paints give a reasonable finish, lettering can be added with "Letraset" or similar material.

Details of wideband transformer construction are shown in Fig 29; as long as the correct number of turns is used and they pass through suitable ferrites, they will work. Fairite 26-43006301 ferrite tubes from Cirkit will cost about £4; they are twice as long as the CN20 type available from GW3TMP Electronics but at similar unit cost represent a worthwhile saving as only half the number are required. If you use the Fairite tubes, T701 will be slightly shorter than the original, and care must be taken to ensure that it fits the pcb.

Setting up the transceiver

All units in this project were built and tested before fitting into the main chassis. A logical order for construction and alignment would be as follows: first, build and align the vfo unit and wideband amplifier; second, build and align the bandpass filter; and third, construct the main exciter/receiver board, which can be tested using the vfo and bpf. Next, complete the transmitter driver board and the lowpass filter; this will enable the project to be put on the air as a QRP transceiver. Construction of the pa can easily be left until last but if, as in the original, the pa forms an integral part of the main chassis construction, the metalwork will have to be completed with the chassis. Wiring of the main chassis was completed after all pcbs had been mounted in their respective places. No sophisticated test equipment was used at any stage of the alignment, only a dfm, a multimeter and a scope.

VFO alignment

The vfo should be tested initially out of its case, and for this purpose the pcb and tuning capacitor were bolted onto a spare piece of aluminium. A dfm capable of 100kHz resolution (or a receiver) is required. The irt circuitry need not be connected initially. Adjust the vfo for operation over the range 8.7 to 8.9MHz by adjustment of the tuning capacitor C305. It may be necessary to alter the values of C303 and L301. If the swing of C305 covers more than 200kHz, C303 will need to be increased a little or correspondingly reduced if C305 does not cover the entire band. Once working, the vfo can be mounted into its box for final alignment, this operation will move the frequency lower by about 100kHz. C306 will allow a small amount of adjustment of the vfo frequency once mounted in its

case. Fitting the lid to the die-cast box will cause a frequency shift and should be allowed for in the final adjustment. While a variable inductor would make alignment much simpler, it was felt that a slug core might cause more problems than it would solve. Adjustment of the turns on L301 and C306 eventually gave the desired coverage of 8.7-8.9MHz plus about 5kHz over at each end. This was the most difficult task in the transceiver alignment and can be made easier if the value of C306 is 30pF rather than 10pF.

Bandpass filter alignment

The alignment of the bandpass filter proved delightfully simple, and was done initially with the main transceiver board acting as a receiver. The object is to produce a fairly flat response across the entire band 1.8-2MHz. The filter can be used either way round, and in fact operates this way on transmit and receive. L201 was adjusted for maximum signal at 1,980kHz and then L202 adjusted for maximum signal at 1,830kHz. L203 was then adjusted at 1,900kHz for maximum signal. As all adjustments are interdependent, the procedure will need to be repeated several times. In practice after three goes (10min) no further improvement could be made and the receiver performance was flat across the whole band. Final alignment was checked when the transceiver was completed by checking the transmit output at either end of the band and in the centre. Ideally it should be fairly constant but, if not, adjustment of L201 at the higher frequency end of the band, followed by L202 at the lower frequency end of the band, and finally L203 in the centre of the band, with several repeat adjustments, will produce a fairly even response. In practice there is a variation of transmitter output of about 3dB across the band, but there is sufficient drive to obtain the full 30W output over the entire band.

Those constructors who have the facility to plot the filter response with an oscilloscope and wobulator can set up the filter in the ideal way, but I have no such facility and neither was it necessary.

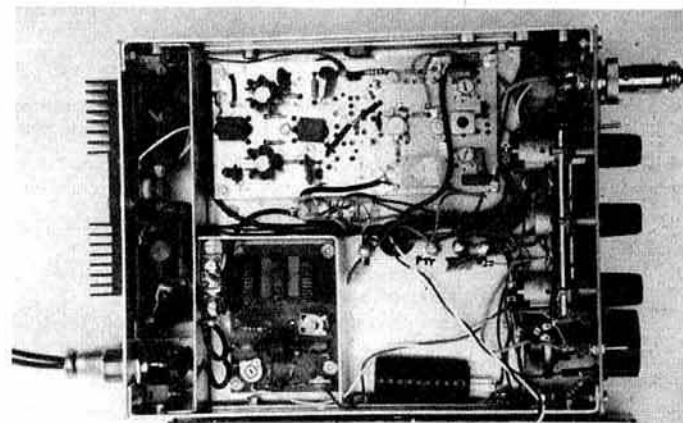
Main transceiver board alignment

Testing the transceiver module is relatively simple, the only alignment necessary is to adjust the two carrier oscillators to the correct frequency using a dfm. C131 and C132 should give a swing either side of the correct frequency. Capacitors C132, 133, 134 and 135 are 39pF for a double-sided pcb, but need to be increased to 47pF if a single-sided board is used. Initial checks with the screening not fitted could make any fault-finding easier.

The receiver section should be checked first: (a) apply +13V to the receive and oscillator terminals and earth the transmit +13V line; (b) apply 500mV rms oscillator injection to the SBL1 and an antenna via the bandpass filter, and then, with volume control and speaker connected, signals should be heard. Any fault-finding should be done logically and progressively until the fault is located.

Testing the transmitter should begin when the receive side of the board is working. Apply +13V, and a low impedance microphone to pin 12 and earth. By listening on a 1.8MHz ssb receiver it should be possible to hear a strong ssb signal emanating from the exciter. Try both sidebands and check for any carrier. There is no adjustment at all on the board and none should be necessary. Any excessive carrier leakage can usually be put down to an out-of-balance SL1640; only full spec ics should be used, not the cheap ones.

Once the basic receive and transmit functions have been checked, the screening can be carefully added and, once complete, a further operational check should be made. With no antenna connected to the receiver, the age line should be at 0V rising to +2V when an antenna is connected. This is the age threshold level and rises to approximately +4V with a strong signal. If the age voltage does not decay to zero on removal of the antenna, the problem is most likely due to oscillator leakage, as encountered on the unmodified board. With the screening described, this problem should not



Bottom view of the transceiver

occur. Oscillator injection should be checked at the input to the SL1640 ssb demodulator and should not exceed 200mV rms. Levels down to 100mV are acceptable. The injection can be reduced by lowering the value of R124 located in the source of the oscillator fets.

Transmitter amplifier driver and lowpass filter

There is no alignment of the transmitter amplifier and driver stages. The gain is controlled by varying the voltage of pin 7 on the SL610. The standing current of the driver stages should be checked and should not exceed a few milliamperes. Apply a tone to microphone input of the exciter and slowly increase the drive level; the driver collector current should increase to a maximum of 350mA and drop back on removal of the tone. The output must be terminated with a 50Ω carbon resistor for this test. The signal voltage at pin 3 of the SL610 should be about 2V rms at maximum drive, and the output from the BFY51 drivers will be in the region of 1 to 1.5W.

No alignment of the lowpass filter is required, but its operation should be checked. When placed in the antenna lead of a receiver it should not attenuate signals below 2MHz but should start to attenuate signals above 2MHz. If the values and constructional details are adhered to, few problems should be encountered, but if core tolerances are causing the filter to cut off too low in frequency, try removing one turn from each inductor.

An SWR bridge is included on the lpf board and can be set up with any 1.8MHz transmitter. Terminate the bridge with a 50Ω non-inductive load, set RV1 to maximum sensitivity and apply sufficient drive to give FSD in the FWD position. Change to the REF reading and zero the meter with C501. This balances the bridge. RV501 can be adjusted for 30W fsw or whatever suits the constructor. Note: an 8V supply is necessary in this particular circuit.

The power amplifier

The power amplifier requires no alignment, setting up is simply a matter of bias adjustment and checking the unit for stability. With no bias applied, standing current should be a few milliamperes. The bias supply should be checked and be variable between +1.25V and +1.8V. Terminate the pa with a 30W 50Ω dummy load: apply bias and monitor the collector current, which should be variable from a few milliamperes up to 2A, and set to 150mA initially; apply drive using a single-tone source and increase steadily while monitoring the pa collector current and rf output. It should be possible to drive the pa up to 30W output with a collector current of 5.5A. Any form of instability should be traced immediately; however, none has been encountered on the prototype. With the pa now slightly warm, reset the standing current to 150mA.

The transmitter should be checked for any distortion or flat-topping, and drive levels adjusted accordingly. The drive control enables power to be varied from 0 to 30W with a little more in reserve; further adjustments can be made by alterations to the driver stage emitter bias resistors and the fixed resistors adjacent to the drive pot.

Audio tone oscillator

The audio tone oscillator is adjusted to give a pure sine wave output. Adjustment of RV602 (Fig 20) changes the oscillator bias from a point where there is no oscillation to one where there is considerable output. It is necessary to set RV602 at a point where output is the minimum consistent with good oscillator starting. An oscilloscope makes adjustment easy.

S-meter alignment

I used a commercial "calibrated" S-meter, so the chances of its calibration meaning anything are quite small, but it looks nice. The meter was adjusted by RV601 (Fig 20) for full scale deflection with the strongest signal I could find, namely the main transmitter on full output. While somewhat crude, the resulting meter readings are more meaningful than the Yaesu S-meter on the main rig.

Conclusion

The transceiver described has been operating successfully for over two years with the rf section well into its third year of use, reports have been good and the receiver performance has been excellent, comparing very favourably with the station "grey box".

Most of the G4CLF modifications were presented in a completed form by G8MKL who has done an excellent job of ironing out many of the problems encountered on the Cirket 91600 module. Considerable help was received from G4ENA who has built a similar transceiver for 1.8MHz.

Little test equipment has been available or used, alignment is minimal and well within the capabilities of any amateur with a little constructional experience; it is not, however, a beginner's project.

By changing the vfo frequency, the bpf and lpf frequencies, operation on any of the hf amateur bands would be possible. Other changes would be to change the driver transistors to 2N4427 types above 7MHz, and a prescaler would be required for the dfm above 4MHz, with resolution dropping from 100Hz to 1kHz. The Cirket 91600 module referred to in the text has been used as a convenient bag of components; it cannot, however, be recommended in its unmodified form but, with a little work as described, forms the basis of an excellent homebrew transceiver. The cost of such a project is difficult to assess, but is most likely in the region of £150. There are, however, many G4CLF and G3ZVC boards in existence, possibly as yet unused on the amateur bands, just waiting to be put to good use.

The majority of components were obtained from Ambit International (now part of Cirket Holdings) while other suppliers are: GW3TMP Electronics, Unit 27, Pinfold Works, Pinfold Lane, Buckley, Clwyd; J Birkett, 25 The Strait, Lincoln; and agents for TRW rf transistors are MCP Electronics Ltd, Alpertown, Wembley, Middx HA0 4PE. Since this article was written, Plessey have discontinued the SL1621, but the SL621 may be substituted at slightly extra cost. Cirket have discontinued the 91600 kit but still sell the components with the exception of the SL621. Plessey ics can be obtained from Celdis-SDS, 37-39 Loverock Road, Reading, Berks

COMPUTER-AIDED DESIGN OF A MULTIBAND DIPOLE

(Continued from page 617)

change at 60° may not have been due entirely to the smaller included angle though, because the ends of the antenna were now closer to the ground than when θ was 90° and the additional capacitance so caused would also lower the operating frequency of the antenna.

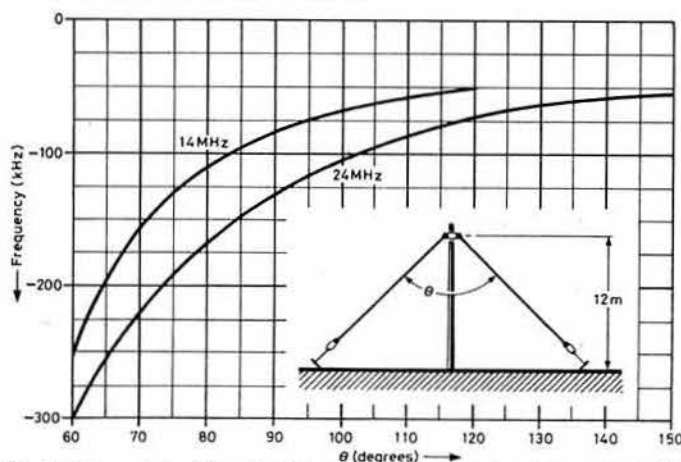


Fig 11. The effect of inverted-V angle on the operating frequency of the antenna

Conclusions

A simple single-wire dipole antenna, without traps, capable of matching very effectively to modern solidstate transmitters on five of the hf amateur bands has been described. The design was based on the very-well-known G5RV principle and implemented by a simple computer program written in Basic. Numerous versions of the antenna, evolved from this cad (computer-aided-design) technique, were tested and compared with others which have appeared in the amateur literature over the years.

Acknowledgement

The work described here would not have been possible without the untiring efforts and sound engineering of Paul Diepenbroek, Geoff Love and Mark Whalley.

References

- [1] "An effective multiband aerial of simple construction," L Varney, G5RV. *RSGB Bulletin* July 1958, pp19-20.
- [2] "The G5RV aerial—some notes on theory and operation," L Varney, G5RV. *RSGB Bulletin* November 1966, pp705-7.
- [3] "Compact multiband antenna without traps," T Nicholson, W5ANB. *QST* November 1981, pp26-7.
- [4] "Technical Topics," Pat Hawker, G3VA. *Rad Com* May 1982, pp412-3.
- [5] *Antennas and waves—A modern approach*, R W P King and C W Harrison. The MIT Press, 1969, Appendix 4, pp753-7.

Technical Topics

by Pat Hawker, G3VA

THERE IS a widespread, though in my opinion a mistaken, belief that the rate of innovation in radio and electronics is growing faster and faster, resulting from the often-quoted fact that there are currently said to be more professional research scientists and engineers than the aggregated total of past history. In such circumstances, it might be thought, the role of amateur radio in generating practical innovation and implementation and as a training ground for both the amateur hobbyist and for young "professionals" must be coming to an end.

Amateurs and the experimental tradition

There are several different approaches to bringing new ideas into radio: the purely theoretical and mathematical, as exemplified by Clerk-Maxwell who predicted the existence of radio waves well over 100 years ago; investigation motivated by purely scientific curiosity, as exemplified by the work of Heinrich Hertz, the centenary of whose pioneering work in demonstrating the existence of radio waves is fast approaching; practical commercial development by those who perceive a need or first recognize the potential value of new discoveries, as exemplified by Marconi and his team of engineers, who may not have "invented" radio communication but who successfully pioneered it.

History shows us that no matter how brilliant the concept, no matter how painstaking the mathematical analysis, in the end what counts is the ability to take some pieces of wire and make things work. The illustrious first President of the Wireless Society of London (now RSGB), A A Campbell-Swinton, FRS, 2HK, was the very first man to conceive and describe, in the early years of this century, a fully-electronic system of television, the basis of all present-day tv. Unfortunately, materials research was still at an elementary stage—and he was never able to make his system actually produce pictures, no matter how crude. The result is that his historic contribution to television is recognized by relatively few people, and many believe that either Baird or Jenkins "invented" television in 1923–5.

Campbell-Swinton was only one of many notable pioneers who have combined "professional" engineering with an interest in experimental amateur radio. The great Howard Armstrong, responsible for the regenerative detector, the practical superhet receiver, super-regeneration and wide-deviation frequency modulation, retained a close connection with the hobby throughout his life; he was deeply involved with the successful transatlantic tests of 1921, while the very first transmissions of his fm system were made on 112MHz (the old 2.5m band) by his friend Randy Runyon, W2AG, of Yonkers, New York. For several months W2AG put out the *only* frequency-modulated transmissions anywhere in the world!

Happily still with us is Dr John Kraus, W8JK, recently awarded the prestigious Edison Medal of the IEEE. In 1937, W8JK, drawing on the newly-published work of Dr George Brown of RCA, designed, put-up, tested and then described the first *close-spaced* bi-directional "flat-top" rotary 14MHz antenna array, and so created the whole new family of driven-element "8JK" antennas, shortly in advance of the first close-spaced unidirectional (Yagi) array built by Walter Van Roberts, W2CWO, of RCA. Less well known among amateurs is that W8JK was later responsible for the introduction of folded and multiwire dipoles; for the corner reflector; for the helical antenna (inspired by the helix of a travelling-wave tube); and for the massive radiotelescopes of Ohio State University, including the famous "Big Ear" array. In the UK, the late Sir Martin Ryle, G3CY, innovated the use of aperture synthesis for radiotelescopes and made many other notable contributions to radioastronomy.

The coming of radar

Recently I had the pleasure of attending several of the sessions of a three-day IEE seminar to mark the 50th anniversary of the development in the UK of radar (formerly "RDF" and "radiolocation") by the team led by (Sir) Robert Watson-Watt. This seminar, attended by many of the surviving pre-1945 pioneers, brought home two important features of this work.

First, the remarkable way in which engineers in many different countries independently and secretly developed basically similar forms of radar during the 'thirties. It is clear that the German radar "hardware" in 1939 was at a more advanced stage than the British, but we had the advantage that more effective operational procedures had been worked out by better

co-operation between the scientists and the RAF. Firm evidence was also presented showing similar "invention" and rapid development of radar in the USA, France, Holland, Japan, Italy and the USSR. The French actually fitted and publicly described a crude collision radar on the passenger-liner *Normandie* in the mid 'thirties.

The most striking feature of all this work, certainly the work in the UK, is the sheer speed at which it was carried out when compared to major R&D projects today. Watson-Watt with A Wilkins, for example, carried out the first feasibility experiment within a matter of days of his first putting forward the possibility of using reflections from aircraft. They simply used the 6MHz transmissions from BBC Daventry; this was February 1935. Again, within a matter of days, he had submitted his report and been authorized to go ahead. He had an experimental installation at Orfordness working by July of that year. Originally it was all hf radar, 6MHz being considered the optimum frequency had it been free of interference; then the idea was to use 12MHz, but finally the original Chain Home (CH) worked on 24MHz, and many of the ideas soon also influenced hf communications.

The single most important UK contribution to radar was the cavity magnetron. This opened the way to 10cm radar. It was developed in a matter of weeks by Randall and Boot at Birmingham University, and first powered up in February 1940. It is often forgotten that this was only a crude laboratory model working directly on a vacuum pump. The important work of getting such a device into production, and in doing so incorporating valuable contributions of his own, and also those of his French friend Dr Henri Gutton, fell to Eric Megaw, G6MU, of the GEC Research Laboratories, Wembley. G6MU had been actively interested in vhf, uhf and microwaves throughout the 'thirties, both as an amateur and as a professional. His "Some experiments on 30,000kHz and above" appeared in the *T&R Bulletin* as early as April 1929. G6MU ranks as one of the major contributors to microwave vhf scatter technology.

I was also interested to learn that it was at Orfordness that it was noted that the "transposition blocks", so commonly used in those days for open-wire feeders (suitable blocks were marketed by Eddystone Radio and others), added nothing to the actual performance of open-wire transmission lines!

Our hobby can be extremely proud of its long "experimental tradition" and the training it provides in "making something actually work before somebody else beats you to it".

Remember that every idea, every circuit, every antenna, every component in modern radio technology had to be conceived and tested by somebody. Many who founded the science of radio communication were closely associated with the early days of experimental amateur radio.

Longer life for nicads

A topic that has turned up many times over the past decade or so is the question of premature failure of sealed nickel cadmium cells and batteries, and a number of experimental cures have already been suggested in *TT*. It is commonly claimed by the battery manufacturers that nicad units will withstand some 1,000 charge/discharge cycles, but many users experience problems long before that number of cycles have been completed. Yet basically the nicad cell, treated properly, is a very reliable and cost-effective device.

Premature failure can often be prevented, or at least significantly delayed, if care is taken during charging and use; the experience of readers has also shown that it is sometimes possible to rejuvenate apparently "dead" cells—a worthwhile process, since nicad batteries are fairly expensive items.

A very detailed two-part article by Rod Cooper ("Avoiding failure of sealed nickel-cadmium cells", *Electronics & Wireless World* May 1985, pp61–3, and June 1985, pp60–3) describes a number of the most common failure modes, suggests ways in which these can be avoided or minimized, and provides hints on experimental cures.

He stresses that water (H₂O) is an essential part of the chemical process and that loss of even small amounts from the electrolyte will result in a large reduction in the capacity of a cell. Loss of water can occur due to "reverse charging" of one or more cells in a battery, or from overcharging.

Loss of water due to reverse charging is a common failure mode. The

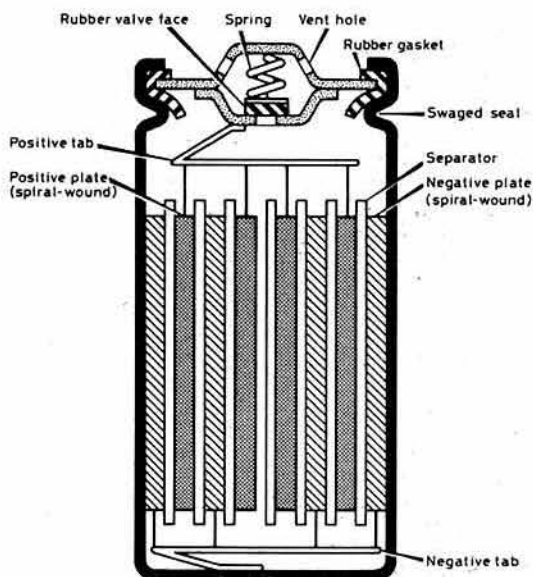


Fig 1. Construction of a typical sealed nicad cell (E&WW June 1985)

reasons why reverse charging occurs in deeply-discharged batteries has been previously described in *TT*. Basically it is because no battery consists of cells of exactly equal capacity, so that some cells are exhausted before the others—which promptly begin to reverse charge the exhausted cell(s), Fig 2(a), progressively bringing about further inequalities in capacity. Some users attempt to avoid this by using low-voltage sensors, cutting out the battery when the total voltage drops to around an average of 1V/cell. Rod Cooper suggests that this precaution is useful but of only limited value, since such sensors, applied across a battery, cannot distinguish between, say, six healthy cells at 1.25V, plus one cell being reverse charged at -0.4V, and alternatively seven cells at 1V. He considers, however, that the problem can be reduced by connecting a reverse-biased diode (preferably a Schottky diode) across each cell (where this is physically possible): Fig 2 (b). This precaution is more effective for larger cells that are charged at around 0.5A.

A better solution, he suggests, is to avoid using nicad batteries but instead to use a single (higher capacity) cell in conjunction with a small dc-dc converter such as the one using the Texas Instruments TL496 switching regulator ic shown in Fig 2(c). This will step up the 1.25V to about 7V at 40mA. It would, unfortunately, be rather difficult to use such a small dc/dc converter with the average handheld transceiver in view of the

considerably greater load drawn during "transmit", but nevertheless the idea seems worth considering for many applications.

Loss of water due to incorrect charging, including lengthy overcharging even at the standard C/10 rate, occurs quite frequently due to the build-up of oxygen pressure and its escape via the safety vent. Rapid charging, at rates above C/10, is not advisable except with nicad cells specifically designed for such treatment. Rod Cooper describes a successful technique for introducing small quantities of distilled water, using a syringe, during several successive charging cycles afterwards resealing the small hole drilled to take the syringe: I recall a similar technique being described by David Foster, G3KQR, in *TT* (June/July 1980, p636), for cells showing a loss of weight.

A different failure mode can be induced by low charging rates extending over long periods: the so-called "crystal deformation" of the narrowly-spaced plates resulting in internal short-circuiting of the cell. Although not mentioned by Rod Cooper, a similar effect can arise from small "whiskers", and in this case the short-circuit can sometimes be removed by discharging a large-value capacitor through the affected cell. Rejuvenation of a cell in which the plates have actually buckled seems more problematic; the best way of avoiding this condition is to charge at C/10 using a sensor to detect and curtail overcharging. I must admit that it is still common practice to leave cells charging at C/10 for hours without worrying whether or not they are fully charged.

Electrolytic creepage through the seals, giving rise to a furry white deposit that is highly corrosive, is another problem and may account for the so-called "black death" syndrome. The deposit is highly corrosive and can cause havoc if it spreads to nearby circuit boards etc. No effective way of combatting this problem seems to exist, although Rod Cooper observes that some makes of cell appear to be more prone than others: he has found that nylon-topped cells made by Saft appear to be free of this trouble, but believes that it is better to throw away a cell suffering from electrolytic creepage rather than to risk corrosion damage to surrounding equipment.

Corrosion problems can also affect the outer steel case whether or not assisted by electrolyte creepage particularly in damp atmospheres; he suggests it is sometimes better to remove the outer plastics coating which traps moisture, if necessary using adhesive tape to provide electrical insulation. It is also advisable to keep dissimilar metals, such as copper and zinc, away from the steel casing. Zinc, for instance, can rapidly cause pin holes if left in contact with the steel casing.

The diagnosis of failure modes can be complicated by the fact that more than one of the above modes may be involved. Rod Cooper provides a short but useful list of "do's and don'ts":

Recharging. Don't recharge cells connected in batteries if at all possible, preferably recharge cells separately. Avoid temperatures above 50°C and below 5°C. Don't persistently overcharge cells. Recharge standard cells at C/10.

Discharging. Preferably, don't use cells connected in batteries. Where batteries are essential, use protection diodes or low-voltage cut-out.

General. Avoid encapsulated batteries such as substitutes for PP9 batteries. Don't replace dead cells in a battery with brand new ones; do not add partly-used cells to a new battery.

One should emphasise that, with care and a good-quality charger, nicad cells can provide excellent, cost-effective, trouble-free service and last for from 500 to 2,000 charging cycles.

Another look at fishing rods

Recent items on the use of long glass-fibre fishing rod blanks as antenna supports (*TT* March and June) have brought in several informative comments. For example, Pat Painting, G3OUC—an advocate of homebrew station equipment—writes:

"I have used a 22ft hollow glass-fibre roach pole for 15 years, loaded inductively for either 3.5 or 1.8MHz, and mounted without guy lines in the top of a birch tree in my garden to a height of 60ft: Fig 3.

"With a loading coil of 208 turns of 14/36 plastic (pvc) covered wire on the handle end of the rod, the antenna is resonant on about 1,930kHz, and by using an atu the whole of the UK 1.8MHz band can be covered. In particular, the winter season 1984-5 gave many excellent contacts with stations all over Europe and the USSR using 25W p.e.p. ssb.

"Roach poles come in various lengths, the most popular being about 22ft long, the collapsible, hollow, glass-fibre rods weighing a total of about 2lb. These rods are extremely strong, telescopic in form, and have no fishing line 'runners', the line being simply tied to the end of the rod.

"Currently, the cost of a roach pole is about £15-£20. One maker is the Shakespeare company, but any fishing tackle stockist should be able to help, provided that you make it clear that it is a roach pole that you require.

"G3LBA is correct in his assessment of the great strength of these rods; mine has suffered no damage during many gales despite its exposed

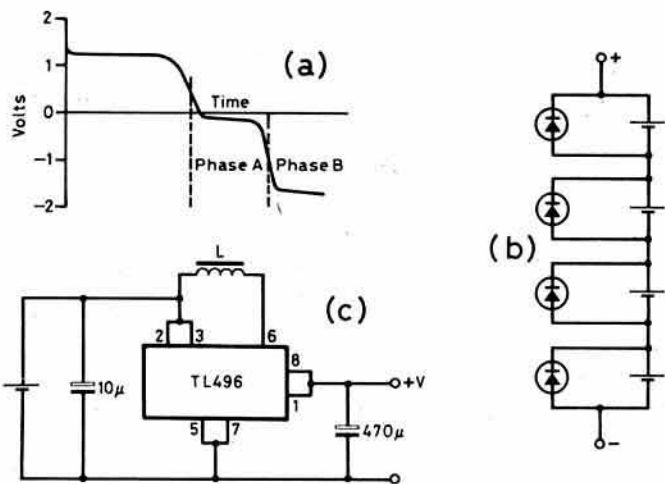


Fig 2. (a) Discharge curve of a nicad cell of reduced capacity when connected in a battery of cells and thus extending into the reverse-charging mode. Electrolyte decomposition occurs during both Phase A and Phase B periods, leading to further permanent reduction of the capacity of the cell. (b) Reverse-charging damage can be reduced to some degree when Schottky diodes are connected across individual cells. (c) A better solution is to use a single cell with a dc-dc converter. This arrangement can step up 1.25V to about 7V at 40mA. L should have a value of about 40-50 µH and very low dc resistance of less than 0.15Ω (wind on RM5 or RM6 core) for operation at about 10kHz (E&WW May 1985)

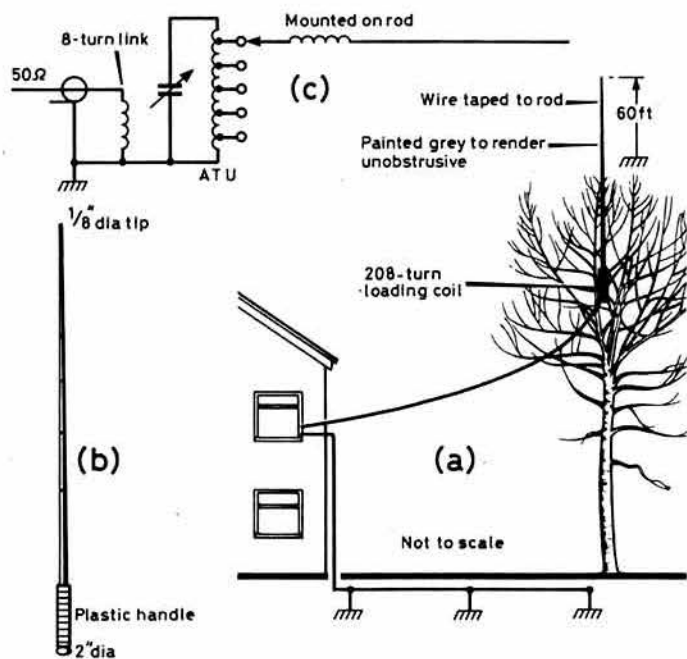


Fig 3. Use of collapsible hollow glass-fibre roach pole as support for 1-8/3-5MHz antenna. The 22ft rod breaks down to about 4ft with self-locking (interference-fit) sections of total weight about 2lb. Roach poles are not fitted with runners or reel fixtures and cost about £20. One firm making them is the Shakespeare Fishing Tackle Company. (c) Matching system used by G3OUC

position; it is advisable, however, not to make the structure 'top heavy' by attempting too much top capacitance loading. The performance of my antenna has attracted many enquiries and resulted in much letter writing!"

Dave Burley, G4WIZ, however, is less confident at the suggestion that even stronger (but much more expensive) support could be provided by using carbon-fibre fishing rods, with a wire running up the centre. It needs to be taken into account, he suggests, that carbon is a conductive material (though not a very good one) so that one might end up with a screened antenna or an untermminated length of lossy "coaxial cable"!

By coincidence, G4WIZ had written an article on "carbon antennas" for the May 1985 issue of the Basingstoke ARC newsletter in which he had warned against using carbon materials as antenna elements in view of the appreciably higher ohmic losses involved. While this would be less apparent when a wire is run up outside a carbon-fibre element, this could still prove a "lossy" form of support. Such considerations would probably not impair the performance when a carbon-fibre rod is used as a support for a G6XN-type of array (*TT* March) though his array used glass-fibre supports. But, as G4WIZ points out, the electrical characteristics need to be taken into account before spending a lot of money to obtain the advantage of extra mechanical strength. The less-costly glass-fibre rods, such as G3OUC's collapsible roach poles, should suffice for most applications, even when modest top capacitance loading is used, as in G3LBA/PA3ACQ's installation.

Opto-isolator current limiter

Lionel Sear, G3PPT, in the "Circuit Ideas" column of *Electronics & Wireless World* July 1984, p51, showed how an opto-isolator device can be used in conjunction with a 317-based variable voltage power supply to provide current limiting for such applications as the protection of rf power transistors during the development of solidstate power amplifiers etc.

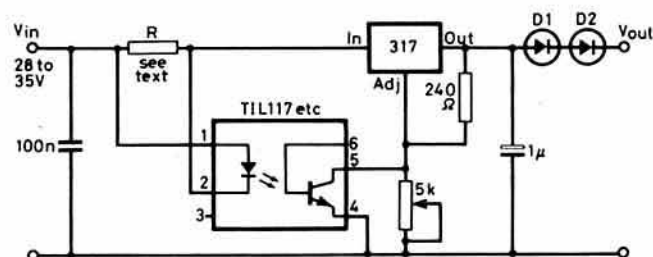


Fig 4. G3PPT's opto-isolator current limiting system on a 317 ic regulator variable voltage psu (E&WW July 1984)

Fig 4 shows his arrangement. When the voltage across R exceeds about 1V, the isolator photodiode begins to light, thus turning on the isolator phototransistor and so reducing the control voltage applied to the ic regulator, normally governed by the 5k Ω potentiometer. Two silicon diodes, D1, D2, rated to carry more than the maximum output current, keep the regulator output voltage 1.5V above the control voltage in order to limit maximum output current and so protect the psu should the load become short-circuited. The value and rating of R are chosen to suit the required current limit by developing the 1V potential at the limiting current value.

Active add-on cw filter

While personally I must admit to a bias towards passive rather than active af filters for cw reception, and an ingrained belief that narrowband filters are better placed before rather than after the signal demodulator, there is no doubt that a simple filter based on a couple of low-cost op-amps can be very useful for those attempting to receive cw through an ssb, fm or even a 600Hz cw filter. Tom Hall, GM3HBT writes:

"I think it is a pity that the major manufacturers of amateur transceivers often do not incorporate what to me is an indispensable aid to comfortable reception of cw—a simple audio filter. The effect on the overall price would be negligible, but the improvement even with such good rigs (in my experience) as the TS520S, TS530S, FT77 and my present delight, the Corsair, is quite remarkable.

"Over the years to each of these rigs (and also receivers R1000 and FRG7700) I have added a little two-stage op-amp (741) active filter, always at the same point in the circuit. This is at the 'top' or input of the audio gain control. I have never failed to find an unused front panel switch or button to switch the filter off and on (eg an unused CAL button).

"CW reception using the filter—audio bandwidth around 150Hz—in conjunction with the usual narrow i.f. filter (500–600Hz) improves the subjective clarity of cw signals by a useful factor; if the components in each stage of the filter are closely matched it even provides a slight gain at the centre frequency. (Often a useful feature, since overall gain of many hf transceivers is insufficient to allow one to take full advantage of the lower noise floor resulting from the narrow noise bandwidth—G3VA.)

The use of the filter on receivers lacking a narrow i.f. filter also gives excellent results, the only limitation being the reduction of the wanted signal caused by other strong signals in the wide i.f. passband, which although unheard by the listener through the filter, may cause the agc to depress the wanted signal. (One reason why some of us regret the loss of the former ability to switch off the agc when receiving cw on older-style receivers—G3VA.)

"No claim is made for originality in the standard op-amp filter circuit design (Fig 5) but the following notes should prove useful to anyone

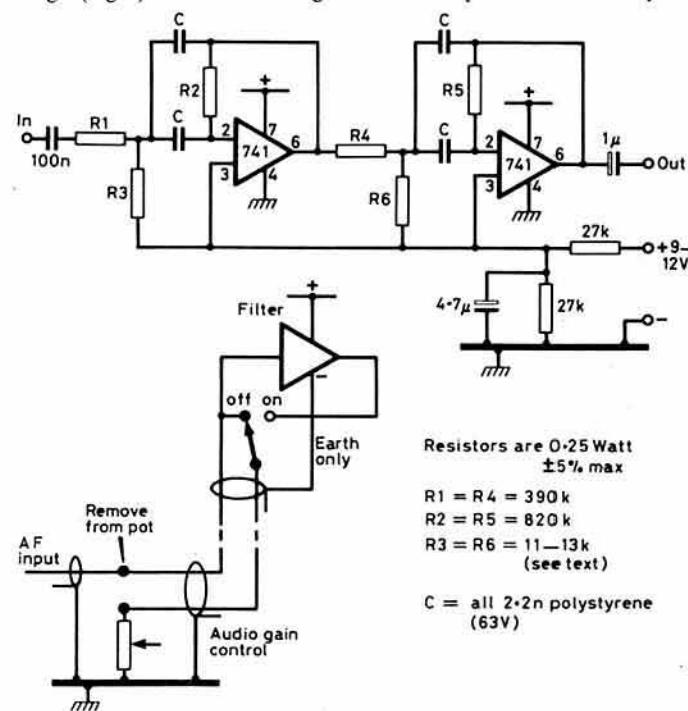


Fig 5. Active op-amp cw, filter recommended by GM3HBT as an add-on unit suitable for many hf transceivers etc

building this useful and simple unit. I attempt to match the values in each stage as closely as possible, normally around one per cent, although even unselected five per cent tolerance components give good results. The centre frequency can be calculated from:

$$f_0 = \frac{1}{2\pi} \sqrt{\frac{R_1 + R_3}{R_1 \times R_2 \times R_3}}$$

"I juggle with the value of R_3/R_6 to make the centre frequency coincide with the specific sidetone frequency of the rig involved. The circuit Q is low enough (around 4) not to cause any sign of ringing.

"The whole unit can be built on a 'postage stamp' of Veroboard, even smaller with a 747 op-amp, and is 'stuck' anywhere handy inside the rig (except near a mains transformer) using the ubiquitous 'Sticky Fixers' adhesive, and connected with miniature screened audio cable. I use this adhesive for all small modules as it provides the obvious advantage that should the unit ever be removed for resale of the rig etc, this can be done without leaving any trace, and the original connections made to the audio gain-control.

"To prevent hum loops, I always use the earth point of the gain control, via the cable screen, as the only earthing point for the filter.

"CW acquaintances are always most impressed by the performance of this compact filter, and I have fitted quite a few to other peoples' rigs—well worth about £1.50 for components and a couple of hours of enjoyable work!"

The Powerbreaker rccb and those fuses

The May 77 notes on the pros and cons of rccb safety-protection devices included a critical comment from G3XEN reporting that when attempting to test a 30mA Powerbreaker rccb, as marketed by RS Components Ltd, by applying a short-circuit to earth, he was surprised that the device did not trip but instead the 13A mains fuses blew.

John Power, G8LXG, applications engineer with RS Components, was dismayed to read G3XEN's comments as he feels that they show a common misconception of the true role of rccb/elcb devices. G8LXG emphasizes that an rccb is *not* an overload-protection device and should never be thought of as a substitute for conventional fuses or miniature contact breakers. A mains short-circuit should blow a heavy current fuse in much less time than the 15 to 30ms trip-time of an rccb. In fact the situation reported by G3XEN would apply generally and is not peculiar to the Powerbreaker. G8LXG writes:

"A fuse blows accordingly to a heating effect which is characterized by $I^2t = \text{a constant}$. At, say, 100A a healthy mains fuse will therefore blow in a considerably shorter time than the 15–30ms needed to trip an rccb. It is therefore not surprising that G3XEN's fuses blew before the breaker tripped. We would be seriously concerned if they had not!

"We have received many enquiries about this effect, and we have had to remind users that an elcb/rcb can never, under any circumstances, be considered to provide overload protection but is to protect individuals against dangerous electric shocks. A phase (live) to earth short-circuit, although representing a large overload which will blow a fuse, does not simulate the conditions under which the rccb is intended to operate, and may even weld the contacts together.

"As pointed out in 77, the average human body would represent an impedance of around 8kΩ from phase to earth, and an rccb should always be tested with a resistor of around this value. As noted in January, all rccbs have a test facility which simulates this order of leakage and provides a simple and valid test. If a user is not satisfied by this built-in test, a number of suppliers, including ourselves, stock purpose-made test instruments which check that installations conform with the requirements of the IEE's 15th edition *Wiring Regulations* in respect of tripping times and current.

"In short, elcb/rcb devices are there to protect the user, and fuses/overload circuit breakers there to protect the supply wiring. Where there is a risk of accidental contact with the mains wiring, both should be installed (my shack is so protected) and I would certainly never recommend that anybody deliberately applies a metallic link from a live conductor to earth."

Personally I suspect that some confusion exists between a relay-type rccb and a miniature relay-type contact breaker. An mcb is a substitute for a fuse and has the advantage of being resettable. I recall finding 2A and 6A mcb devices installed in homes in Germany in 1945, and was sufficiently impressed to acquire one for use on a home-built transmitter. Very much more convenient than the old-fashioned fuses still in use at my QTH in 1985!

Microwave radiation hazards

The long and often heatedly-debated question of possible hazardous effects of non-ionized microwave radiation other than the known hazards arising

from thermal effects on sensitive organs such as the eyes, continues to rumble on. In 1982 the National Radiological Protection Board recommended that the official safety limits should be lowered at vhf/uhf, and suggested also a base standard for microwave exposure to be reduced from 1W/kg of body weight to 0.4W/kg. However, it would appear that none of the 1982 recommendations has been acted on officially to-date. The British authorities are currently opposing some draft EEC proposals that would reduce safe exposure limits well below even the 1982 NRPB recommendations.

According to reports in *Electronics Times* (11 April and 2 May, 1985) the situation has been further confused by a Polish report that military personnel who have been exposed to microwave radiation are statistically more likely to suffer from some forms of cancer than those who have not been so exposed. Polish scientists believe this ranges from a factor of three for stomach and skin cancers, about four for thyroid cancers to almost seven for cancers of the lymphatic system and blood forming organs.

Clearly, a single statistical study, no matter how well conducted, is unlikely to be widely accepted without a great deal of further investigation and assessments of the actual levels and periods of exposure involved. However, if it could be shown convincingly that low-level microwave radiation does in fact pose health hazards other than those arising directly from thermal effects, it would be bound to re-open the whole issue regarding radiation from radar and communications transmitters, microwave ovens etc. It is increasingly accepted that ionized radiation (nuclear radiation etc) has no absolutely safe threshold, although statistically it can be shown that at very low levels the effects merge into those resulting from natural radiation levels. The moral for radio amateurs, in the interim period, would seem to be to keep out of strong microwave fields wherever possible, particularly over regular extended periods, and make sure any microwave oven doors fit tightly—just in case.

Radiation and leukaemia risks

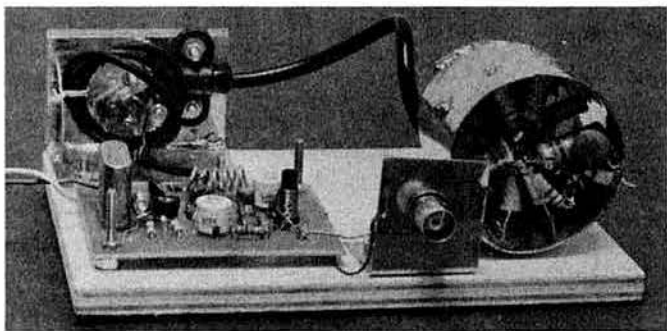
Further studies relating to the hypothesis that electromagnetic fields may be carcinogenic have been reported in letters published in the highly-respected medical journal *The Lancet* (April 6, 1985 pp811–2) and brought to my notice by Ned Row, G8GZZ.

The first relates to the apparent increased risk of leukaemia among electrical workers. A study in New Zealand of 546 male leukaemia patients aged over 20 years registered during 1979–83, and contrasted with 2,184 matched controls, divides "electrical workers" into eight categories. As a result, the study highlights an apparently significantly increased risk to only two of the eight categories: "electronic equipment assemblers" and "radio and television repairmen"; whereas the other six categories of electrical/electronic engineers, electrical/electronic technicians, electrical fitters, telephone installers, linesmen and power-station operators, show only a small, if any, statistical difference from the controls. This study, by members of the New Zealand Department of Community Health thus suggests that the apparent additional risk to assemblers and repairmen is more likely to be due to exposure to metal and flux fumes and substances such as polychlorinated biphenyls (pcbs) than to exposure to non-ionizing radiation from electromagnetic fields from transformers, power generators and the like.

On the other hand, a letter "Silent keys: leukaemia mortality in amateur radio operators" by Samuel Milham of the Department of Social and Health Services, Washington (state), carried in the same issue of *The Lancet* does provide some further evidence in support of the electromagnetic radiation hypothesis. Milham, who presumably is an amateur operator himself, collected "cause of death" information on 1,691 amateurs formerly resident in California and Washington relating to those listed between 1971 and 1983 in the "Silent keys" column of *QST*. Of the 1,691 deaths, 24 were ascribed to leukaemia as compared with an expected 12.6 from statistical averages. The excess was confined almost entirely to myeloid leukaemia (16 compared with an expected 5.7). Milham also notes that the statistical excess among radio amateurs does not appear to relate to their professional occupations ("occupational exposure alone, therefore, probably does not explain the leukaemia excess in these men"). However, before rushing to pull the big switch before it is pulled on you, it is perhaps worth noting that in this study the excess seems to have amounted to just 11.4 out of almost 1,700 deaths. There is also the fact that modern amateur stations usually involve much lower levels of non-ionizing radiation than in the shacks of the mainly old-timers who became "silent keys" between 1971 and 1983. (See also statement by NRPB in "Amateur Radio News"—Ed.)

Bilateral harmonic mixer

Bilateral mixers are, as the name implies, mixers that are intended to work equally well in converting a higher frequency signal down to a lower



LA8AK's bilateral mixer with dummy load when used with 145MHz transceiver

frequency, or without changing the configuration, converting the lower frequency to the higher frequency. Such mixers are finding increasing application for a variety of purposes in transceivers, transverters and test instruments. Packaged doubly-balanced diode mixers (eg SBL1, MD108) can readily be used as bilateral mixers, but tend to be rather costly components for some applications.

In *Spratt* (No 42, Spring 1985) Mike Roblic, GW4GIU, describes a home-built bi-directional mixer he uses in a low-power transverter to provide 7MHz output from a 144MHz IC202, and similarly to provide a 144MHz receive output from incoming 7MHz signals, using a 137MHz crystal oscillator chain (45.7MHz crystal). This has a balanced mixer with two jfet J310 devices, and 6dB of attenuation is applied to the 144MHz output from the 3W IC202 (later type with sideband selection).

Jan-Martin Noeding, LA8AK, has built a 14/145MHz bi-directional mixer using two anti-parallel diodes in the harmonic mixer configuration

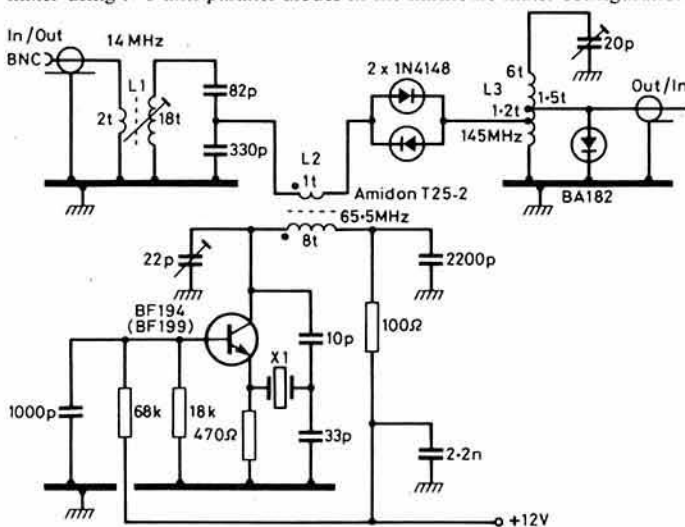


Fig 6. LA8AK's 14/145MHz bilateral mixer using anti-parallel diodes (eg 1N4148). L1: 5mm dia with core, 18+2 turns closewound, 0.3mm enam copper wire. L2: Amidon T25-2 core, 8+1 turns, 0.3mm enam copper wire. L3: 6 turns, 6mm id, 2cm long, 18swg tinned copper wire tapped at 1.2 and 1.5 turns. Conversion loss approximately 7dB

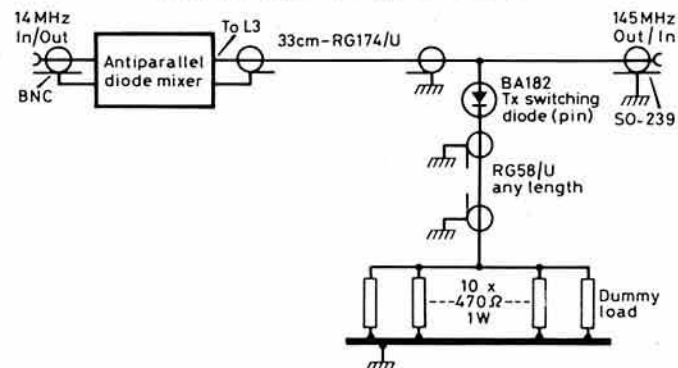


Fig 7. How the bilateral mixer is connected to a 145MHz transceiver. A dummy load is used to protect the mixer in case the "transmit" button is accidentally pushed

popularized by RA3AAE for hf direct-conversion receivers (described a number of times in *TT*). With his mixer, (Fig 6) LA8AK uses this device primarily to align "14MHz i.f." equipment from a 145MHz fm transceiver, but many other applications seem possible since it converts a 145MHz signal to 14MHz, or vice versa, with a conversion loss of only about 7dB. For example, it could be used to provide calibrated levels of test signal in the 144MHz band using a 14MHz rf signal generator etc.

When used with a typical fm transceiver it is advisable to incorporate a dummy load (shown in the illustration) as protection against inadvertently pressing the transmit button: see Fig 7. This is in addition to the protection provided by the BA182 or similar pin-switch on the 145MHz side of the circuit.

Adhesive aluminium tape

The May *TT* (pp360-1) included some suggestions for using adhesive copper tape or kitchen aluminium foil for indoor antennas. This has prompted Ernie Sumption, G3DQL, to comment that the 9mm adhesive aluminium tape used in burglar alarm systems could be used in place of copper tape.

He writes: "These adhesive aluminium tapes are far cheaper and have the advantage that suitable connectors are available. The connectors are made of acrylic plastics but could be mounted on glass-fibre or other more suitable materials for good rf insulation. One source for these items is Maplins."

While aluminium is not quite such a good conductor as copper, the lower cost of this material has encouraged increasing use of aluminium wire for professional applications, including antennas, earth mats and radials; 9mm or wider tape should prove entirely suitable for hf or vhf antennas.

ICs that simplify receiver construction

From time to time attention has been drawn to the availability of low-cost consumer-type integrated circuit devices that can form much of the "heart" of home-brew hf or vhf communications receivers or can provide "tunable i.f." systems for use with pre-converter front-ends from hf to microwaves. The use of one or more such device can greatly simplify construction of receivers suitable for many applications.

Mats Esping, SM6EAN, in *QTC*, Nr 3, 1985, presents a tabulated compilation of 21 devices of this general type, listing the main capabilities of each device, maker, operating voltage etc. Unfortunately this takes up three large pages with Swedish-language text, but the following very brief summary may at least draw attention to the wide range of devices now available.

Philips TDA1072. Intended for a.m. receivers to 30MHz (agc amplifier intended for 455kHz i.f.) and tuning indicator facility. 12V. Recommended by SM6EAN.

Philips TEA5560. Much as TDA1072 but without tuning indicator facility. 12V.

Philips TEA5570. Intended for a.m./fm clock radios, includes fm detector with internal oscillator for use below 30MHz. Tuning indicator for a.m. 6V.

Philips TDA7000. Intended for miniature fm-only receivers. 110MHz capability with pulse-counter type fm discriminator for 70kHz i.f. 4.5V.

Motorola MC3356. Device suitable for nbfm/fsk reception to 100MHz, including digital fsk. Recommended by SM6EAN for fsk applications. 5V.

Motorola MC3357. Similar to MC3356 but with frequency limitations, but suitable for use in nbfm receivers at 10.7MHz. Recommended by SM6EAN. 6V.

Motorola MC3359. Roughly similar to MC3357 but with afc facility. Recommended by SM6EAN in preference to MC3357. 6V.

Toko KB4420B. Similar to RCA CA3089E. 12V.

Toko KB4454. Intended for a.m./fm broadcast radio or clock radio with 10.7MHz fm i.f. 3V.

Siemens TBA120S. Intended for television sound providing i.f. strip to 12MHz. 12V.

Siemens TCA440. Intended for a.m. receivers to 30MHz but suitable for ssb with an external product detector. Recommended by SM6EAN. Note that the use by ZL1NB of this device to form the basis of a simple 3.5MHz df receiver was described in *TT*, December 1983, while in *TT*, March 1984, DJ1ZB outlined how two TCA440 devices could provide the major part of a high-performance hf receiver, including ssb demodulator, for use with modular front-ends.

RCA CA3089E. Intended for fm broadcast receivers with separate front-end. Recommended by SM6EAN for nbfm 10.7MHz i.f./detector etc. 12V.

RCA CA3189E. Much as CA3089E but with additional facilities. Recommended by SM6EAN in preference to the CA3089E ("on channel" indicator etc). 12V.

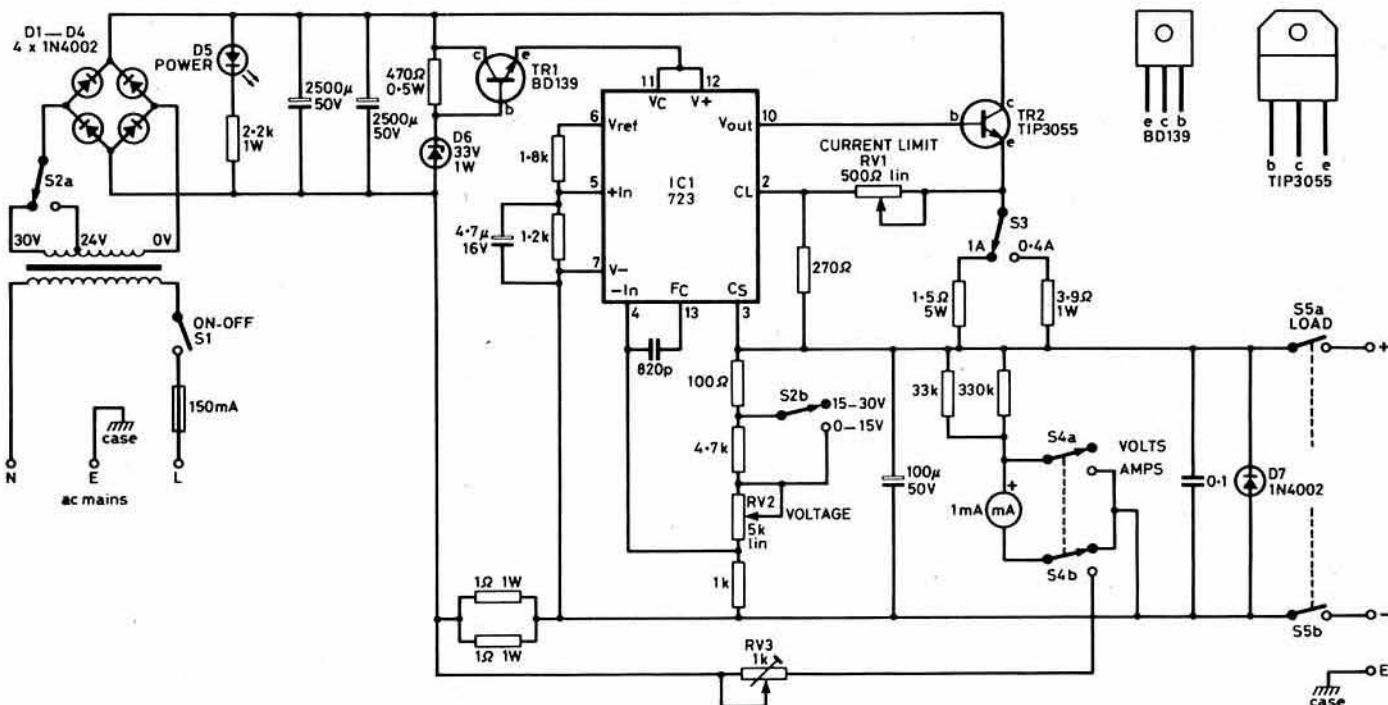


Fig 8. Circuit diagram of the versatile 30V, 1A power supply described in *Electronics Australia*

Plessey SL6601C. Specifically intended for use with nbfm (10·7MHz) with pll demodulator. 7V.

Toko TK10420. Similar to Motorola MC3357. 6V.

Plessey SL6700C. Can form a 10·7 or 21·4MHz i.f. system for a.m., or for ssb with external demodulator. Incorporates noise blanker. Recommended by SM6EAN. 4·5V.

Plessey SL6691C. 455kHz i.f. section for mobile fm receivers etc. 2·5V.

SGS TDA1220L. Intended for a.m./fm clock radios etc. Devices to 30MHz and 10·7MHz fm i.f./455kHz a.m. i.f. 5V.

Siemens TCA1046. Intended for a.m. receiver to 30MHz and suitable for ssb with external detector. Recommended by SM6EAN in preference to TCA440. 10V.

Siemens TCA1047. Intended for fm receivers (10·7MHz i.f.) 12V.

Siemens S469. Intended for fm receivers (i.f. to 30MHz). Recommended by SM6EAN for nbfm.

Note that Philips devices are marketed in the UK by Mullard with the same type numbers.

Experimenters' power supply

Most of the power supply ideas that have been featured in *TT* in recent years have been heavy-current units for the operation of 12V solidstate transceivers from ac mains. But there is often a need for a flexible bench unit providing a regulated output of up to about 1A at an adjustable output voltage up to about 30V. Preferably such a psu should incorporate overload protection and metering and be capable of providing a full 1A output over most of the voltage range and generally be suitable for testing equipment based on 5, 9, 12 and 24V devices.

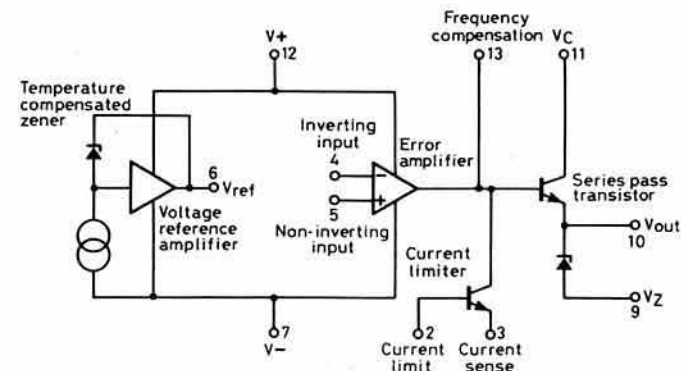


Fig 9. The 723 ic regulator contains a series-pass transistor (150mA), an error amplifier and a voltage reference source

A design (Fig 8) fulfilling such a specification has been described by Greg Swain and Franco Ubaudi, staff members of *Electronics Australia* ("30V/1A benchtop power supply", January 1985, pp60-5). This is built around the 723 ic regulator and a transformer with switchable secondary (24V, 30V), and provides two voltage ranges 0-15V and 15-30V (1A up to 27V). In the absence of a suitably-tapped transformer, a single range could be provided. The tap is needed to permit the full rating of 1A to be provided at low voltages where heat dissipation problems tend to be most severe. In the Australian arrangement the bridge rectifiers provide a no-load voltage of either 37V or 47V. TR1 is a preregulator and TR2 an external series-pass transistor driven by the internal (maximum 150mA) series-pass transistor. TR1 and TR2 are mounted on a common heatsink (high efficiency fan type, 105 by 58mm). Current limiting ranges are adjustable 0·15 to 0·4A and 0·4 to 1A. A 1mA fsd meter is used to show voltage/current output.

The useful 723 ic regulators, available from a number of semiconductor manufacturers, incorporate a 150mA series-pass transistor, an error amplifier and a voltage reference source: Fig 9.

The original article gives full constructional details based on components readily available in Australia, and this brief note is intended only to show some useful design features for this class of psu.

Disposable syringes as spreaders?

Richard Thurlow, G3WW, has long used 600Ω open-wire transmission line to feed a 7MHz Lazy-H antenna array. The spacers for most of the 128ft line are good-quality ex-WD ceramic spreaders, but the final 10ft use a motley assortment of ballpoint pen cases and old toothbrush handles, while the line between the higher and lower sections of the Lazy-H uses chunks of knitting needles, some of which have become "rubbery" with age.

Ever on the alert for suitable, low-cost spreaders to replace the ailing needles, G3WW has recently discovered that many hospitals use and throw-out hundreds of disposable syringe cases made from a transparent plastic that looks as though it could be a good rf insulator. If so, the tubes would make convenient, lightweight spreaders. But he poses the question whether anyone knows for sure whether or not this is the case and the type of material used?

Creeping ptfе tape

GM4GSJ and EI9DZ in the May *TT* drew attention to some uses for the type of ptfе tape intended for plumbers. Dr Martin Sweeting, G3YJO, director of the UoSAT spacecraft engineering research unit, comments as follows:

"This tape is indeed most useful to amateurs, but I should also like to mention another, possibly unexpected, property of ptfе that might give rise to later difficulties: that of 'cold flow'. PTFE under mechanical stress exhibits the tendency to 'creep' or flow away from that stress. This can result in failure of electrical insulation if not used with care.

"PTFE sheet and tapes of various thicknesses have been used on both UoSAT spacecraft successfully, but early experiences were not so happy. Several instances of 'cold flow' were identified on UoSAT1 before launch, necessitating rework and relief of the relating stress. In one case, the pte insulation on a cable had 'crept' away, leaving an exposed conductor! This can happen with no more encouragement than just tight bending radii. Different varieties of pte/Teflon are more or less prone to creep, but the 'white' tape or sheet seems particularly fluid. The creep may take months to occur but, fortunately, we identified this problem early on and were able to take appropriate action. If undetected it could, however, have proved disastrous."

Star Wars and the ionosphere

Several years ago there was a certain amount of concern, particularly in the USA, that the increasing use of aerosols would release more freon gas into the upper atmosphere and that this would gradually destroy the ozone which not only plays an important part in the formation of the ionospheric layers but also protects us all from the bulk of the sun's ultra-violet radiation. Whether this was, or perhaps still is, a real danger to our environment I do not know, though I have seen few references to the problem in recent years.

Now, however, G4JBR has drawn attention to an article "Star Wars" by John Draycott in *Resurgence* No 110, May/June 1983, which appears to be a journal committed to the peace and environmental movements. This article claims that the launch by NASA on 14 May 1973 of Skylab on a Saturn 5 rocket knocked a temporary "hole" some 800 miles wide in the F layer of the ionosphere, due to the ton or so of water vapour from the five J-2 liquid oxygen hydrogen engines. The extra oxygen, it is suggested, combines with the ozone to form molecular oxygen and thus reduces the amount of ozone, permitting more ultra-violet radiation to reach the earth's surface.

The point made by John Draycott is that the "strategic defence system", sdi or more popularly known as "star wars", would require the frequent launching of rockets very much larger than even Saturn 5. He claims that "the mere deployment of sdi could have a major effect upon all life on earth. It would alter the whole structure of the upper atmosphere, with resulting effects upon radio transmission, weather and on the level of surface ultra-violet light".

I have no idea how realistic is this warning; it may well be that concern with hf dx could be the least of our worries!

Switched capacitor bandpass filters

The use of switched-capacitor bandpass filters to provide receiver selectivity is already being exploited in the Collins HF2050 receiver (*TT* May, p359) and a switched-capacitor tunable notch filter was described in *Electronics* (24 February 1983). In practice, device limitations have so far meant that most of this form of filter have been confined to relatively low digital rates representing audio rather than radio frequency filters.

A team of engineers at STL and Imperial College (including I A W Vance, G3WMS) has recently reported (*Electronics Letters*, Vol 21, No 11, 23 May 1985) the implementation of second-order switched capacitor bandpass filters at carrier frequencies up to 4MHz (switching clock frequencies up to 100MHz) using integrated-circuit devices made from gallium-arsenide semiconductor material. They forecast that it will prove possible to extend clock frequencies up to 250MHz, which would presumably permit centre frequencies of the order of 10MHz. The published response curve of a two-pole filter having a 1.6MHz centre-frequency, as might be expected, does not approach in shape factor or ultimate rejection the characteristics of a modern multi-pole crystal filter, but presumably in practice a number of such filters could be cascaded. GaAs ic devices still tend to be laboratory devices, and it may be some years yet before this type of filter at typical intermediate frequencies will come into widespread use. But it could happen eventually.

Tips and topics

David Seddon, G4VCO, adds to the saga of rf interference to "Statesman" telephones. A unit (type GNA 83/1) installed in his office experienced much interference whenever an hf TIG welding machine was in use. A local telephone engineer claimed nothing could be done. Later, however, G4VCO—with the advice of G3YXZ—was able to induce another engineer from BT's rfi department to pay a visit. He quickly solved the problem with just four 1nF capacitors, connected as follows: the first capacitor was soldered across R4; the second across the zener diode D6; and the other two on the ic amplifier (TMC 1302), from pin 11 to pin 10 and from pin 7 to pin 10. G4VCO is not sure whether this cure would prove equally effective for vhf rfi but it might be worth trying in the absence of a knowledgeable BT engineer. □

4-2-70

by Ken Willis, G8VR*

50MHz

The big event in this part of the spectrum is the Government statement of the plan to give UK amateurs an allocation in the 50MHz band (See "Amateur Radio News"). The experiment already in progress has shown some of the great potential of this band for both local and dx working. Thanks are due to RSGB headquarters staff for painstaking work over several years to make this addition to our bands possible; let's hope other European countries follow suit in due course.

On 8 June 1985 at 2100gmt, SM6PU heard W3ZR in QSO with KA1P on 50.115MHz for about 10 min, and other stations were heard but too weak to identify. It is interesting to speculate what the propagation mechanism was over this very long path; I have no information whether the signals heard were cw or ssb. I think we can discount any F2 propagation at that time and in this part of the solar cycle, so was it multi-hop sporadic-E auroral-E or something equally exotic? There was certainly some auroral-E observed over Europe a couple of days later, but W3 to SM6 is a very long path by any standards for anything other than F2 reflection.

G4IJE is very well-known for his ms work and he added yet another "first" to his collection on 5 June when he had a crossband ms contact (6/144) with OH5IY in (old) NU square. It is good to find yet another distant station equipped to receive on 50MHz, but just consider the merits of Paul's contact; many would be glad enough to work OH5 on 144MHz at all, without complicating matters by having the OH listen for you on 50MHz. VHF communication has come a long way in the past couple of decades.

G4IJE and G3IMW have suggested some "activity periods" for ms working on 50MHz, since there are now a number of Norwegian amateurs using this mode. Their suggestion is: frequency 50.300MHz, ssb, periods 1min, LA stations to transmit first period, every Saturday and Sunday from 0500 to 0600gmt. Paul had worked five of the LA stations by the end of May, and is now sufficiently "hooked" on 50MHz to have raised the height of his five-element Tonna for this band to 32ft above ground. This meant some sacrifice to the 144MHz array (16-element Tonna) which was replaced by a nine-element at a slightly lower height than before; this apparently made little difference to the 144MHz performance, although the normal tropo range on 50MHz has increased. Paul had completed 392 meteor scatter contacts on 50MHz by the end of May.

Bill James G6XM (Christchurch), has so far worked 67 of the 100 permit holders but thinks that there are some who are not active at all. He has had a contact with LA6PV on ssb via ms and heard several others without being able to identify call signs positively. He says his location is poor for vhf and, apart from local rag-chews on 144MHz, he confines vhf operation to 50MHz. Since he does pretty well, this will be good news to the many operators who do not live on mountain tops or in areas where they can erect large antennas. By the end of May, Bill had not heard beacon ZB2VHF at all this year, nor GB3SIX except by ms pings but finds GB3NHQ audible about 90 per cent of the time at his QTH. The value of the headquarters beacon to Bill is that if it were not there he might be "pulling his receiver apart" due to the lack of other signals on the band to indicate that it is working correctly.

The West Kent transatlantic test team (4-2-70 June 1985) will be listening on 50MHz during their expedition, and have now received authorization to work on 220MHz, a very popular USA band. K3HZO visited them recently and is to co-ordinate their activities from the far side of the Atlantic. Apparently some 100-plus USA amateurs are ready and willing to listen or transmit on 220MHz while the team is at its Irish location.

GBBQX raises an interesting point by saying that expedition stations often say they have "50MHz receive capability for crossband working", and may therefore be in violation of their licence terms. This is part of the much-disputed argument that Class B operators cannot work crossband to 70MHz or 50MHz because those bands are not specifically mentioned in their licences. There is no mention of 50MHz in a Class A licence either, hence the confusion which exists, for technically only those with a 50MHz permit should operate crossband from or to this band.

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Class B morse operation

As if to illustrate the difficulties encountered in attempting to please all readers, two letters arrived on the subject of morse operation by Class B licensees which present completely opposed viewpoints. John Ridd, G8BQX (St. Leonards) says that a selection of suitable frequencies for communication this mode by Class B operators is an absolute "must" if the experiment is to succeed. He has been sending CQ calls on 144-540 and 432-540MHz on Monday evenings for periods up to an hour on each, with no replies. He also claims to have noticed that operators who have learned their morse by receiving and sending large batches of text or groups seem unable to cope with on-the-air contacts, whereas those who have learned by communicating are perhaps not well equipped to take the morse test.

Dave Ackrill G6VMQ (Birmingham), on the other hand, says "please don't add another calling frequency to the 144MHz band which already has nine 'official' calling frequencies, not to mention ms, Raynet and slow morse frequencies, so that it sometimes seems you cannot operate anywhere without encroaching on a calling-spot. He comments that on the hf and shf bands they seem to get by without calling frequencies. John Ridd comes a little closer to G6VMQ when he adds "What is the objection to the use of the 'proper' morse parts of the band, does the obligatory voice announcement do much harm?"

Dave has been more successful with his cw contacts. In nearly two months of operating, he has managed to have 18 cw contacts with different stations (25 contacts in all), mostly on 144-155MHz, with voice identification. He has passed the word around that he uses this frequency, and always checks it to find if it is in use before "starting up". He says another group known to him use a similar procedure on 144-520MHz. His plea to Class A operators is: "Don't assume that cw operation ends at 144-150MHz".

Auroral notes

Pat Gowen, G3IOR, says that one can definitely detect auroral activity by checking the signals of satellites on north to south passes (4-2-70 June 1985). More of this at a later date when space permits, but Pat has written an article on the subject (*73 Magazine* November 1977) and he presented a paper which refers to this phenomenon to the IEE last February, so check these if you need earlier information.

A few years ago, few would have heard about auroral-E propagation, but now with better equipment and many more observers its presence is being noted more often. On 10 June on 144MHz, GM3XOQ (Shetland) worked UA1ZCL by this mode at 2245gmt "during a fairly intense auroral opening" when signals were T9 both ways. From locator KP78TX, UA1ZCL also worked several LA stations, all T9. Pete's beam heading was 050° which, he says, would have been correct for either tropo or Au in this particular case.

On the same day, Andy, GM4IPK, reported a "northern type GM/Scandinavian aurora in which he worked some LA, GM and SM stations, but at 0027 SM3AKW was worked at T9 via (presumably) auroral-E. SM3AKW tried to put Andy into contact with UA1ZCL, but he was inaudible to Andy although SM3AKW was T9 for about 2h continuously. Andy also worked LA1K (FX) at 0050 with T9 signals, and with beams not quite pointing towards each other but in Andy's case about 20° offset towards the north. Andy sent a tape recording of SM3AKW which indicates that although T9, the signals are rather "flutery".

Last month the GM4IPK/OY9JD auroral-E contacts were reported, so stations further to the north should keep a watch for this type of propagation when auroral conditions exist.

Beacon notes

SM6AFH/SM6EOC report, through their 2 *Meter News Sheet*, that the "TF3IRA gang" is planning a vhf beacon in Iceland. Tentative ideas are for about 100W to a 10-element antenna pointing towards the southeast for tropo, Es, aurora and auroral-E propagation observations. They need donations, especially parts for the transmitter, coaxial cable etc, as well as cash. This would be a most interesting beacon, so if you wish to help in any way, please contact LA6HL, Johannes Bardsen, Risabergstien 29, N-4056 Tanager Norway (or write to SM6AFH).

For those who like way-out projects, Woodbridge (Virginia, USA) Wireless Inc is now operating a beacon on 220-055MHz from near Washington DC, using call sign WB4FQR and running 13W to an omnidirectional antenna, polarization unknown.

Somewhat closer to home, propagation-wise, is news of a constructional project to provide a 50MHz beacon on Cape Cod, Mass. This would be a very useful one for those who listen on this band.

Andy, GM3ZBE, says that he recorded reception of beacon OX3VHF on 50-045MHz as long ago as 15 November 1984 between 1927 and 1935gmt when it was 20dB over S9 bearing 335°. He heard it again on 19 November,

and on 28 January 1985 at 2200gmt when it was RST 339. Since all signals received from it so far have been T9, he suspects the mode of propagation to have been auroral-E, especially as GB3NHQ was heard aurorally just prior to reception of OX3VHF on 15 November.

Sporadic-E

The sporadic-E season on 144MHz came in on schedule, with several openings being reported during the first three weeks in June. Times and openings depended on where you were located in the UK, but in very general terms, the following countries were reported worked on the days listed:

2 June: CT, EA, 17, HG, SV, YO, UB5.

5 June: IT9, SV, LZ, YO, YU.

6 June: CN8EO reported worked by several G stations in an opening lasting about 5min.

11 June: YU, YO, HG, UB5, OK, 14, 15, 13.

It is very noticeable these days that there are many stations waiting for the openings to occur, indicating that successful monitoring is being carried out on lower vhf frequencies by the use of television or general-coverage vhf receivers. At times the tv coverage from Europe has been so overpowering on Band 1 that literally dozens of interfering signals have blanketed the screen, making identification impossible.

The emergence of several Greek stations during some of the openings has been very welcome, since this country has not been easy to work in the past due mainly to lack of activity there. There are also several Bulgarians on the band these days, but most of them are to be found on cw at the bottom end of the band where they tend to send rather rapid morse.

Repeater news

The decision of the licensing authority to allow the experiment of GB2RS newscasts being transmitted through repeaters will interest many repeater users. The experiment will commence when all six repeaters selected for the test are suitably equipped, and this will probably be later this summer. The duration of the experiment is one year. The repeaters participating in the test will be GB3SL, GB3PY, GB3SK, GB3HO, GB3NI and GB3CF, and transmissions are planned for the evening period. It will be noted that half of the repeaters are vhf, the others uhf, this being a deliberate policy on the part of the RMG to encourage more use of the uhf repeater network.

G8BQH, who is membership officer for the Aylesbury Vale Repeater Group, wishes to correct a statement in 4-2-70 June which referred to a proposal by the RMG for a repeater to cover an area around Luton. He points out that one of the proposals submitted was not from the Hemel Hempstead Group, but from Aylesbury Vale, and the proposal is for two repeaters to be located at Hemel Hempstead, one on 144MHz, the other on 432MHz. The group already has a suitable site for this purpose, and call signs GB3BV and GB3VB have been applied for. The 144MHz installation (VB) would have coverage tailored to provide service in areas currently badly served, with minimum of overlap with existing repeaters. They have identified these areas as part of the Chilterns from Amersham to Hitchin, including the M1 from junctions 5 to 11. The group is open to suggestions from the RMG, and does not want to be part of a joint approach with other groups. They believe the RMG should define the area they would like to see covered and offer the franchise to the group most able to provide the service required.

GIEBD (Staffs) is much concerned by what he calls the proposal to force three vhf repeaters to change frequency to accommodate GB3GD, commenting that the original proposal was rejected by the RMG on the grounds that GB3GD would cause co-channel interference and be used for dx working. He continues: "Subsequently the proposal was accepted provided that the IoM group could restrict the service area and not cause co-channel interference to existing networks." He says: "To QSY is easy for synthesized equipment, but what about those, including swls, who use crystal control?"

Kent Repeater Group in their May newsletter pay tribute to Mike Dennison, G3XDV, for having been awarded the Founders Trophy for his sterling work as chairman of the RMG (previously the RWG). In the same publication is a letter from G4LBC asking other operators on the Kent repeaters to allow a mobile to get in occasionally, KN being, he says, by far the worst. Were not repeaters originally to improve mobile coverage? I get rapped over the knuckles when I mention dx coming through on repeaters during Es and tropo!

The "producers" of that excellent publication *The International VHF-FM Guide* are planning a new edition, and they urge secretaries of repeater groups throughout the UK and Europe to supply them as soon as possible with up-to-date information for inclusion. The co-compilers are Julian Baldwin, G3UHK, and Kris Partridge, G8AUU, both QTHR.

Grampian repeater GB3GN has been modified to provide restricted talkthrough time during morning and evening rush-hour periods. During

these periods, time allowed is 1.5min followed by 10s of beeps and then closedown. At all other times, 5.5min is allowed before timeout. Restricted periods are indicated by a series of five dits at the end of each transmission; at other times the morse "K" is an invitation to transmit. The delay between carrier-drop and invitation to transmit has also been shortened to make it easier for stations to break in and join the net, and all users are asked to await this invitation (whether five dits or a "K") before transmitting so that new callers can be heard.

GB3BB, South Powys, opened by the then RSGB President Bob Barrett, GW8HEZ, about a year ago, now faces financial problems. Initial teething problems which discouraged several users have now been largely overcome, but funds are urgently required to continue operation. Annual subscriptions are only £2.50, but several operators who have not subscribed regularly use the repeater, so an appeal is made to all concerned to help keep this "machine" up and running. Secretary of the group GW6SMC, QTHR, will be pleased to hear from new subscribers.

Meteor scatter

My comments and suggestions for changing the meteor scatter reporting system (4-2-70 June) proved that although they may get up early in the day for skeds, ms operators remain very much alert. There was a general consensus of opinion which emphasized that ms operators know what they are doing, they do not "cheat" as some have suggested, and they know when a QSO is complete or not, so why change a system which works well.

Ian White, G3SEK, wrote at length on this topic and made some very interesting observations. He helped to write the 1978 revision of ms procedures, and is still involved with eme work where procedures are relatively similar. He says that criticisms of ms "ethics" have been going on for years, mainly from people who have never made a really difficult or marginal QSO in their ham careers. Ian goes on to define a QSO, and quotes a basic definition which the ARRL came up with some years ago. It is: *A minimum QSO is an exchange of both call signs, plus a previously unknown piece of information, plus acknowledgements.* The previously unknown information is typically a signal report, but the emphasis is on the fact that both stations must receive and send both call signs, and both must acknowledge, usually through rogers. Lacking any one of these requirements, a QSO is incomplete—ie, it fails.

Ian asks: "How many critics realize that we are quite prepared to write-off a 2h sked as a failure if we have not heard that single, final, elusive, essential "R"? We do that because failure to make a complete and difficult QSO is not something to be ashamed of."

Conversely, one would be suspicious if someone did not lose a percentage of QSOs by a narrow margin. Finally, he says: "We are selling ourselves short if we do not defend ourselves against the critics. To my mind the ethically "dodgy" area is not ms or eme at all—it is the marginal QSO between casual operators whose so-called contact fails for the lack of a final "R" as the station fades into the noise. It is *they* who need *our* standards, not we who need theirs!"

Andy, GM3ZBE, takes quite a different view, however. He goes so far as to say that many ms contacts must be of doubtful validity, especially when a tape recorder was used to record the received signal, which can then be replayed as many times as needed to make sure the calls and other information have been copied correctly. That is an interesting point of which not much has been heard previously. Incidentally, some of the Americans I met in May thought that we set the tape recorder running, went to bed, and played back in the morning "to see what we had caught overnight"—like laying fish traps or snares! Andy says ms awards should be specifically for ms contacts, with these QSOs not being allowed to be mixed with other modes in a claim. He also says that if my "2-digit" system were used, the station transmitting first could use 0-50 and the second period sender would choose between 51-100 to avoid both stations picking the same number.

Dave, G4RGK (Marlow), thinks that changes are needed in some areas, but my proposals would only serve to confuse new operators "even more". (Dave received an 8s burst recently from a station giving him a 25 report!). He thinks 26 and 27 reports are given regularly because they are genuine reports, "unlike the 59 everyone seems to give during an Es opening". Dave also comments on current similarities between eme and ms reporting; he has views on random-channel operating, but we will keep these until a later date when more information has been collected.

Terry Hackwill, G4MUT (Reading), has come on to the ms scene only recently and is having a lot of successful contacts plus a great deal of fun. He correctly says that although the present ms procedures may have their shortcomings, previous attempts to change them have not been very successful. He cites, in particular, missing information procedure, which so few European operators seem to understand, plus the problems of frequency separation attempted on the random channel. However, he also

suggests a way out of my problem of two operators choosing the same random numbers to transmit instead of a report. In his suggestion, the first period operator could use two odd numbers, and the second two even numbers, but before long the merits of sending 55 and 44 would be obvious rather than a cumbersome 91 or 28, so these would become as common as the 26 report. Terry sums it all up by saying he is quite happy with the way things are.

Gerald, G4OIG, (Northampton), got "mildly hot under the collar" while reading my proposals. He feels no need for a change and doesn't much care about the views of any "anti-ms lobby". To change it would admit a basic weakness in it and its operators. This was a quite common point made in the correspondence. Serious ms operators know only too well when they have made a successful contact. To my statement that a 37 report received early on does not affect the course of the QSO, he refers to the fact that this might make him use break procedure (on ssb presumably) if he received such a report—though I did mention this possibility. Gerald got a 47 report on ssb in one sked from an operator who never said "break" in the entire sked! So let's leave it there for the present.

Interest seems to be growing in possible 28MHz meteor scatter working mentioned in 4-2-70 June. Tim Stanley, G4DBL (Winchester), says he has been aware of 28MHz ms propagation for years. He regularly hears DL0IGI via this mode, and referred to an experiment publicized through the RSGB news bulletin some three years ago when he endeavoured to interest operators in this mode on 28MHz. A few contacts were made, some only partly via ms. He also listens to rty signals just above 14,350kHz in the early hours and hears bursts on these, complete with doppler shift. He would be interested in some further 28MHz tests and hopes to be active during the Perseids.

Gordon Pheasant, G4BPY, has become very interested in meteor scatter through his 50MHz activities which gave him his first experience of this mode. He hears GB3SX, DL0IGI, DK0TEN and DF0AAB "anytime" via ms. During the Quadrantids he heard LA5TEN, though since then it has been pings only—it is a low-power beacon. Gordon has 100W and three-element monoband beam for 28MHz, but as yet no high-speed cw capability. He would like to get into touch with others interested in experiments on this band. So now we have G4BPY, G4DBL and (from earlier comments) Cliff Ranft BR51418, all of whom have similar interests. If there are any more, I suggest they correspond with these readers, and if tests result, maybe they would let 4-2-70 know about them.

Another chance to work Foula

Petra, G4KGC, has sent details of the expedition to Foula Island (old YU square, now IP80) planned for the Perseids period, 8 to 14 August. Operators will be ON6UG, ON1UI, G4KGC and G3WDG. Main operation will be on 144.028MHz meteor scatter cw, numerous skeds having been arranged, but Petra says she is very anxious to work the "southern 10W stations" so she will be taking advantage of any openings for this purpose, and listening on both cw and ssb for the weak ones (up on or near the calling channels presumably). Charlie, G3WDG, will be manning the vhf net on 14,340kHz each afternoon for further skeds. The call will be GM4KGC/P.

The Foula team will always take first period for ms skeds, since this is probably best to avoid interfering with the many G stations likely to be active during the Perseids period.

From here and there

David Dibley, G4RGK, may have the solution to the YU6ZA/P situation reported in 4-2-70 June. This station was apparently worked by several Gs, but the "real" YU6ZA denied all knowledge of such contacts. Dave thinks it was a case of mistaken identity since he has a tape recording of the opening and says that YU6ZAH was using the word "hotel" at the end of his call, and this in his accented voice sounded much like "portable". Dave goes on to comment that a YU6 portable in his own area would, in fact, sign YU6ZA/6, not /P. Many similar instances of mistaken calls have been in evidence in the recent sporadic-E pile-ups.

Reg Woolley, GW8VHI, says that I2FHW—reported worked on 24 April and queried in 4-2-70 June as being a possible "wrong-un"—was in fact genuine, since someone had telephoned him after the opening which seems to have been some relatively localized tropo.

Frank Bannister, G3COX, is unfortunately confined to a Sussex nursing home following a serious illness. He would very much like to keep in touch with the outside world, so please listen for him on channel S20 between 11am and 12am. He also operates on 14,240kHz.

E17CS (Truskmore) in the old VO square, should be active on the 70MHz band by now, so turn the beam up that way occasionally.

Yet another report of interference on 144MHz from a public service station comes from G3NT (Northallerton), who says that the North Yorks

Police transmitter with "a 300ft mast and 20-plus antennas" causes breakthrough especially between 145 and 146MHz, and the effect is noted by other amateurs within a quarter-mile radius. He says this is a common problem close to police transmitters. If sheer front-end overload is the cause there seems to be little one can do about this except to use a very well designed front-end as per G3SEK's article in *Rad Com* April-July 1985.

It is understood that there is another problem of this sort, this time from a police repeater station atop Windwhistle Hill, Somerset, which operates on 146.000MHz.

Bob McHenry, G3NSM, is giving up his role as distributor of *DUBUS* after some years of sterling service. He is handing over to Ken Hatton, G4IZW, whose address is Thorneycroft House, Shield Hill, Haltwhistle, Northumberland NE49 9NW, so contact him for new subscriptions or queries related to this publication.

G6WDK, who is also at times GJ6WDK and swl station FE8957 (France), plans to be active from the Isles of Scilly between 10 and 25 August on both 144 and 432MHz using relatively low-power equipment hand-carried to the site. Callsign will be G6WDK/P, and he will have a 50MHz receiver with him. Apart from the calling channel his frequency choice will be 144.219, 144.319, 432.219 and 432.319MHz.

It was good to hear again from Hennig, Y22ML, who is one of the Dresden University club operators. This club plans to operate from JO71AE (HL61g) from 8 to 14 August using callsign Y41ZL. There may be some ambiguity in the call quoted, since Henn also gave the calls Y22ML, Y33NL, Y24NL, Y25VL and Y41YL as being those present, so if any of these are heard on the vhf net they should be able to arrange skeds. The equipment will generate 500W ssb/cw $2 \times$ F9FT Yagis. The team will monitor the vhf net Saturdays and Sundays 0900-1300gmt prior to the expedition.

Callsigns for the North West Kent ARS attempt to bridge the Atlantic on 144MHz from Western Eire have been notified as EI2VTQ, VUI, VUJ, VUK, VUL, VUM and VUN. They propose using a Dresden linear into 4×19 element MET antennas. The group will respond to calls from G and Europe generally between 24 and 28 August during the first 15min of each hour on 144.025MHz cw and 144.210MHz ssb. They warn that anyone calling outside these times (ie when they are trying for the USA/VE contact) will be most unpopular, even to the point of being blacklisted! Further information can be obtained from Nigel Peacock, G4KIU, expedition sponsorship manager, QTHR. □



General view of HB9MIN's operating site



Rear view of the dish and transceiver, complete with dial thermometer which confirms the sub-zero temperature

13 January 1985

20km (5/9) at 1110gmt
38km (5/5) at 1245gmt
53km (5/2, 5/3) at 1430gmt

For the final contact, HB9AMH/P was located at JN37OD (1,025m asl) and HB9MIN/P at JN37WB (1,100m asl). To quote "There was some snow falling and the temperature was -11°C . The snow and clouds gave some scatter so that the parabolic reflector could be moved $\pm 3^{\circ}$ without the signal dropping significantly".

The stations' equipments were as follows:

HB9MIN/P: 23.5GHz vco (Microwave Associates), output 25mW, doubler and mixer (using an MA40406 GaAs Schottky diode) giving an output of 2mW. The receive i.f. was 30MHz, bandwidth 75kHz. Antenna 0.6m parabola and slot radiator with an estimated gain of 45dB.

HB9AMH/P: 47GHz Gunn oscillator, output 10mW, MA40406 mixer, 0.4m parabola and slot feed, receive i.f. 30MHz.

To cap it all, 24GHz transceivers were used for dish alignment! Both Erich and Arnold wish to thank Mr Siegenthaler (of the Swiss PTT) for his constructive ideas and technical backing for the project. Credit is due to both operators for their constructional and operating abilities in achieving this notable result. There is little doubt that the intense cold (and therefore virtually zero atmospheric water content) contributed to its success—UK operators are urged to "have a go"!

Bernard, HB9RO, added in his covering letter that bands "currently allocated in Switzerland are 1.24 to 1.3GHz, 5.65 to 5.85GHz, 10 to 10.5GHz, 24 to 24.5GHz and the new (WARC '79) bands extending to 250GHz; 2.3 and 3.4GHz are not allocated".

Two of HB9MIN's photographs are reproduced here. Duplicate QSL cards were sent for scrutiny before being passed on for the appropriate RSGB award.

Operating news

Once again there has been comparatively little operating news, occasioned by the absence of really significant lifts. As I write (early June) there has been a marked improvement in weather conditions brought about by a significant and slow-moving high centred over the UK: this has been accompanied by something of a lift on 144MHz, a somewhat less

Microwaves

by Mike Dixon, G3PFR*

World record on 47GHz

A letter has been received from HB9RO (vhf/uhf manager of the Swiss national society, USKA) detailing a contact which took place on 13 January 1985 between Erich, HB9MIN/P, and Arnold, HB9AMH/P, over a distance of 53km. This was the culmination of work which started immediately after the IARU Region 1 UHF/SHF Contest in October 1984, when their first contact, over a distance of 1km, took place.

Test equipment built interim consisted of a power meter based on an HP HSCH 3206 zero-bias Schottky GaAs diode built into R400 (WG 23) waveguide whose height was reduced to 1mm by means of a five-lambda taper to match the diode; a beacon consisting of a 23.5GHz Gunn and high-pass filter with horn antenna, and a frequency converter consisting of a second oscillator driving a sub-harmonic mixer to produce an if output to feed either a spectrum analyser or frequency counter in the range 0 to 1GHz. It was noted during the course of development that the oscillator possessed a stability of about 3MHz/ $^{\circ}\text{C}$, with a total warm-up drift of about 90MHz.

Once frequency setting and measurement was established, the following contacts took place:

26 December 1984	11km (5/9 reports)
26 December 1984	41km (5/5 reports)
29 December 1984	20km (5/9 reports)

*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LL

pronounced lift on 432MHz and very ordinary conditions (as far as monitoring beacon reception is concerned) on 1.3GHz, at least from my QTH.

Charlie, G3WDG, and Petra, G4KGC, wrote to say that, as from 23 May, they will be active on 10GHz narrowband from their home QTH. Aided and abetted (maybe it should be prodded!) by G3JVL and G4KNZ, they now have a 2ft dish mounted just below roof-apex and, listening in unsettled (rain and thunder) weather over the Whitsun holiday, have heard G3JVL (Hayling Island), G4MBS (Alton), G3YGF (near Salisbury) and G3FYX (Bristol) at between 10 and 30dBn. Of significance, and possible encouragement to others, is that their "take-off" to the south is poor, the horizon being at about 4°, consisting of house roofs and a small hill rising to about 100 to 150ft above them. They say: "There must be quite a few 10GHz stations with better sites than ours who could also join-in. The gear here is a 2ft dish with 'penny feed', a single-stage preamp using a Plessey GaAsfet and JVL transverter. We hope to have a 2W twt going very soon and look forward to more tests, possibly up north from Towcester. The take-off is much better than to the south, so it would be very interesting to try some up-country tests. We are very impressed with what rain-scatter has to offer." Charlie and Petra noted that all three southerly stations could be heard (while beaming at any single station) over an arc of about 25°.

After the above was written, further tests took place and G3JVL and G4MBS were again heard, with two distinct openings during the afternoon/evening of Monday 27 May, each lasting about 1h. G3JVL's signals were audible in between lifts, very weak, possibly by troposcatter. Further tests the following day seemed to confirm the presence of a troposcatter path, and Charlie added: "We have begun a period of regular monitoring, so hopefully there will be more data in the future. The twt is now operative, but no QSOs yet." The path to G3FYX was described as being much better, in terms of take-off, with the horizon about 2km away, and although Charlie and Petra heard G3FYX's signals up to 30dBn, their 10mW signal was not received in Bristol. All-in-all, a very encouraging report—keep up the good work!

A brief note from Julian, G4UET (Lewes, Sussex), indicated that he is now QRV on 1.3GHz with 2W to an antenna array consisting of four "Double-quad" radiators (UHF *Compendium*) and is preparing to construct a 6ft skeleton dish for portable use. He added: "I hope to increase power as time and money allows. When I first had my old call sign (G6IKY) about three years ago, I dabbled on 10GHz. Hopefully this new investment will spur me on to get going on that band again."

Geoff, GJ4ICD, wrote: "Just a line to let you know we're still around. I've just put up a new antenna system for 1.3GHz: it is now 2 × 50-element JVL quad-loops, soon to be expanded to four with an elevation rotator. Things have been quiet down here—let's hope for some nice tropo soon!"

Richard, G4CVI (Southampton), sent details of his equipment on both 1.3 and 2.3GHz. On 1.3GHz, 250W to four 23-element Yagis at 115ft above ground, soon to be uprated to 400W. On 2.3GHz he said: "It has been difficult to generate 30W from a 2C39, fed to a 64-element JVL quad-loop at 120ft above ground—complete with 8dB feeder loss!" Richard mentioned that John, G8ACE (Winchester), is very keen for QSOs on 2.3GHz using his newly-constructed transverter. Both can often be found on 432MHz and will be pleased to QSY higher: Richard's latest score on 1.3GHz is 40 squares and 14 countries. Graham, G8NVL (Southampton), is mentioned as just having purchased his local hilltop and should soon be QRV on 2.3GHz with 0.5W ssb. Richard added, jocularly, "there will be trouble if he overloads my front-end!"

Don, G8WPL (Stockport), wrote indicating that he has been QRV on 1.3GHz for some time, has thoroughly enjoyed the experience, and has so far worked 17 squares—mainly (as might be expected from his proximity to the Pennines) in the southwest to northwest quadrant. He is always on the lookout for new squares and stations, and mentions a regular sked with Frederick, G6FK (Wolverhampton), at 1630bst Mondays to Thursdays on 1.296-2MHz.

Frederick, mentioned above, commented on activity on 1.3GHz in the period 15 April to 27 May, mentioning some 30 callsigns heard or worked. On 2.3GHz he mentioned 13 callsigns "each of which has effected exchanges on 2.3GHz, one-way or both ways. It is of interest that the majority seem to be using LWM equipment, which seems to work well".

Finally, further words of encouragement from Derek, G8RSZ (Lincoln): first, "conversion" to a Class A licence is imminent; second, his first 10GHz wideband contacts were from a site near Caistor, Lincs, to Great Whernside, N Yorks (136km) where G3PHO and G1BHQ operated under dreadful conditions in the April 10GHz Cumulative; third, he and Nick, G4JHM, now have 3.4GHz polarplexer transceivers working—"although one of the klystrons goes intermittent hot short when hot"—any offers of a spare? (Type 726A).

Many of the operating reports this month indicate significant numbers of stations coming onto various microwave bands with fairly low power, relatively simple equipment and modest antenna systems, many with the intention of upgrading both as experience, time and expense will allow. This is a healthy sign, and it is hoped that, given the odd lift or two, these operators will be spurred-on by the results attained. To use an old expression: "Mighty oaks from little acorns grow!" □

RAYNET

by Geoff Griffiths, G2STG*
Chairman, Raynet Committee

Bill Colclough, G3XC

I am very sorry to have to advise members of the loss of Bill, who died on 20 May. He had suffered a heart attack earlier this year, and we all hoped that following a period of rest, and easing of family burdens, he would bounce back from this setback, but sadly this was not to be the case. As well as his work over many years for the Society, including three years as Region 9 representative, Bill was the representative for Raynet Zone 7, county controller for Cornwall and vice-chairman of the Raynet Committee. He was one of those rare characters who always spoke his mind straightforwardly and critically without offending anyone, and committee meetings with Bill participating were never dull boring affairs. He had been responsible for co-ordinating the Raynet Technical Information Service since its inception, and many controllers will have gained much from Bill's advice on talkthrough boxes and on modifying commercial equipment for special tasks. Controllers in the surrounding counties have found him a tower of strength and encouragement, and many of us have lost a good friend. Our condolences and best wishes go to his family.

Practicalities

Raynet members are not greatly renowned for their love of paperwork, or for a great preoccupation with formality, preferring rightly to concentrate on training and operations in the field—after all, that's what the organization is all about, isn't it? In common with most other voluntary aid organizations, much time is spent in comparative inaction waiting for something to happen, punctuated by short periods of mayhem when much too much is happening, and it is during those periods that members and their controllers discover whether the investment in training has really worked out.

The reaction of members to the 1984 edition of the *Raynet Manual* has been very encouraging, for they have either praised it, or constructively criticised it, or said nothing and put its contents quietly to good use. In particular, newly-formed groups have found the sections on operating procedures particularly helpful, and many old-established groups have been impressed by the efficiency with which their newcomers have slotted into the team when using the manual as a training document. Exercise briefings, too, have become much more professional, with many groups producing documentation which answers all the questions, and which ensures that members arrive at the right time and place with the right equipment, and understanding precisely the task in hand.

In terms of group organization, there is a very useful section of guidance on the construction of a constitution for a group, and this has come out of many years' experience by many controllers and secretaries. There are still too many instances, however, where groups operate under the kindly dictatorship of one well-meaning individual and who are not backed up by the strength which a supporting team can bring. This can lead to all sorts of problems if, for instance, an individual is out of action for a while or away on a business trip. In any case, Raynet groups are nowadays getting too large and professional to be one-man bands any more, and a group's controller needs to be able to devolve membership registration, training, equipment maintenance or secretarial duties on members of his team. Some groups have even gone so far as to identify a particular member to be responsible for liaison with a user service.

Sometimes, as with any organization, members need to be able to air

11 The Grove, Asfordby, Melton Mowbray, LE14 3UF.

grievances, or to ask awkward questions, and it is essential that there be a formal framework within which this can happen. So if your group has not got a constitution set down on paper, why not have a look at Chapter 3 of the *Raynet Manual*, and help your controller by taking on one of the supporting roles. Do I hear you say that you haven't got a *Raynet Manual* and haven't ever seen one? Well, I know that many groups produce their own group manuals, but there is still a wealth of experience which can well support your own manual, and I suggest you get one right away, either through RSGB Publications Sales, or through your group controller or zonal representative.

RTTY/Amtor/packet radio

The development of the use of various forms of data transmission goes on apace within many groups. RTTY now seems to be becoming a widely-used norm for many, with more teleprinter traffic than voice now on many operations for cepos. This mode of transmission seems very appropriate for carrying complex details at high traffic density with good accuracy, and reports are commonplace of improvements in traffic capacity of the order of 100 per cent.

The shortcoming of rtty, however, is that only one message can be handled at a time, and you are never sure until your transmission is over whether the other station is copying you or whether the data has been spoiled by QRM or a change in conditions. The use of Amtor would seem to overcome these drawbacks in principle, and I have been very interested to read the results of some work being carried out between North Yorkshire and Nottinghamshire using 1W on 144MHz. This path is being developed using Amtor software specifically developed for Raynet use on Commodore and BBC Computers, and the system is intended to be used operationally for the RAC/Lombard Rally operation in the autumn this year. The use of packet radio was demonstrated very successfully at the Chesford Grange weekend earlier in the year by the West Midlands Groups, so there is obviously much activity in this area to keep an eye on. My own feeling is that both Amtor and packet radio offer great advantages for operations between two fixed or mobile stations, but that they may not be so readily applied to multi-station nets. Obviously, further work needs to be done to explore the possibilities, and I hope to hear from other groups who are working along these lines.

Meanwhile, all this talk of data will no doubt have proved infuriating to those groups who have not got the opportunity to develop such systems within their boundaries. They should not lose heart, because lurking within their territories they will find many newly-licensed amateurs to whom these modes of communication are commonplace, and who are looking for an opportunity to put their skills and enthusiasms to the service of the community. So go out and recruit them, and encourage them to show off their systems to their fellow group members.

Technical challenges

The use of talkthrough is increasing by leaps and bounds, if the number of talkthrough permits being issued is anything to go by, and the usefulness of these devices seems to become more appreciated by groups every month. Much useful guidance is available from the Technical Information Service (via the writer), and more and more ways of achieving the end more simply seem to be developing. I saw the other day a simple plug-in device to the phone plug of a two-bander which seemed to give instant crossband capability. This is admittedly an expensive piece of equipment but, if available, a very inexpensive way of providing a talkthrough facility for a group, either mobile or at a base station.

I note that in the current issue of the *Microwave Newsletter* it is suggested that Raynet groups think about the feasibility of using 10GHz for fixed links between well-sited controls, and with the availability of "Solfan" type heads, and more expertise and advice being generally accessible, this may well be an area in which some groups may wish to work. I have also seen recently a suggestion for a talkthrough provision at vhf incorporating many of the features taken for granted in the commercial field, and again there seems to be much opportunity for the boffins within each group to share notes and to work away through the coming months in order to improve their group's capability. But whatever you decide to do, don't forget:

Someone else may already have done it, so ASK!

You may be the first, so TELL!

Raynet Controllers Net

The recent change of frequency for the Raynet Controllers Net ("ARN", *Rad Com* July, p525) should no doubt please those who have expressed their displeasure at Raynet's presence at the top of the 3.5MHz band, but doubtless has not pleased existing users around the new frequency of 3.663MHz. The new meeting place is certainly noisier than the old, and the changeover took place at a period of unfavourable propagation, but let us

persevere gentlemen and give the new arrangements a fair trial. There is usually much of interest reported on the nets, and reports from members and swls would be welcome. The start time is 8.30 am, and the net control station on the first Sunday of the month is G4NRC, with control on other Sundays being taken by one of the committee members or zonal representatives. See you there. □

Computing

by John Morris, GM4ANB*

Duplicate checking (3)

Parts 1 and 2 (*Computing*, April and June) described the use of hashing and character coding for fast duplicate checking on the Spectrum, BBC and Microsoft based computers. This month I will pass on a couple of alternative techniques that have appeared in the post in response to these.

Allan Jones, G3XJO, has come up with an ingenious technique which allows very fast go/no-go checking for duplicates on the Spectrum. G3XJO's original program contains many options and user-friendly features, but is too long to give here in full. Program 1 is a much shorter version that demonstrates the basic idea and can be used as a basis for experimentation. It is based on the principle that amateur call signs have two parts; a prefix ("GM4") and one to three serial letters ("ANB").

The serial letters are padded out with blanks if necessary to give three characters, giving just $26 \times 27 \times 27 = 18,954$ possible combinations. This is small enough for an array. c\$(26,27,27), to be declared. (Note that the Spectrum requires the length of each string in an array to be declared as the last element of the array). There is thus one element of c\$ for every conceivable combination of serial letters. Initially, all elements are zero. To record that a sequence has been worked, it is sufficient to put any non-zero value into the corresponding element of c\$.

In tandem with the "serial array" is an array of prefix strings, p\$(255,7),

Program 1

```
10 CLS : PRINT AT 11,0;"Initialising."
20 DIM c$(27,27,27): DIM p$(255,7): DIM c3(): DIM m$(3)
30 DIM b$(7): DIM i$(255,10): DIM r(255): DIM d$(255,3)
40 FOR j=1 TO 27: LET c$(1,j)=CHR$(0): NEXT j
50 FOR j=1 TO 27: FOR k=1 TO 27
60 LET c$(j,k)=c$(1,1): NEXT k: NEXT j
70 LET bs=CODE "A"-1: LET a=0: LET p=0: LET d=0
80 POKE 23658,8: REM Set CAPS LOCK on
100 INPUT "Call sign for QSO 'i+a': "i$a
110 CLS : PRINT "Entry: 'i$a'"
120 FOR j=1 TO LEN i$a
130 IF i$(j)="" AND i$(j)!="9" THEN LET t=j
140 NEXT j
150 LET b$=i$(t): LET m$=i$(t+1 TO )
160 FOR j=1 TO 3
170 LET t=CODE m$(j)-bs: IF t<0 OR t>26 THEN LET t=27
180 LET c3(j)=t: NEXT j
190 LET n=CODE c$(c3(1),c3(2),c3(3))
200 IF n<0 THEN GO TO 300
210 PRINT "OK OK OK": GO SUB 500
220 LET c$(c3(1),c3(2),c3(3))=CHR$(p)
230 GO TO 100
300 PRINT "Stations worked:"
310 IF d$(n)=m$ THEN GO TO 360
320 LET m=n: GO SUB 600: GO SUB 500: IF pp=0 THEN GO TO 100
330 IF d=255 THEN PRINT "Dups table full": GO TO 100
340 LET d=d+1: LET d$(d)=m$: LET c$(c3(1),c3(2),c3(3))=CHR$(d)
350 LET r(d)=1: LET i$(d,1)=CHR$(n): LET n=d: GO TO 380
360 FOR j=1 TO r(n): LET m=CODE i$(j,n): GO SUB 600: NEXT j
370 GO SUB 500: IF pp=0 THEN GO TO 100
380 LET m=r(n)+1
390 IF m>10 THEN PRINT "Too many 'i$m's': GO TO 100
400 LET i$(n,m)=CHR$(p): LET r(n)=m: GO TO 100
500 PRINT "Press ENTER to enter in log"
510 PRINT "Press SPACE to ignore call sign"
520 IF INKEY$="" THEN LET pp=0: RETURN
530 IF CODE INKEY$()>13 THEN GO TO 520
540 PRINT "i$a" being logged: LET a=a+1: LET pp=1
550 IF pp THEN LET p=pp: LET p$(p)=b$: RETURN
560 IF p$(pp)=b$ THEN RETURN
570 LET pp=pp+1: IF pp>255 THEN GO TO 550
580 PRINT "Prefix table full." : LET pp=0: RETURN
600 FOR k=1 TO 7: PRINT p$(m,k) AND p$(m,k)() " "
610 NEXT k: PRINT m$: RETURN
```

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Program 2

```
10 PRINT "Set CAPS LOCK before starting"
20 LET a$="" : LET c=1
30 INPUT "Call sign for QSO no. "(c)?" : t$
40 IF t$="" THEN STOP
50 LET t$=(t$+" ") ( TO 6): PRINT t$
60 IF INSTR(1,a$,t$) THEN PRINT " is a duplicate":
  BEEP 0.3,40: GO TO 30
70 LET a$=a$+t$: PRINT " is a new call": PRINT: LET c=c+1:
  GO TO 30
```

containing all the prefixes that have been worked. The value found from looking up c\$, if not zero, is a pointer to an element of p\$, so giving the prefix. This, together with the serial letters, gives the complete call sign. For example, suppose "G3XJO" has been worked. "XJO" is coded as (24,10,15), and this element of c\$ is examined. Suppose it contains 10 (in CRSS form). Then p\$(10) will be "G3".

Implicit in this technique is the assumption that all serial codes will be different. In practice, duplicate serial letters will occasionally be encountered. There are various ways to deal with this. The method used in Program 1 is a separate "duplicate array", d\$, which holds the serial sequences that have been worked more than once. The values in c\$ can then point either to p\$ or to d\$, the difference being detected by comparing the serial letters with the element of d\$. Associated with d\$ is an array of indirection pointers, i\$, and an array of counters, r. Suppose both "GM4ANB" and "F6ANB" have been worked. Element (1,14,2) of c\$ will contain a value, say 3. In d\$(3) will be "ANB", showing that this is a multiply worked sequence. The value of R(3) will be two, showing that an "ANB" has been worked twice. Finally i\$(3,1) and i\$(3,2) will be pointers to elements of p\$ containing "GM4" and "F6" respectively.

Most of the complications in Program 1 are to handle multiply worked sequences. Lines 100 to 170 fetch the call sign, extract the prefix and serial, and check the c\$ element. If it is zero then the call sign is required and, if confirmed by the user, line 220 marks the entry as worked.

If c\$ is not zero initially, then the sequence may have been worked exactly once, in which case the single call sign is printed (320), or more than once, in which case i\$ must be examined (360). In the former case lines 330 to 350 change the c\$ entry from direct to indirect pointers. Once a sequence is stored as multiply worked, lines 380 to 400 add an extra pointer to i\$.

The subroutine at line 500 makes sure that the prefix, b\$, is in array p\$ and returns the array index in pp, or zero if the user does not confirm the contact.

There are all sorts of expansions that can be added. G3XJO's version has extensive call sign checks, and combines any suffix with the prefix before entering it in p\$. It allows just the serial letters to be entered, for a minimum-typing check. While waiting for the contact to be confirmed it lists all "near misses"; that is call signs with just one serial letter different. The only real limitation is that it does not store the contact number with the call signs, so it is difficult to go back and check the log.

The same technique can be used on other computers, if enough memory is available, but unless string arrays are the same as on the Spectrum it will probably be necessary to PEEK and POKE a section of memory set aside for the serial array.

The second program came from Kevin Tyler, G6VFR, and could hardly be shorter (Program 2). It uses the Betasoft "Beta Basic" language extension for the Spectrum. The INSTR function searches one string for any occurrence of a second. This program can, in principle, be adapted for any computer that has an INSTR type function. Sadly, it does not go on the BBC; the available function is available (INSTR), but strings are limited to 255 characters, so that only a very short list could be created.

Morse decode for the BBC

Time for a change of topic! Program 3 is a short but effective morse decoder for the BBC. It starts off reading at 12wpm, but will adjust speed automatically from about 5 to 40wpm.

The decode algorithm is to compare each key-down period with a "dot discriminant", DD. Anything shorter is a dot, anything longer is a dash.

Program 3

```
10 C$="*ETIANMSURWDKGOHVF*L*PJBXCYZQ**54 (3***2***"
20 C$=C$+"*1E=/(***)*7***8*90*****)******?****"
30 DOT=10: DD=DOT*2: DS=DOT*5: TIME=0: C=1
40 REPEAT: D=TIME: UNTIL INKEY(-1)
50 REPEAT: U=TIME: I=U-D: UNTIL NOT INKEY(-1)
60 C=C+C-(I) DD)
70 DD=DD*0.9 + I*0.1: DS=DD*2.5
80 REPEAT: D=TIME: I=D-U: UNTIL INKEY(-1) OR I) DD
90 IF I) DD PRINT MID$(C$,C,1): C=1 ELSE GOTO 50
100 REPEAT: D=TIME: I=D-U: UNTIL INKEY(-1) OR I) DS
110 IF I) DS PRINT " ": GOTO 40 ELSE GOTO 50
```

Dots and dashes are coded as binary 0 and 1 in C, which is shifted left, by adding it to itself, after each key down. An extra 1 bit at the high order end marks the character length.

When the key has been up for a while the character is deemed to have finished. C\$ contains the characters corresponding to the encoded morse, so C is used to pick out the right one, which gets printed. If the key stays up a while longer, a space is printed for the end of word.

Speed adjustment is obtained by taking a decaying running average of key-down periods. The speed of adaption can be altered by changing the constants in line 70. It can be fooled by sending a non-stop series of only dots or only dashes.

As it stands, Program 3 decodes cw tapped out on the SHIFT key. To read off-air, a tone decoder is needed. All occurrences of "INKEY (-1)" should be changed to a function which returns any non-zero value if the key is down (tone present), or 0 if it is up. If the joystick input is used then "ADVAL(0) AND 3" (or "NOT (ADVAL(0) AND 3)", depending on the sense of the decoder output) will do the job.

For anyone wishing to adapt the program to another computer, the BBC "TIME" variable accesses a real-time clock which is incremented every 0.01s.

Oddbits

Richard Saunders, G8GSG, has a cw practice program with a couple of useful features. Instead of generating purely random characters, it uses the Scrabble letter distribution to approximate to that of English, so giving more realistic practice. It also has an input section which displays a histogram of key-up and key-down times, giving a picture of the sender's cw signature. The feedback on timing accuracy can then be used to develop a clean fist.

Don't forget the BARTG Rally at Sandown Park on 25 August. ☐

SWL News

by Bob Treacher, BRS 32525*

VHF news

Once again the dx season on 144MHz was slow to start, but at the time of writing there had been tropo, to northern Germany and Scandinavia, and some good sporadic-E openings. Early June is the traditional starting date of the Es season, and 2 June provided Es to EA, EA6, while the afternoon of the 5th produced dx from 9H1, IIT9, SV, LZ, YO and YU. On 11 June YO, YU, SP and OK stations were audible. As usual when Es is about, most swls were at work, but on the evening of 6 June EA9 and CN8 were being worked.

Martin Parry, BRS52543, seems to have fared best in the quest for sporadic-E. He reported Es on 2, 5 and 6 June on 144MHz, while on 3 and 4 June Es signals were heard on 70MHz. Martin caught the following during the 2 June event: EA3BNB, EA3IH, EA3DLL, EA6ET (JM19), FC1CCG (JN13), I4XCC, I6XOG, I6GVY, IK6EIW/6 (all in JN63), I7VPF, YU7AR, YU7KWX and YU7POA (KN04). On 5 June IK5BME was heard at 1248, and on the 6th EA7AYD and EA7EBO were copied at 1450. Martin was copying both EA7s better with the beam to the southeast, and feels that they also had an Es opening to YU at the same time.

Dave Whitaker managed to catch only YU7AR during the 2 June event, but on 11 June he heard YU2RCS (JN65TF), IK2EAD (JN55EJ) and IW4AOD (JN64FD). It appears from the London area that YU and YO were heard, together with several HA and OK stations. Joan, BRS62088, was monitoring the band but only caught snatches of one dx station, probably a YU.

On the tropo scene, life had been fairly flat, but on 1 June Dave Whitaker caught SM6JDO (J066), OZ1KLU (J046), OZ9JT, OZ2BB and OZ1IJP (J04S) on 432MHz. Martin Parry stayed on 144MHz and logged dx in JO10, 21, 22, 23, 31, 32, 33, IN98 and JN19. Having been on vhf so little so far this season I have had to refer to the map to make sense of these JO locations.

The highspot of August is the Perseids meteor shower around the 12th/13th, and this is a good way of collecting exotic squares, when reflections are at their best. In the last few years, much good dx to the east has been audible, culminating with HGIW/Q in LH square last year. A few tips for

1985 HF COUNTRIES TABLE (Updates and additions only)

Station	DXCC	28	21	14	7	3-5	1-8	Total
BRS52543	188	32	88	139	120	133	61	573
BRS25429	183	35	65	124	108	133	67	532
BRS1066	145	33	71	113	93	70	51	431
FE8957	—	14	40	31	29	51	0	165
BRS20249	—	1	14	37	25	44	6	127

those who have not listened to me before. Do not expect big signals covering the whole of the band. Signals are often only around S5/6 and sometimes are only audible for a matter of seconds. Look for signals on ssb around 144-200MHz and 144-400MHz for random ms. The best time to listen is often during the evening of 12 August and early on the morning of the 13th, when signals from I and YU are usually particularly good. Let me know how you get on.

Dave Whitaker reported some interesting tropo happenings. On 20 May the 144MHz band was very quiet, but he heard a local station calling "CQ Scandinavia", and copied 56 signals from LA1BM (JO29AJ); no other Scandinavian signals were heard. He heard GM4LER at 59 off the back of the beam on 27 May, but swinging the beam north brought no further GM signals, and the Angus beacon was only 52. On 30 May he heard DG9BAX in QSO with another German station on 432MHz before the "lift" developed, and later that evening PA0RDY was heard working SM6JDO.

Following all his recent activity on both 144 and 432MHz, Dave sent G5UM a large batch of QSL cards and hoped to get the Senior Receiving Award for both bands, the 30/10 Squares Award for 432MHz and the 125/20 Squares Award for 144MHz. I believe Dave is the first to claim the 432MHz squares award (I still need three more cards!). Congratulations. Perhaps others such as BRS52543, 31976, 28198, 62088 will be stirred into action now to join Dave and myself as recent claimants of RSGB vhf awards. G5UM is ready and waiting for your claims!

A good battle is likely for the top spot in the uhf/vhf table this year. Let's make it more interesting and give the top two a run for their money. Entries to me in time for publication in the October issue.

HF report

David Hunter, BRS84664, found 14MHz particularly useful late in the evening. Many South American and Caribbean stations were heard, but the best dx was a 57 signal from HC8RS at 2239.

Brad Bradbury's pick of the month also came from 14MHz, where CE0FFD, T10RC, YN1CC and CP5LK were heard. 28MHz produced some South American signals, but some sporadic-E into Europe boosted Brad's band score for the year to a grand total of 33! Just behind Brad, on 32 for 28MHz this year, is Martin Parry who added much in the way of sporadic-E to boost his score. Among the European signals were CE, CX, LU and PY. On the lower frequency bands, XT2BR was a new one on 3-5MHz, while an 8RI on 7MHz was the best on that band. 14MHz was the best band, with BY, KH6, VQ9 and ZD7 the pick of the bunch.

Bev West, BRS86845, has 144MHz facilities and hopes to put a table score in later this year. He is studying for the December RAE and the morse test, while rtty reception is also practised from his Pontypool, South Wales, QTH with a spectrum computer. On 14MHz he had confirmations from A22BW, 9H4C, YC0GI, SV5TS, ZS6CC, JA1WVK, 4X4KM and OD5NG. Since October 1984 Bev has heard 201 countries on 14MHz, together with 98 on 7MHz and 109 on 3-5MHz.

Robert Small, BRS8841, considered the bands to have been poor in May and June, but had several KH6 and KL7 stations to show for his efforts. One new one on 3-5MHz was CX3TU, while 7MHz gave OH0MM/OJ0 for a new one on ssb. Apart from the KH6 and KL7s, 14MHz produced only FY5BB, 4X85WSE, WB1GIV/VOI (Bell Is), TZ6FS and WD8NPZ/DU2 of any particular note. 21MHz came up with dx in the shape of F6DVI/FH and 5Z4EN. On the QSL front, PY0FG, TL8AR, VK9XG and 4K1GDW were particularly welcome.

It seems I "dropped a clanger" when publishing the photograph of Stan Porter's shack earlier this year. The gentleman in the photo is Stan ORS45992, not the local Roman Catholic priest! Apologies for the mix-up.

Contest news

Contest participation by listeners in recent months has shown some improvement, and it is hoped that this trend will continue. For hf types the LZCW event falls on the first weekend of September, while the third weekend sees the Cray Valley event which falls nicely into the slot occupied by the SAC CW contest. The ssb offering occupies the following weekend. In September the 28MHz phone cumulatives take place on the 2nd, 10th, 18th and 26th. Next year's event will count for points in the SWL Championship, so why not get the feel of the event this year and see what conditions are like at the same time. A new contest this year—yet

1985 UHF/VHF TABLE

Station	QTH loc	70MHz Squares	Countries	144MHz Squares	Countries	432MHz Squares	Countries	Total
BRS52543	IO83	13	2	48	17	19	9	108
BRS25429	IO93	—	—	50	14	28	9	101
FE8957	JN13	—	—	14	3	—	—	17
BRS32525	JO01	—	—	10	5	—	—	15
BRS62088	JO01	—	—	6	3	—	—	9

another for the cw enthusiasts—is the 3-5MHz hopscotch event on 4 August. How about a few more swls taking part.

On vhf, the 144MHz open and IARU Region 1 event are in their traditional place on 7 and 8 September. This is usually the best-represented vhf swl event. Hopefully a good number of logs will be sent in this year. The 70MHz Trophy event is on 22 September, and is the last of the swl events of 1985 to count for the championship.

Belgian awards

Lambert Derenette, ONL7535, kindly sent details of the new Belgian awards directory. Published in English, this 80pp guide includes details of all the awards, together with space to record the details of the station heard/ worked. The cost is 15 ires and can be obtained from Lambert at Strandlaan 47, B-8460 Koksijde, Belgium.

Finale

News, views, table scores for the October issue should reach your scribe at 93 Elibank Road, Eltham, London SE9 1QJ by 20 August. ☐

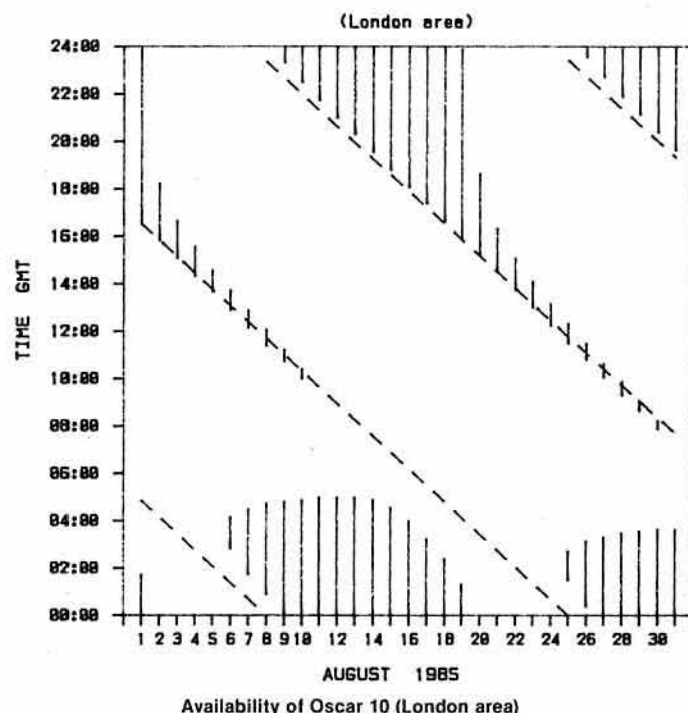
EPHEMERIS

Satellite news and views

by R. O. Phillips, G4IQQ*

RS satellites

The relatively difficult operating conditions for Oscar 10 earlier this year appear to have caused a surge in interest in the RS series of satellites, both from those who had used the satellites before the advent of Oscar 10 and newcomers to the scene. All three remaining satellites (RS5, RS7 and RS8)



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were receiving the benefit of very good solar illumination during May and early June, and their performance was better than had been seen for some time. Around 8 June it was reported that RS8 had in fact ceased to function; however, all appeared to be well a few days later. The problem appears to be associated with the degraded performance of the command receiver, resulting in difficulties in turning the transponder on again after the off days of the schedule.

Oscar 10

The satellite is now well into its third year of operation, and the month of June saw some of the best operating conditions to date, with the solar illumination and spacecraft orientation at apogee being close to optimum. However, by the time this issue is delivered the situation will have changed quite dramatically. Predictions of a period of major eclipses combined with poor sun angle will mean that a new operating schedule will need to be introduced. The only information available at the time of writing is that a change would be implemented on 1 August as follows: both transponders OFF MA 30 to MA 89; mode L from MA 190 to 205 and mode B from MA 206 to 29. (Check the cw bulletins (145·810MHz) on the hour and half hour for the latest information.)

The satellite orbit has now rotated around its plane such that the argument of the perigee is at 32·6°, hence the apogee now occurs when the satellite is about 14° below the equator, resulting in lower maximum values of elevation and shorter periods of visibility.

I have made a slight addition to the chart showing the availability of the satellite for the month; it now indicates the times of perigee for every orbit. These are indicated by the sloping dashed lines, eg, the perigees for 1 August occur at 0451 and 1631. The resolution is perhaps not too good, but it should put you in the right ballpark. If changes are made to the operating schedule in terms of the transponder switching times, it should still be fairly straightforward to evaluate the appropriate times when the satellite is both in range and the transponders switched on.

The relevant orbital data for the first orbit of the month are as follows:

Date	1 August 1985
Orbit number	1,605
Reference perigee	0451gmt
Argument of perigee	32·6

A final point on Oscar 10; the bulletin transmissions from the satellite are currently carrying a reminder that Mondays (gmt) are low power days. The same message is of course appropriate to operation through the RS satellites.

Uosat

Occasional problems with the Uosat Oscar 11 on-board computer (obc) have given rise to "hang-ups" during the transmission of whole orbit data (wod) every few months. The cause is thought to be a possible timing problem between software and hardware which may have been made worse by the current low temperatures of the spacecraft. The anomaly is not felt to be serious, but it is necessary to reload the obc software from the control station whenever the hang-up occurs.

Experiments with the satellite have concentrated on use of the particle wave equipment, with data being dumped at 4,800 bit/s afsk on the 435·025MHz downlink. The university of Surrey would be interested to hear from anyone able to receive such transmissions so that a suitable schedule which reflects users interests can be organized.

The university has announced the winners of its school's competition for the best report of tracking, receiving and assessing data from Uosat Oscar 9. The first prize of £100 was awarded to Milham Ford School, Oxford, and the runner-up was the Sir William Turner School, Cleveland.

Other news

The construction of the Japanese satellite JAS-1 has progressed very well, and the satellite was recently undergoing thermal-vacuum tests to ensure that it will perform correctly in a space environment. When all of these activities have been completed, attention will be turned to preparation of the software for the digital communications payload and the firmware for the tracking, telemetry and command functions. It looks like the launch date for the satellite will have to be delayed from the earlier announced date of the first quarter 1986. Problems with the existing Japanese broadcasting satellites has meant that replacement satellites will be needed as soon as possible, thus the February 1986 launch window will be used for that purpose. JAS-1 should follow in the next available window in August 1986.

The launch of the AMSAT Phase 3C satellite looks good for the summer of 1986 on the first flight of Ariane 4. However, it looks increasingly that the French satellite project, ARSENE, has run into some problems and may not be carried on the same flight. The difficulty appears to be with the kick motor, but it is hoped that the problem will be resolved in time for the second Ariane 4 launch later in the year. □

The Month on The Air

by John Allaway, G3FKM*

HOW MANY READERS have worked for a long time to qualify for an award, only to have it arrive in badly-damaged condition? One of your scribe's correspondents writes: "As a one-year-old call I have now discovered the annoyance of certificates and awards being bent in the post. Usually on the last lap of the journey when a large award envelope is used as a wrapper for a bundle of letters in the postman's sack. Is there a hope that you can influence other member societies to use cardboard rolls as does the RSGB? At least to use cardboard backed envelopes and to use "Do Not Bend" stickers. A slight extra charge would be well spent. . . ."

DXCC Honor Roll

June QST listed those in the top 10 placings down from the current maximum of 315 DXCC countries. UK calls and scores are as follows (figure in brackets is "all-time" countries confirmed): **Mixed:** 315 G3AAE (360), G3FKM (358), G3FXB (358), G3HCT (352), G13IVJ (355), GM3ITN (349), GW3AHN (360); 314 G2FSP (351), G3JAG (335), G3KMA (314), G4CP (361), G5VT (359); 313 G2FYT (349), G5RP (340); 312 G3LQP (330), G3UML (336); 311 G3KDB (327), G3HTA (333), G3JEC (334); 310 G3IOR (345), G3RCA (316), G3RUX (316), G3ZAY (323), G13OQR (339), GM3BQA (333); 309 G3GIQ (335), G3SJH (321); 308 G2BOZ (351), G3ALI (326), G3TOE (320); 307 G2DMR (328), G3DOG (330), G4DYO (313); 306 G3MCS (322). **Phone:** 315 G3FKM (354); 314 G5VT (359); 313 G3NLY (337), G3TJW (330), G13IVJ (355); 312 G3UML (336); 311 G3JEC (334), G5AFA (329); 310 G3ZBA (327), GM3BQA (333); 309 G3KMA (327), G3RCA (315), G3SJH (321); 308 G3TOE (320); 306 G3ZAY (319), G4DYO (312).

Don Wallace, W6AM

Older readers will well remember Don Wallace, probably the world's foremost dxer. He died on 25 May, aged 86, having transmitted since 1910 when he used the callign WU with a spark transmitter. During the first world war he was a radio officer in the US Navy, and in fact was on the USS George Washington when President Wilson was on board en route to the Versailles Conference. Don was one of the first group of amateurs invited to China to explain amateur radio. He was in top position in the DXCC Honor Roll for 25 years, and held annual open days at his home—a site



A group of Gs at the clubhouse of the Royal Jordanian ARS on the occasion of the visit by G4KLP in March. L to r: Peter, G8GLB; Alan, G3WUW; Colin, G3MUL/JY9CL; Keith, G3OVQ/JY9VQ; Kevin, G4ATZ/JY9WR; and Graham, G4KLP/JY8KL

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"Devon DXers". L to r (back row) G4YAG, G3TJW, G3HTA, G4EDG; (front row) G3MIR ex VS1HQ, VS9AQ, ZB1HC, G3RUX, G3RUV

sold to him by a press agency and containing a number of rhombic antennas, which finally became nine rhombics using 61 poles and some 45 miles of wire. The site of Don's station undoubtedly helped him with his extraordinary dx success, but most of it happened before news-sheets and "spotting nets" were around, and it was necessary to keep a close ear to the bands to learn about dx activity. The writer had the privilege of meeting Don two years ago, and was very impressed by the fact that he was still alert enough to take part in a round-table seminar on dx!

DX news

The JARL special station at the Tsukuba Expo '85 will be on the air until 16 September. Its callsign is 8J1XPO and it operates on all bands 3-5 to 28MHz with 500W of cw, ssb, rtty, fax and sstv. Any licensed amateur may operate the station without formal permission from the Japanese authorities.

BY1QH is still very active, and BY0AA and BT0NMN have also been worked. BY1QH has been a good ssb signal on 14,196kHz at 0700 and between 1930 and 2130 according to *DX News Sheet*, and the same source reports BT0NMN at the low end of 14MHz on cw at around 1600.

ST5ALR claims to be an Englishman engaged in food distribution work with a relief agency, who finds amateur radio a useful way of communicating with the UK. He says that he is in Nyala but there seems to be some doubt about his possession of an amateur radio licence.

VK0DJ and VK0ML, at Mawson Base, Antarctica, have been worked in the UK on 14MHz ssb around 0600. The latter is said to be on every Saturday from 0530 to 0730 on 14,105kHz. Amateurs in Australia have permission to use the VI prefix in place of the normal VK—this is to mark the 75th anniversary of WIA, the world's oldest national radio society.



Operators taking part in the expedition to Riekkalla Is in June 1984. L to r: Oleg, UB5MID; Andrei, RA6LBS; and Alex, RA1NA Photo: G3G1Q

10MHz TABLE

	All-time	1985
G3IGW	93	65
G4UZN	68	45
5B4DN	31	30
G5LP	36	—
G3UYR	33	—
G4RWP	4	—

28MHz TABLE

	1985
G3XQU - 78 (ssb)	G4NXG/M - 31
G3VOF - 78	GW4TEJ - 31
G4RAB - 75	G0AGP - 25
G4JBR - 71	G4VPD - 24
G4XAH - 62 (ssb)	G4YWG - 22
G4MUW - 42	G2FQR - 21 (ssb)
G4DXW - 36	G4FVK - 9
G4OBK - 33	G4RWP - 5
5B4DN - 32	

FW8AF will be leaving Wallis Is soon and the island will be without a resident amateur. He keeps a schedule with F8RV every day on 14,275kHz at 0800, after which he works other callers. There seems to be a new station on Tonga; A35PP has been worked on 14MHz ssb at around 0730.

Jim Russell, G3OKQ, arrived on Pitcairn Is on 1 June, and has been on the air as VR6JR using VR6TC's equipment. RS10906 logged G3OKQ/OZ/MM from HP to VR6 and copied his signals most days, which is somewhat surprising as Jim had only 100W to an 18AVQ antenna—but he did have rather a good "earth". Several stations have been heard from FO—FO8BI often on 14MHz ssb around 0630, FO8FO, FO8KS and FO8MM are also to be found at this time. FO8LV is on Bora Bora and also quite active.

HB9APJ and HB9ASJ will be on the air /OX from 2 to 25 August. Frequencies to be used include 7,020, 14,050, 21,050 and 28,050 (cw), and 7,080, 14,180, 21,180 and 28,580kHz (ssb).

Beacons

Copies of the latest version of reporting form for recording the signals of the NCDXF beacon network on 14,100kHz are now available from the writer (sase please). They use a simple and straightforward reporting code by using numbers of signal levels heard at the time of recording—"3" would mean that the 100W, 10W and 1W signals were heard, and "2" that only the 100W and 10W levels were audible. W6RQ, who is in charge of the records, reports that the Colombian beacon is not operational yet and that LU9CN has been appointed as trustee of the Argentinian beacon. The 4X unit has been off the air but should have been repaired by now.

W6RQ (in the Northern California DX Foundation newsletter) has written some explanation of the data transmitted from WWV at 18min past each hour. The first figure given is the solar flux, which is a measurement of the noise that the sun is putting out on 2,800MHz—W6RQ's theory why this frequency was chosen is that there were many surplus 10cm radar receivers and antennas available in 1946 when these studies began! This figure ranges between 300 plus at the peak of a solar cycle, to less than 70 in the trough, and it varies almost directly with the sunspot number. A solar flux of 300 is equal to a sunspot number of 300, and a flux of 67 is close to a zero sunspot count.

The a-Index is the second figure given, and this is the average of the disturbances in the earth's magnetic field during the previous 24h.

The K Index is the third figure, and this is the maximum disturbance in the earth's magnetic field during a 3h interval.

The a-Index is calculated from eight 3h K figures: in other words, the a- and K indices are the same disturbances presented in different ways. The a-Index is updated daily at 1818 and the K at 1818, 2118, 0018, 0318 etc.

Generally speaking, the higher the flux and the lower the geomagnetic index the better for hf band conditions. However, Al points out that there seems to be a "time lag" effect and that a day with an a-Index of 10 will probably be much better if the previous day also had a low index, and that a higher level then will often mean that conditions on the second day will not be so good. Another thought has been provoked by this—for the first part of October 1984 the solar flux and sunspot numbers recorded did not seem to be as bad as this suggested—there were better 21 and 28MHz openings than in 1975-6. Could this also indicate a time-lag between propagation and the observed solar conditions? W6RQ suggests that the a-Index should be used as a true indicator of a day's conditions, as a 24h delay is already built in. Send your comments (and report forms) to Al Lotze, W6RQ, 46 Cragmont Av, San Francisco, Cal, 94116, USA.

News from Guam

Edward L Campbell, KB6DAW/KH2, has just been elected as secretary of the Marianas ARC, and has kindly sent in details of some of the current goings-on in Guam. It seems that MARC is an active organization and supports the island with communications. The president of the club is John Connors, KG6JIC; the vice-president W1YRM; secretary KB6DAW, and treasurer KA8GVS. QSL bureau manager is Joe Frekot, AH2G. Active on the island are WH2ACV, KG6RN, KG6JJH, AH2AN, KS0C and Edward himself (all mostly on ssb), and K0AX, KS0C and AH2G (on cw), with

QTH CORNER

FV6PAX Beo Pierre Herbet, F8BO, La Deixiere, Mouen, F 14790 Verson, France
J28EI BP 2417, Djibouti.
JY9WR via G4ATS, G Oddy, 8 Pendas Way, Crossgates, Leeds LS15 8HX
N6YM/KH2 Gary Dein, 216 Holden St NCWP, FPO San Francisco, Cal 96630-1800 USA.
T31AT via G4GED, R Richardson, 92 Betham Rd, Greenford, Middx UB6 8SA.
T32AB Janice Weaver, N7YL, 2195 E Camero Av, Las Vegas, Nev, 89123, USA.
G3KQL/TT via W4BWS, 359 Glenwood Av, Salt Beach, Fla, 32937, USA.
TV6JUN Guy Vibet, F6EYM, 14 rue des Troenes, F 50000 St Lo, France.
YB0ARA now via WA6AHF, 17494 Via Alamitos, San Lorenzo, Cal, 94580, USA.
9X5SP now direct—BP 111, Kigali, Rwanda.

WIYRM and KG6DX also using Oscar. KD7P has left and took part in the recent KH4 expedition on his way back to the USA.

At the time of writing, openings have been beginning into W at 0300 and then these are followed by Central and South America. At 0630 the HIXDA net opens, and as many as 40 choice dx stations join in. At about 0930 21MHz opens into Europe, and into Africa at 1100—a schedule with QSL manager ZS2DK takes place at 1130 on 21,250kHz every Sunday. The USA becomes audible from 1130.

In two years Edward has worked 205 countries and he says: "Anyone who comes to Guam can find a lot of fun with amateur radio. DX is usually open to some part of the globe. We do have two repeaters, so please bring your gear along. Our club meets on the first Tuesday of each month and welcomes visitors—H44IA was our most recent. If you hear any of us on, please give us a call. We are always happy to rag chew. I hope to have a dxpedition to Johnson Is (KH3) around the next WPX Contest—but more info later."

Military bases in Cyprus

The latest list of ZC4 calls known to count for DXCC credit for the Sovereign Base Areas was issued by DXCC Manager Don Search, W3AZD, on 30 May. It is: ZC4s AB, AK, AKR, AM, ASG, AU, AJ, AVU, BI, BSG, CB, CI, CN, CS, CT, CW, CZ, DA, DY, EPI, ES, ESB, ESG, FE, GB, GM, HC, HMS, HS, ID, IK, IO, JB, JE, JH, JK, JU, JV, KF, LC, MR, MT, NL, PC, PM, RAF, RB, RM, RP, SC, SJ, SS, SB, TEN, TI, TX, TK, UHF, VHF, WD, WW and ZN.

Welcome . . .

. . . to the following who became members of the Society during May: HB9DAY, KL7AVX, LA2EG, LA6QBA, SK7CE, VK2BDG, VS6XPZ, W7CZH, 6Y5WC, and J Perez Moran (EA), O Ergun (TA) and E Mallett (F).

HF Convention

More details are now available, and it is now planned that there will be a twin lecture stream, with lectures on: hf propagation and the USSR satellites (G3IOR); antenna tuning units (G3RZP); the sunspot minimum (G3LTP); the dxpedition to Navassa Is (G3RFS); an introduction to contest operating (HF Contests committee); simple-sideband, milliwatt and "life begins at 40" (G-QRP Club); and, applying for planning permission (Society's planning panel). There will also be a planning forum, display of QRP equipment, RNARS QRQ cw tests, RSGB bookstall, dz quiz, GB2HF, an hf and hf contests forum, videos of dxpeditions, the "cw pile-up" tape, a car-boot sale, QSL checking for Society awards. In addition to these and other features, there will be the facility to take morse tests by prior arrangement with Gavin Williams, BTI Radio Station, Worston Lane, Highbridge, Somerset TA9 3JY (the £15 fee is payable on the day).

Awards

GB GCC Awards

During June Cannock Chase ARS ran five special event stations to assist the County Council "Care for Cannock Chase" campaign. An award is available to anyone who worked at least one GB GCC station during June. Send log extract plus details of 20 other QSOs where the last letters of the call signs of the stations worked spell out "Glorious Cannock Chase" and £1.50 to G1AZQ, QTHR, tel 0543 79160. The club wishes to thank the RSGB, Cannock Chase District Council, R Withers Communications, and Springhead Printers of Cannock for their assistance.

ECRA Award

This is issued by the Dutch Christian Radio Amateur Group. Licensed amateurs and listeners need 10 points by working/hearing ECRA members—each counts two. On Whit Monday, Boxing Day and Easter Monday QSOs are worth three points. More information is available from G3AGX, QTHR. The award costs DFL 10, USA \$3, or six ircs.

RNARS Silver Jubilee Award

To celebrate the 25th anniversary of RNARS, and available to licensed amateurs and listeners. It is necessary to contact/confirm reception reports with members of RNARS during 1985. It is in four classes: Class 1 (UK and Eire), five special stations and 25 members; Class 2 (Europe), five special stations and 15 members; Class 3 (DX), two special stations and five members; Class 4 (VHF), two special stations and 10 members. Send log data, certified by another amateur, plus £1 (UK and Eire, £1.50 elsewhere) to Award Manager,

G3HZL, Don Walmsley, 3 Meon Court, 609 London Rd, Isleworth, Middlesex TW7 4EW. Special stations include GB0s FAA, BRN, SCC, GB2s, RN, RNR, WRN, MN, MRN, GB3RN, GB4s RN, RM, RNA, RNR, FAA, SCC, WRN, STD, GV2ISO, GV4RN, ZB2s RNR, GRN, ZC4HMS, ZD8RN, ZL2RN, ZS5RNR, VE1s HMS, RCN, VK1RAN, VK3RAN, 9H3XRN and OZ1XRN. RNARS stations congregate around 1,840, 3,520, 7,020, 14,052, 21,052 and 28,052kHz on cw, and 1,930, 3,660, 3,740, 7,080, 14,135, 14,190, 21,360 and 28,933kHz on ssb.

Contests

The LZ DX Contest

0000 to 2400 1 September

3,510–3,560, 7,000–7,040, 14,000–14,060, 21,000–21,080 and 28,010–28,200kHz—cw only. Single-operator, single- and multi-band, multi-operator multi-band, and listener sections. Exchange RST and ITU zone (UK is 27). Each LZ QSO is worth six points, otherwise QSOs with stations in own continent count one point, and in other continents three. The multiplier is the number of different ITU zones worked on each band added together. Listeners score three points for logging both call signs and numbers of a QSO, one point for both call signs and one number. Use separate log sheets for each band. A summary sheet showing zones worked on each band and containing the usual signed declaration. Logs must be postmarked no later than 30 days after the contest and sent to CRC, PO Box 830, Sofia 1000, Bulgaria. Logs may be accompanied by applications for the awards listed in June MOTA.

SEANET Contest

0001 17 August to 2359 18 August

SSB section. Single-operator single- and all-band and multi-operator all-band. Exchange RST plus serial QSO number (from 001). QSOs with DU, HS, YB, 9M2, 9M6, 9M8, 9V1 and V85 count 20 points on 1–8MHz, 10 points on 3–5 and 7MHz, and four points on 14, 21 and 28MHz. QSOs with other SEANET countries count 10, 5, and 2 respectively. There is a multiplier of three for each SEANET country worked (A4, A5, A6, A9, AP, BV, CR9, C21, DU, EP, HL, HS, H44, JA, JD, JY, KA, KC6, KG6/KH2, KH6, KX6, P2, S7, VK, VQ9, V85, V6, VU, XU, XV, XW, YB, YJ, ZK, ZL, 3B6/3B7, 3B8, 3D, 4S7, 4X, 5W, 5Z4, 8Q, 9K2, 9M2, 9M6/8, 9N and 9V). Logs must reach Eshee Razak, 9M2FK, PO Box 13, Penang, Malaysia, no later than 31 October.

All Asian DX Contest

0000 24 August to 2400 25 August

CW section. Fuller rules were given in June MOTA. Photocopies of rules and log forms are available from G3FKM (sase please).

European DX Contest

0000 10 August to 2400 11 August

3–5 to 28MHz. CW only. Single-operator all-band, multi-operator single-transmitter sections. A photocopy of the full rules is available from G3FKM (sase please).

Keymans Club of Japan Contest

1200 17 August to 1200 18 August

CW only, single- and all-band categories. JAs send RST and Prefecture code, others RST and continent code. Each QSO counts one point, and the multipliers are the 46 Japanese prefectures on each band. Logs should show time, call sign, and exchange and multipliers first time worked. Use separate logs for each band and mark call sign on each sheet. Enclose summary sheet. Post before 31 October to Nagashima Takayoshi, JA7GAX, 20-6 Kabasawayama, Imogawa, Miyagi-town, Miyagi-Pref. 989-32, Japan. (The continent codes are AF, AS, EU, NA, SA and OC.)

Howdy Days

1800 4 September to 1800 5 September

For lady operators only. Copies of rules (sase please) from G3FKM.

Around the bands

"Not as bad as may have been anticipated", seems to have been the comment of most contributors, and this is borne out by G8KG's report as follows:

"At long last there has been a small upturn in solar activity. The provisional monthly mean sunspot number for May was 27.4—the highest value to come from SIDC Brussels for nine months. At the same time the 27-day average of the daily solar-flux readings rose to 84 sfu, a figure not seen since August of last year, while daily values exceeded 90 sfu on a few days in both April and May. Also in May there was a very welcome reduction in the level of geomagnetic activity, with no fewer than 19 days on which the A-index was 10 or less.

"It remains to be seen how strong and prolonged this recovery will be. It is most unlikely that it marks the end of the present cycle, and we can expect the overall trend to continue to be downwards for some time to come."

Thank you to the following for their loggings: G2HKU, G3YY, G5JL, G3s GVV, IGW, JJH, URA, YRM, G4s EHQ, FVK, GW4KGR, G4s LRS, MUW, OBK, GW4TEJ, G4s UOL, UYR, UZN, XAH, XLO, G0AGP, and RSs 10906 and 84323.

Calls listed in italics are as always those of stations using cw:

1-8MHz. 0300 LZ2KZA. 0500 W2. 2200 LG5LG. 2300 UA9CBO.
 3-5MHz. 0100 FR5DX, UP2NKIUF. 0300 W2JTV2A. 1800 UL7TX. 2100 CN8AQ. 2200 PT7PZ, YB0JH. 2300 TR8JLD, 5Z4MX.
 7MHz. 0200 TR8I. 0400 C6ANI, CE0ZIG, T10RCT, VU2AB, ZLs (to 0600). 0500 J88BL, PJ3MV, T18CCJ, ZSs 5LB, 6AL. 2100 VK7HA. 2200 YV5ANT. 2300 OZ5DLOJ, UA9CT, UL7CAD.
 10MHz. 0100 T12LK, VP2MDY. 0400 FG4CP, TKIDK9CG, W5ZF (N.M) 5B4OG. 0300 OA4SS, VE7VC. 0500 K2KTTIPJ, VE7DXE, VK2, 3, W7. 0600 KL7J, VE6-7, VK2-3, ZL. 0700 OY1R, W6. 1000 OZ5URIOY. 1500 W2, 4, 6, 7, 8, 1800 J28EI, ZS. 1900 W1. 2000 5N0NAS. 2200 EA6OV, FM5DD, KP4KS, T12PI, VP2MIX. 2300 CT2FN, LU9CV, OA4SS, V2A, VK6ABL, ZL3GQ.
 14MHz. 0100 6Y6A. 0300 J28EI, 9Y4GR. 0400 A92P, DL7FT/SV9. 0500 VR6s

JR, TC, W6-7. 0600 KB6DAW/KH2, KL7. 0700 T32AF. 0800 FW8AF, KH6WU, W6, 5X5GK. 0900 KL7FD, 5W1DZ. 1000 OX3UD. 1400 JA, VS6DO. 1500 TA2TAT. 1600 V85GA. 1700 4U1VIC. 1800 HL1CG, HS0A, UA1OT, 8J7ITU, 9X5SP. 1900 A71BK, TR1G, TU2LN/TZ, 3B8FP, 9Q5MA. 2000 T26WC, VP8PU, Y11BGD, 5T5RD, 5V7HL, 9M2CO. 2100 KB6DAW/KH2, S92LB, G3KQL/TT. 2200 CE0FQU, HC7FR, TA1E, W6-7. 2300 W6JKV/KP5, OD5SH.

18MHz. 0800 DL, J28EI, SM, Y. 1200 F, I, OYML. 1300 4X4. 1400 9J2BO. 1500 DL, OE. 2100 LU7ER. 2200 LX1PD.

21MHz. 0700 JA, VK6AEK, Y11BGD. 0800 HS0A, JY9WR. 1200 HS0AA. 1600 HH2WW. 1800 HZ1HZ, TU4BK, VP9JY. 1900 TA1E, TR1G, 5H3BH. 2100 FG4CH, VP2s MDG, MIN. 2200 CE6PV, TG9ET, W2-4.

24MHz. 0800 DL, Y. 1000 EA6DV. 1100 LA9MF. 1300 J28EI. 1600 SM6LQG/MM (S. of CT2). 1700 LU1DOW, ZB2I. 1800 I2VUC, LU5DJO, Y22TO.

28MHz. 0700 OE1EHB/5B4. 1200 VU2PY. 1300 PY2CDS. 1400 HB0CZS. 1500 OD5AS. 1600 7Q7LW. 1700 EA9IB, TK/DK9CG. 1800 C53FE, JW5NM, TA1E, TL8CK, TR8DR, 6W1NQ. 1900 OE3HGB/YK. 2000 CX, LU, PY, YV, 5B4DN. 2200 LU, PY, ZP.

Information was also obtained from the following publications, whose authors are thanked—*CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), the *Ex-G Radio Club Bulletin* (G13OEN/W6), *Long Skip* (VE3XN), the *Lynx DX Group Bulletin* (EA2JG/EA3CBQ), and *DX'press* (PA0GAM).

Please send everything for October issue to arrive no later than 29 August. ☐

HF F-layer propagation predictions for August 1985

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	000 024	001 060	111 246	122 802	000 024	001 060	111 246	122 802	000 024	001 060	111 246	122 802	000 024	001 060	111 246	122 802	000 024	001 060	111 246	122 802	000 024	001 060	111 246	122 802					
EUROPE																													
Moscow								11.	1	345	545	882	314	555	445	797	754	322	223	578	†4.				24†				
Malta								22.		355	545	893	523	655	556	798	987	432	223	589	††4	2.			25†				
Gibraltar								1.		34	322	782	3.	466	555	798	865	643	333	589	†††	3.			2††				
Iceland										2	221	351	2	1	345	555	687	746	543	333	467	††5	2.		234				
ASIA																													
Osaka										123	221			132	122	142					241				2.				
Hong Kong										123	334	41.		12	123	564					363				3.				
Bangkok								1.		124	333	32.	1.	1	113	574	2.			1	366				33				
Singapore								1.		1	234	332	1.	1	113	32.	2.			1	362				34				
New Delhi								1	1	1	1	1.	1	223	335	73	211	1	113	575	51.		1	367	2.	35			
Teheran								11	1	1	41.		2	323	335	782	423	1.	113	588	741		1	367	5.	35			
Colombo								11	1	2.			1	223	335		1.	1	113	253	41.			367	2.	35			
Bahrain								12	112	41.			2	323	335	774	533	1.	113	588	841			368	5.	35			
Cyprus				1.				123	212	64.			2	3	656	557	896	756	433	334	689	874	111	112	478	†4.	4†		
Aden								12	213	2.			1	1	322	346	724	733	1.	13	578	851			368	†2.	35		
OCEANIA																													
Suva (S)										112	2.	23.		1	422	11.	431			21			21						
Suva (L)										1.		42			4.		141			1	2.		21.						
Wellington (S)										21.		3.			2	42.	1.	51		1	2.		12.						
Wellington (L)												3		211	2.		33			1	2.		2						
Sydney (S)										1	431				1	331	12	212		1.		1	351			3.			
Sydney (L)										1.		4			21.	2.		34			21			51					
Perth								11		1	354	1.			211	131	111	32.		2.			1	362		33			
Honolulu										1		1	311		2	322	2	31.		2	21.		1.						
AFRICA																													
Seychelles								11	213	1.			1	323	346	6.		3	1.	113	55.	121			365	†2.	35		
Mauritius								12	223	2.			1	323	345	74.		3	1	1	113	573	5	1.		367	†2.	35	
Nairobi				1.				11	224	7.				422	346	83.		1	4	2.	13	574	613			367	†5.	35	
Harare				2.				11	335	72.				433	346	78.		4	3	31.	113	585	825	1.		267	††2	35	
Capetown								11	232					453	345	51.			521	113	55.	341	2.		262	††3	35		
Lagos				1	3.			1	235	83.				352	235	78.		43	52.	3	585	884	2.		267	5†3	35		
Ascension Is				21.				11	13	76.				53	224	795		3.	31	1	488	71.	1.		257	††	25		
Dakar				21.				1.	112	77.				153	223	694		651	431	1	378	885	21.		157	††3	25		
Las Palmas				1.				11	111	46.			2.	276	555	897		863	654	334	689	997	421	111	368	††4	3†		
S AMERICA																													
South Shetland								12	1.					1	1	112	565		1		1	112	633	1.		236	5†3		3
Falkland Is				1.				112	63.					1	335	67.			1	1	112	354	344	2.		126	††3		3
Rio de Janeiro				11.				1	111	56.			2.	4	333	577		752	12	1.	259	885	1.		27	††3		4	
Buenos Aires				1.				1	11	46.			2.	4	333	577		752	2	2	111	247	885	2.		15	††3		2
Lima										141			3.	11	332	246		841	131	11.	15	785	21.		2	4†3			
Bogota										31			3.	2	221	246		741	112	1.	14	685	21.		2	3†3			
N AMERICA																													
Barbados								141					3.	4	321	257		841	112	1.	26	885	21.		3	5†3			
Jamaica								21					3.	1	221	235		741	2	11	13	585	2.		1	2†3			
Bermuda								11					3.	2	221	256		731	2	1.	25	685	11.		2	3†3			
New York													2.	1	222	135		631	2	11.	24	475	1.		1	253			
Mexico													2.	1	121	123		421	1.	11.	1	265	2.			33			
Montreal													2.	1	222	245		621	2	111	124	475	21.		1	43			
Denver													1.		11	112		311	11	11.	2	145	2.			23			
Los Angeles															11	111		211	1.	12	1	35	2.			2			
Vancouver															1	111		112	211	112	111	25	21.			2			
Fairbanks															111	111	111	1	2	422	112	221	2	21.					

The provisional mean sunspot number for May 1985 issued by the Sunspot Index Data Centre, Brussels, was 27.4. The maximum daily sunspot number was 56 on 9 May, and the minimum was 8 on 30, 31 May. The predicted smoothed sunspot numbers for August, September, October and November are, respectively: (classical method) 13, 12, 11 and 10; (SIDC adjusted values) 9, 6, 4 and 2.

Contest News

April 1985 70MHz and SWL Contest results

This contest was moved from June to avoid a clash with HF NFD, which had resulted in many adverse comments and, predictably, several contestants asked for it to be moved back to June in 1986. In fact it was better supported in April.

Conditions were generally said to be average, declining as the event continued, and scores were certainly lower than in June 1984. Stations in the south reported the reverse, with best conditions towards the end. Several operators commented on the high operating standards which prevail on 70MHz, and everybody enjoyed the event. Nevertheless, logging was not, in some cases, to the standard expected on this band.

One group was operating from the English Channel, according to their given locator code, which presumably accounts for mistakes in half the logged contacts made by their five operators. Congratulations and certificates to GW4MGR/P, G3PMH/P, G4ZAP, G4NRG and BRS52543.

G4JLG

ALL OTHER STATIONS SECTION						
Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	GW4MGR/P	561	75	IO83JA	G3YF	349
2	G3PMH/P	408	67	JO02BH	EI2CA	427
3	G4FRE/P	390	55	JO02KD	G3YJX	438
4	G3UAX/P	367	66	IO91GI	G3BW	380
5	G4HLX/P	313	61	IO91FN	G3BW	357
6	G4RXD/P	308	53	IO83XD	G3YJX	353
7	G4DDC/P	293	64	IO91RU	EI2CA	398
8	G3WOR/P	255	45	IO90TV	G3TSJ	319
9	G3YMH/P	240	48	IO90SV	GW4MGR/P	301
10	G4FOH/P	217	49	IO92WE	G3BW	350
11	G3BPM/P	214	30	IO80NV	G3OJ	313
12	G4ILUA	209	39	IO90WQ	G4CAX	327
13	G3UEY/P	170	42	IO92GA	G3BW	303

FIXED STATIONS SECTION						
Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4ZAP	357	58	IO93DC	G3YJX	360
2	G4NRG	280	55	JO01EN	G3YJX	385
3	G4MHC	265	54	IO82UC	G4VXR	246
4	G3WHK	249	52	IO91UJ	G3YJX	341
5	G3YJX	246	23	IO90NM	G4FRE/P	437
6	G4NBS	239	45	JO02AF	G3YJX	390
7	G4FRO	239	42	IO81QM	G3VVT	310
8	G4CIZ	193	41	IO91KI	GW4MGR/P	234
9	G4VXR	190	28	JO02OO	G3BPM/P	344
10	GW4HKB	178	29	IO81KP	G3OJ	285
11	G4CAX	167	32	IO83RF	G4ILUA	327
12	G4WNF	102	32	JO01BL	GW4MGR/P	275
13	G4EYD	95	28	IO92AJ	G4FRE/P	215
14	GM4CAZ	39	7	IO85KV	GW4MGR/P	442
15	G3JDM	21	9	IO92WS	G3PMH/P	163

LISTENERS SECTION						
Posn	Station	Points	QSOs	QTH	Best dx	Km
1	BRS52543	180	27	IO83LT	G3WOR/P	371
2	BRS28198	53	12	JO00HX	GW4MGR/P	346

Check logs from G4BIK and G5DQA acknowledged.

Marconi Memorial Contest 1984 results

The following results are extracted from full tables supplied by ARI. Full results are available from G3XDY, QTHR, on receipt of an sae.

Multi-operator section						
Posn	Callsign	QTH	QSOs	Points	Posn	Callsign
1	OK1KTU/P	GK45d	446	154,885	95	G2VJ/P
2	DK0BN/P	DJ09b	413	126,102	112	GW4MGR/P
3	14KLY/I	GD11e	253	115,701	115	G4EZA
54	G4NUT	ZM77a	234	55,069	134	GW4TTU/P
82	G4SFI/P	AM06d	108	37,757	139	G4RGK
89	G4JGK	AL33g	151	34,501	144	G4AGQ
101	G4EKT/P	ZO79b	113	31,311	165	G4BUO
102	G3SDS/P	YK28c	118	31,068	166	G4XEN
120	G4VXE/P	YL20a	104	24,416	167	G4BLX
122	G4RST		114	21,775	184	G4ERG
138	G4HVC	ZN78f	59	15,715	197	GW4ALG
145	GM3LYK/P	XO26e	29	10,474	218	G4NSE/P
148	G4VIX	AL32g	67	9,632	246	G4VBG
155	G4UJS	YM78j	46	8,519	257	G3ILO
Total entries 168						
Single operator						
Posn	Callsign	QTH	QSOs	Points	Posn	Callsign
1	YU4CF	IE05b	330	122,926	282	G4TIL
2	OK2BWW/P	HK29b	342	111,822	283	G3DAO
3	OE1JNB/3	II52g	354	107,568	300	GW3POM
55	G4MDZ	AL76b	130	41,202	341	G2DHY
61	G4NDG/P	YK21f	147	40,326		
66	G3POI	AL51g	127	37,991		

Total entries: 385

Region Round-up Contest 1985 results

Yet again this contest attracted almost the same number of entrants as in the previous year, but this time there was one less in Section A and only one entry in the receiving section.

Conditions do not seem to have been of the best, typical comments being:

"Conditions considerably poorer than last year—especially on 7MHz"—GM3ZSP; "7MHz even worse than in 1984 or at least the band opened later"—G2HLU; "What a contest! 7MHz virtually unusable"—G3FKH; "Another enjoyable contest. Timing just right. 7MHz hard going but worth retaining because it sorts the men from the boys—guess I'm just a teenager!"—G3NKS.

The top three scores broke down as follows:

Callsign	Frequency	QSOs	Multipliers
G3SXW	3-5MHz	84	19
	7MHz	30	16
GM3ZSP	3-5MHz	64	17
	7MHz	49	14
G4OBK	3-5MHz	75	17
	7MHz	31	14

G3SXW used a Ten-Tec Triton 4 and dipoles. GM3ZSP and G4OBK both used FT107Ms, the former having half-wave inverted-Vs, and the latter a dipole on 3.5 and 7MHz and an inverted-L on 7MHz as well.

The standard of log keeping was good, and if extra marks were earned for neatness they would certainly have been awarded to G2HLU, G3SYA, and G4EOF, whose logs were a pleasure to check!

The HF Contests Committee wishes to thank all who took part and looks forward to a larger number of participants next year, perhaps following some rule changes.

Certificates will be awarded to G3SXW, GM3ZSP, G4OBK, G4ARI, G4ELZ/P, G3PRD/P and RS1066.

John Allaway, G3FKM

SECTION A						
Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs
1	G3SXW	114	11,935	17	G3CCZ	68
2	GM3ZSP	113	10,478	18	G4CNY	56
3	G4OBK	106	9,734	19	GW4PXQ	58
4	G3PDL	99	9,176	20	G3LHJ	56
5	G3FKH	99	9,114	21	G4UZN	69
6	G3NKS	102	8,874	22	G4RPW	62
7	G3SYA	97	8,700	23	G3AWR	51
8	G4OTU	87	7,680	24	G3MUO	65
9	GW3JI	83	7,056	25	G4SND	58
10	G4KGG	81	7,018	26	G4HZF	55
11	G4UMS	80	6,720	27	G4NSE	53
12	G4FBX	78	6,552	28	G4OKN	41
13	G4EOF	98	6,174	29	G3GMM	45
14	G4OGB	82	5,904	30	G4HZV	40
15	G2HLU	78	5,592	31	G3MCK	35
16	G5MY	71	5,512	32	G3ILO	16

SECTION B—QRP						
Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs
1	G4ARI	79	5,640	3	G3PRD/P	49
2	G4ELZ/P	69	5,454	4	G3SB	29

RECEIVING SECTION			
Posn	Station	Points	Receiver
1	RS1066	5,082	Yaesu FR101S
			Antenna 120ft long-wire

Thanks are due to G3WRR and G4FJZ for check logs.

1985 Ropoco 1 Contest results

The HF Contests Committee is pleased to report an over 40 per cent increase in entries received for this contest, and it appears that the short sharp type of contest meets with majority approval. Some entrants lost a considerable number of points due to unmarked duplicates, and it seems that some do not check their logs for duplicates even when they only have 50 or so QSOs; maybe the 10-times rule for loss of points should be increased.

Many thanks to all those who submitted logs, with a special mention of the Gloucester ARS which submitted seven logs.

G3KDB

Posn	Callsign	Points	Posn	Callsign	Points
1	G4NUT/A (G4BJM op)	891	30	G4ECI	511
2	G3PDL	834	31	G4UMS	508
3	G4OBK	825	32	G4EBK	501
4	G3RTE	792	33	G3XBY	500
5	G3OLB	764	34	G4IUZ	498
6	G5LP	759	35	G3GCC	488
7	G4BWP	744		G3HQH	484
8	G3SXW	740	37	G4KGG	480
9	G4DJX	737	38	G4PQD	475
10	G3VVG	724	39	G3MUO	464
12	G4MUL/A	721	40	G3IGU	461
13	G4BUO	704	41	G4OGB	440
14	G3SYA	678	42	GW4PXQ	438
15	G4UML	677	43	G3MA	434
17	G3MXJ	664	44	G4BOU	432
18	G3SWH	657	45	G3AWR	428
19	GW3NYY	657	46	G4MEM	418
20	G4OTU	614	47	G8FC	412
21	G4XFB	597	48	G4ELZ	411
22	G3JGG	594	49	G3HKO	410
23	G4KRS	577	50	G4OKN	398
24	G3TVW	571	51	G3SZG	392
25	G3CCZ	567	52	G4HZV	391
26	G4HFT	564	53	G4SND	380
27	G3ILO	559	54	G3LOI	370
28	G3UFY	541	55	G3LHJ	365
29	G3RXP	521	56	G5ECD	344
	G4WWW	517	57	G4PTX	319
	G2HLU		58	G3VDF	

Posn	Callsign	Points	Posn	Callsign	Points
59	G8QM	317	69	G3SB	264
60	G3BPM	314		G4KLO	
61	G4OXC	304	71	G3GMM/A	254
62	G3HTI	297	72	GM4OSS	251
63	G3CQR	294	73	G4XQK	204
	G4CLR	294	74	G4FJZ	190
65	G3MCX	290	75	GM4LVW	180
66	GOAGP	288	76	G4RCT	98
67	G4HZF	274	77	G4PVB	57
68	G4NSE	267			

Check logs received from: G3BMO, G3FXA, G3LP, GW4GXG.

Low Power Contest April 1985 results

Last year's write-up started "Interest in QRP is on the increase!" For 1985, one could add "and it still is!". The UK entry increased from 27 to 39 in spite of the hopeless conditions on 7MHz. The overseas section, although small, is supported by many of the same "regulars" each year.

The HF Contests Committee hopes to receive even more logs next year, especially from those many QRP stations who made QSOs during the contest but who didn't put in a log this time! Among comments received were: "Good fun, though I wonder why I bothered to make a 7MHz transmitter specially for the contest!"—G2HLU. "My QRP power based upon G-QRP Club's award scheme of 3W output"—G4JFN. "Using a 500ft lw and 120ft leg rhombic for 7MHz"—GM3OXX/A.

Subject to approval of Council, G4OSY will receive the 1930 Committee Cup. G3TXF

SECTION A						
Posn	Callsign	Power (W)	QSOs 3-5MHz	QSOs 7MHz	Points 3-5MHz	Points 7MHz
1	G4OSY*	3	99	—	1,344	—
2	GM3OXX/A*†	1	86	—	1,234	—
3	G4GQR (op G4UNX)*	5	84	1	1,089	5
4	G5ECD*	5	78	3	1,028	25
5	G4EYE	3	78	—	1,049	—
6	G3AZ	5	79	3	993	35
7	G4ELZ/P	1	71	—	1,010	—
8	G4OTU	4	64	5	920	65
9	G3KKQ	3	73	2	937	30
10	G8DV	5	61	—	892	—
11	GW4XXP	3	71	—	889	—
12	G4SBU	5	66	—	832	—
13	G3DNF	5	55	—	775	—
14	G4PIQ	5	51	4	657	60
15	G4JFN	3	49	—	694	—
16	G2HLU	1	42	1	588	15
17	G4KLQ	5	42	—	589	—
18	G3AWR	5	36	4	520	40
19	G3VIP	5	37	4	492	47
20	G4XUV	4	35	—	499	—
21	G4SXE	5	34	—	476	—
22	G3MCK	3	34	—	470	—
23	G3BCC	5	32	—	450	—
24	G8QM	5	30	—	420	—
25	G4XFB	4	28	—	414	—
26	G3NKS	1	28	—	395	—
27	G4JJN	4	28	—	387	—
28	G13PDN	3	27	—	380	—
29	G4ZME	5	25	—	340	—
30	G4EHT	2	25	—	321	—
31	G4OJP	5	25	—	314	—
32	G4MIJ	5	20	2	279	7
33	G3ILO	1	15	—	225	—
34	G3NNK	5	14	—	215	—
35	G3JKY	4-5	11	8	135	70
36	G8PG	3	14	—	177	—
37	GM4XNQ	3	11	—	155	—
38	G0BBL	3	9	—	110	—
39	G4PVB	3	5	—	69	—

SECTION B						
Posn	Callsign	Power (W)	QSOs 3-5MHz	QSOs 7MHz	Points 3-5MHz	Points 7MHz
1	DL1SN*	5	2	7	30	105
2	OK1DKW*	5	—	8	—	110
3	OK2BMA*	5	—	4	—	60
4	OK1DNM	3	—	1	—	12

* Certificate winners.

† Also received certificate for highest-scoring station using 1W input or less.

Check logs were gratefully received from G3BDQ and G4BCY.

RSGB SSB Field Day/IARU Region 1 HF Phone Field Day 1985 rules

1. **Eligible entrants.** Members or groups of members of the RSGB located in the British Isles.

2. The general rules for RSGB hf contests, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply.

3. **Period.** 1500gmt Saturday 7 September to 1500gmt Sunday 8 September.

4. **Sections.**

(a) **Open.** Multi-operator, maximum licensed power. Equipment: one transmitter and one receiver, or one transceiver plus an additional receiver if desired. Antenna: no restriction.

(b) **Restricted.** Multi-operator, 200W p.e.p. input maximum. Equipment: only one transmitter and one receiver, or one transceiver. Antenna: only one antenna may be used which must be a single element such as a dipole, long wire, W3DZZ, or trapped vertical, having not more than two elevated support points. No part of the antenna may be higher than 15m above ground level.

Notes (these apply to both sections).

(i) Stand-by equipment is allowed, but it may not be connected at the same time as the main equipment.

(ii) The use of support points for antennas from permanent buildings or structures is not permitted.

5. **Location.** Each portable station must operate from the same site for the duration of the contest and may not be located in a permanent building or use public mains supply.

6. **Power.** Power for all equipment may be derived only from a portable generator on the site, accumulators, or batteries.

7. **Installation.** No equipment or antennas may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to the storage of equipment.

8. **Contacts.** Phone only in the 3-5, 7, 14, 21 and 28MHz bands.

9. **Contest call and exchange.** Call "CQ Field Day". Exchange RS plus serial number starting with 001.

10. **Scoring**

(a) QSO with a fixed station in IARU Region 1 ... 2 points

(b) QSO with any station outside IARU Region 1 ... 3 points

(c) QSO with a portable or mobile station in IARU Region 1 ... 5 points

See Appendix for list of IARU Region 1 countries.

11. **Multiplier.** Each DXCC country worked on each band gives one multiplier.

12. **Final score.** The total points scored on all bands is to be multiplied by the total number of different countries worked on each band to give the final score (ie total QSO points × multiplier = final score).

13. **Logs.** Separate logs are required for each band, together with a check list showing the countries worked on each band. Log sheets are to be headed: date/gmt; station worked; RS and serial number sent; RS and serial number received; operator; new country/multiplier; points. RSGB HF Contest Log Sheets should be used.

14. **Declaration.** Logs must be accompanied by an RSGB HF Contest Cover/Summary Sheet with the declaration signed by the person responsible for the contest entry.

15. **Address for logs:** RSGB HF Contests Committee, c/o P. Miles, G3KDB, PO Box 73, Lichfield, Staffs WS13 6JJ.

16. **Deadline for logs:** postmarked not later than the Monday 22 days after the end of the contest.

17. **Awards.** The leading station in the Open Section will receive the Northumbria Trophy. The leading station in the Restricted Section, and the entrants placed second and third in each section will receive certificates of merit. Certificates will also be awarded to the stations submitting the leading check log from each continent.

IARU Region 1 will award certificates to the top 10 stations in each section in the combined results table.

18. Any log found to contain more than five unmarked duplicate contacts for which points have been claimed will be automatically disqualified. Points to the rate of 10 times the contact value will be deducted for each unmarked duplicate contact up to five.

Contests Calendar

May-September 10GHz Cumulatives (*Rules in April issue*)

May-September Microwave Cumulatives (*Rules in April issue*)

4 August 3-5 Hopscotch (*Rules in June issue*)

4 August DF Qualifying Event, Salisbury (*Details in July issue*)

10, 11 August European DX (*Rules in August MOTA*)

17, 18 August Seanet (*Rules in August MOTA*)

17, 18 August Keymans Club of Japan (*Rules in August MOTA*)

18 August 1,296/2,320MHz (*Rules in June issue*)

18 August DF Qualifying Event, Coventry

24, 25 August All-Asia DX (*Rules in August MOTA*)

25 August ROPOCO 2 (*Rules in July issue*)

25 August GARTG-RTTY 1985 (*Rules in April MOTA*)

1 September LZ DX (*Rules in August MOTA*)

4-5 September Howdy Days (*Rules in August MOTA*)

7, 8 September IARU Region 1 VHF/UHF/SHF (*Rules in July issue*)

7, 8 September 144MHz Trophy and IARU (*Rules in July issue*)

8 September DF Qualifying Event, Slade

2, 10, 18, 26 28MHz Phone Cumulative

September

14/15 September International ATV (*Rules in April issue*)

22 September 70MHz Trophy (*Rules in July issue*)

29 September DF National Final, Northampton

5, 6 October 432MHz-24GHz and IARU (*Rules in July issue*)

5, 6 October GARTG-SSTV 1985 (*Rules in April MOTA*)

8 October 432MHz Cumulative

12 October GARTG-RTTY 1985 (*Rules in April MOTA*)

12 October DF Double Night Event, Slade

13 October 21/28MHz Phone (*Rules in May issue*)

16 October 1,296/2,320MHz Cumulative

20 October 21MHz CW (*Rules in May issue*)

24 October 432MHz Cumulative

26 October DF Treble Night Event, Mid-Thames

27 October 70MHz Fixed

1, 17 November 1,296/2,320MHz Cumulative

2, 3 November 144MHz CW

3 November WAB CW (*Rules in February MOTA*)

9, 25 November 432MHz Cumulative

9, 10 November 2nd 1-8MHz

11, 19, 27 28MHz CW Cumulative

November

5, 13 December

1 December 144MHz Fixed

3, 19 December 1,296/2,320MHz Cumulatives

11 December 432MHz Cumulative

15 December 70MHz CW

Appendix

IARU Region 1 countries include those in Europe, Africa, USSR, Mongolia, ITU Zone 39. For a precise definition refer to the RSGB *Amateur Radio Operating Manual*.

432MHz Cumulative Contest 1985 rules

1. 1930-2200gmt, 8 October
2. 1930-2200gmt, 24 October
3. 2030-2300gmt, 9 November
4. 2030-2300gmt, 25 November
5. 2030-2300gmt, 11 December

There will be separate sections for fixed and all other stations, and multi-operator entries will be accepted in either category. Entrants should provide a summary of the claimed scores from each session. Logs should be clearly marked with the session number and date on each sheet.

The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply: 1, 2, 3, 4e, 5a, 6a, 7a, 9, 10a, 11b, 12b, 13-24.

All entries and check logs to: VHF Contests Committee, c/o A J Collett, G4NBS, 10 Quince Road, The Limes, Hardwick, Cambridge CB3 7XJ.

1,296/2,320MHz Cumulative Contest 1985

1. 1930-2200gmt, 16 October
2. 2030-2300gmt, 1 November
3. 2030-2300gmt, 17 November
4. 2030-2300gmt, 3 December
5. 2030-2300gmt, 19 December

This year a cumulative contest for 2-3GHz will run concurrently with the 1-3GHz event. Each event will be scored separately, and crossband contacts from 2-3GHz will count for half points. There will be a single section in each event, to include both single- and multi-operator entries. Entrants should provide a summary of the claimed scores from each session. Logs should be

clearly marked with the session number and date on each sheet. The leading fixed and portable stations, and the overall runner-up, will each receive certificates.

The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 9, 10a, 11b, 12b, 13-24, 2, 320MHz: 1, 2, 3, 4a, 5a, 6a, 7a, 9, 10b, 11b, 12b, 13-24.

All entries and check logs to: VHF Contests Committee, c/o T Melvin, GM8MJV, 2 Dudley Avenue South, Edinburgh, Scotland.

70MHz Fixed Station Contest 1985 rules

1000-1500gmt, 27 October 1985

The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 9, 10a, 11a, 12a, 13-24.

All entries and check logs to: B J Morton, G4HWA, 39 Green Lane, Blackwater, Hampshire GU17 9DG.

DF Qualifying Event—Coventry

Date. 18 August 1985

Map. OS Sheet 140 1:50000 series, Coventry and Leicester

Assembly. 1300bst for start 1320bst

Location. Kenilworth Castle car park, off B4103, NGR 280720

Competitors requiring tea should notify Mr N Rathbone, 7 Foreland Way, Keresley, Coventry, West Midlands, tel 0203 337124, by 11 August.

DF Qualifying Event—Slade

Date. 8 September 1985

Map. O.S. Sheet 139 1:50000 series, Birmingham

Assembly. 1300bst for start 1320bst

Location. Beacon Hill car park, NGR 986757

Competitors requiring tea should notify Mr John E Drakeley, 186 Conway Road, Fordbridge, Birmingham B37 5LD, tel 021-770 3474 by 30 August.

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. Basic unchanged information on other affiliated organizations will be published again in January 1986.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the October issue should reach them by 16 August and for the November issue by 13 September.

Club programmes are given in order of date, subject, time and place of the meeting. All call signs 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 B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ.
Tel 051-722 3644.

Ainsdale (AARC) (G20A) 13, 27 August (Normal meetings, 8pm Scout HQ, Marine Drive), 3, 4 August (GB2WR in operation at RAF Woodvale, hf and vhf), 6 August (Visit to Merseyrains main power-control room) 20 August (DF hunt, start at Mere Brow), Sec G4TUP, tel 35947.

Barnoldswick (Rolls-Royce ARC)—7 August (Visit from Bert Donn, G3XSN, Regional 1 Representative), 8pm. Sports & Social Club. Sec G4ILG, tel 0282 812288.

Blackburn (E-LARC)—6 August (Visit to British Nuclear Fuels at Salwick), 27 August (Informal), 3 September (Surplus equipment sale), 7.30pm. Conservative Club, Cliffe Street, Rishton. PRO G6LXU, tel Great Harwood 887385.

Chester (C&DARS)—27 August (Pre SSB HF field day contest meeting), Morse Classes 7.15pm before main meeting 8pm. Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Contact G4EZO, tel 40055.

Fylde (FARS)—6 August (Visit to Lytham CAA Radar), 20 August (Topband fox hunt, assemble at

club 7.45pm), Kite Club, Blackpool Airport. Sec G8GG, tel 725717.

Kendal (Westmorland RS)—13 August (Noggin and natter), 8pm. Strickland Arms, Sizergh, near Kendal. Sec G11IE, tel 0539 28491.

Liverpool (L&DARS)—6 August ("50 years of radio", G6KS), 13 August (Open night), 20 August (Isle of Man planning), 27 August (Junk sale), 8pm. Churchill Conservative Club, Church Road, Wavertree, Liverpool 15. Sec G6XBK, tel 051 427 8557.

Manchester (SMRC)—2 August ("Propagation", G3SVW), 9 August ("Paint—its uses and misuses", G6EAO), 16 August (TBA), 23 August (DF contest, 160/2m), 30 August (TBA), 8pm. Sale Moor Community Centre, Norris Road, Sale. Sec G3WFT, tel 061 973 1837.

Manchester (WestMRC)—18 August (Mobile rally, Haydock Park Racecourse), parking is free and admission by programme 50p. Contact G6YIO at Club, c/o Astley & Tyldesley Miners Welfare, Meanley Rd, Gin Pit Village, Astley, Tyldesley, Manchester.

Penrith (Eden Valley RS)—15 August (Car treasure hunt), 7.30pm. Kings Arms, Temple Sowerby. Sec G1FBD, tel 0768 88260.

Preston (PARS)—1 August (Informal), 15 August (Final preparations for the rally), 29 August (Audio-visual evening, G3UEC), 8pm. Lonsdale Club, Fulwood Hall Lane, Fulwood, Preston. Sec G3ZXC, tel 0772 718175.

Tarporley (Mid-Cheshire ARS)—7 August (Closed), 14 August (Radio evening social and Bar-B-Q), 21 August ("50MHz", G4RXD), 7.30pm, Cotebrook Village Hall, Off the A49, Cotebrook, Near Tarporley. The rally on 6 May was a great success and we wish to thank all the traders and club members for their great effort. Sec, G4VOH, tel Winsford 4719.

Thornton Cleveleys (TCARS)—5 August (Informal—station on the air), 7 August (Visit to Red Rose Radio Station, 7.30pm), 12, 19 August (Informal, club station on the air), 26 August (Bank Holiday—no meeting), 7.30pm. Norbreck 1st Scout Hut, Carr Road, Bispham. Sec G4WIC, tel 0253 821 827.

Wirral (W&DARC)—7 August (D&W, The Harp, Ness), 11 August (Fifth and final Sunday df hunt—start from Heswell 2.45pm), 14 August (Mobile treasure hunt—start from Irby 8pm), 18 August (Club entry in the 1296/2320MHz contest), 21 August (D&W, Saughall Massie Hotel), 28 August (Surplus equipment sale), 4 September (Quiz team as guests of the Wirral ARS at Heswall), 8pm. Irby Cricket Club, Mill Hill Rd, Irby. Sec G8TRY, tel 051 630 1393.

I would like to thank Stockport RS and Wirral & DARC for their hospitality and courtesy during my recent visits.
RR1

Region 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, North Humberside

HU17 7LX.

Doncaster (D&DARC)—Fourth Tuesday in each month, 7.30pm. SYPT Club, North Bridge, Doncaster. Net nights on Tuesdays and Thursdays on 144-775, 8pm. PRO G4ZWQ, tel Don 0302 857526.

Goole (GR&ES, G8HSG)—6 August (Natter night), 11 August (Barmston beach party), 13 August (Mini df), 20 August (Computing evening), 21 August (Visit to BBC TV Centre), 27 August (Map reading—practical session), 7.30pm. Goole Junior Chambers, Boothferry Rd, Goole, Details G8IOH, tel 040-584 462.

Hull (H&DARS, G3AMW)—2 August (DF hunt), 9 August (Club construction project). West Park Recreational Centre, Walton St, Hull. Details G4PEP, tel 0482 77249.

Maltby (MARS)—2 August (Three-in-a-row, short lectures by club members), 9 August (Junk sale), 16 August ("Getting on 144MHz ssb on the cheap", G1CAQ), 7pm. School Buildings, Church Lane, Maltby. Details G3ZHI, tel 0709 814911.

Todmorden (T&DARS)—5 August (Chat night), 19 August (Talk, by leading antenna manufacturer), 8pm. Queen Hotel, Todmorden. Sec G6MDB, tel Todmorden 2494.

REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT.
Tel 0203 616941.

Birmingham (Midland ARS)—20 August ("Amateur tv", G8GWN), 294a Broad Street, Birmingham, B1 2DS. Sec GBBHE, tel 021-422 9787.

Bromsgrove (BARS)—27 August (Natter night), 8pm. New meeting place and secretary. Hundred House, Stourbridge Road, Bromsgrove. Regular morse classes open to all. Sec G4LVK.

Coventry (CARS)—2 August (144MHz df hunt), 9 August (Night on the air), 8pm. Scout HQ, 121 St Nicholas St, Radford, Coventry. Sec G4JDO, tel 73999.

Dudley (DARC)—12 August (General meeting), 7.45pm. Allied Centre, Greenman Alley, Tower St, Dudley. Sec G4NRA, tel (0384) 278300.

Halesowen (MEB Sports & Social Club RC)—13 August (General meeting), 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.

Hereford (HARS)—1 August (Surprise night), 15 August (Informal meeting), 8pm. Civil Defence HQ, Goal St, Hereford. Sec G3WRQ, tel (0432) 54064.

Kidderminster (K&DARC)—14 August (Committee meeting), 8pm. Aggborough Community Centre, Hoo Rd, Kidderminster. Sec G8WOX, tel (0562) 751584.

Rugby (RATS)—20 August (DF hunt), 7.30pm. Cricket Pavilion, "B" entrance, Rugby radio station. Sec G4TWH.

Shropshire (Salop ARS)—1 August ("Frequency synthesis", G3SES), 8 August (Natter night), 15 August (Discussion night), 22 August (Natter night), 29 August ("What can the matter be", G3UDA), 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G6DQY, tel 92-260668.

Stratford-upon-Avon (SuA&DARC)—August, change of venue to Baptist Church, Payton St, Stratford-upon-Avon. Normal meetings, second and fourth Mondays in each month. 7.30pm. The control tower, The radio station, Bearley, Nr Stratford. Sec G8OVC, tel S-on-A 750584.

West Midlands Police (ARC)—This is a new club in the area. Sec D Mytton, tel 021-458 3236.

Wolverhampton (WARS)—6 August (Visit to police motorway control), 13 August (Discussion night), 20 August (Fire prevention), 27 August (Night on the air), 8pm. Electricity Sports Club, St Marks Rd, Chapel Ash, Wolverhampton. Sec K Jenkinson, tel (0902) 24870.

Worcester (W&DARC)—5 August ("Contesting", G4ERP), 21 August (Informal meeting), 8pm. Oddfellows Club, New St, Worcester. Sec G4RBD, 14 Oakleigh Heath, Hallow, Worcester.

Please note that it is essential that your programme details reach me well before the deadline shown at the top of club news. RR3

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey DE3 2BJ.
Tel Derby (0332) 556875.

Bolsover (BARS)—7 August (Natter night), 14 August (TBA), 21 August (Natter night), 28 August (DF hunt), 7.30pm. The Angel Hotel, Bolsover. Sec N G Herrington c/o G4AGE.

Buxton (BARS)—13 August (Open forum), 27 August (Visit by Lowe Electronics), 8pm. Haddon Hall Hotel, London Road, Buxton. Sec G6MIF, tel Buxton 6174.

Derby (DADARS)—7 August (Rally prep at Lower Bemrose School), 11 August (28th annual rally, Lower Bemrose School), 7.30pm. 119 Green Lane, Derby. Sec G4EYM, tel Derby 556875.

Grantham (GRC)—20 August (Natter and noggin night), 8pm. Shirley Croft Hotel, Harrowby Road, Grantham. Sec G8WWJ, tel Grantham 65743.

Lincoln (LSWC)—14 August (Activity/night on the air), 28 August ("Sea angling", G6DKK and G8VGF), 8pm. City Engineers Club, Waterside South, Lincoln. Sec G4STO, tel Gainsboro 788356.

Matlock (MTARA)—Tor amateur radio association is a new club. Every other Tuesday. Crabtree Inn, Smedley St. Sec 7 Collingwood Cres, Matlock, tel Matlock 55420.

Newark (N&DARC)—1 August ("Planning", G6NUM, and "10m operating", G4SDZ), 7.30pm. Palace Theatre, Appleton Gate, Newark. Sec G4SDZ.

Nottingham (ARCON)—1 August ("Competition", G4XOU), 8 August (Forum), 15 August (Foxhunt), 22 August (Junk sale), 29 August (Treasure hunt, G4SGU), 7.30pm. Sherwood Community Assn, Woodthorpe House, Mansfield, Nottingham. Sec G4JAE.

Scunthorpe (S&DARC)—6 August (QSL night), 13 August (Astronomy at the telescope), G4GZA,



Overseas members present at the silver jubilee dinner of the RNARS. L to r. (back) Flemming, OZ1EVA; Ken, ZD8KM; Dusty, ZL2VS; Heinz, N2LK; Nobby, VE3DAO; Jules, ON4WD; (front) Ken, G4PZR (chairman); xyl N2LK; xyl VE3DAO; xyl OZ1EVA

20 August ("HF linear with X150B's", G4GZB), 27 August (DF hunt, 8pm), 8pm. Grange Farm Hobbies Centre, Franklin Cres, Scunthorpe. Sec G4ZGJ, tel Scunthorpe 732268.

Spalding (S&DARS)—9 August (Bring and buy), 7.30pm. The Ship Albion, Spalding, Sec G4ZGT, tel Spalding 2781.

Workshop (WARS)—6 August (Foxhunt), 20 August (Junk sale), 25, 26 August (Special event station, Bassettlaw, GB2BTF). The Unicorn Hotel, Bridge Street, Workshop. Sec G4ZUN, tel Workshop 486614.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT.
Tel 0582 508515 or at work on 0582 21151.

Dunstable (D/Downs RC)—2 August ("Radio controlled models," a talk by G1ALL's brother), 16 August (DF hunt on 160 and 2m), Room 3, Chews House, High St South, Dunstable, Beds. Details G6EES, tel Dunstable 607623.

Peterborough (GPARS)—22 August (Informal social evening, venue to be advised), 7.30pm. Southfields Junior School, Stanground. Sec G4NRJ.

Sheffield (S&DARS)—This club is closed during the month of August, but informal evenings are held on Thursdays at the Black Horse Pub, Ireland, near Sheffield, see you there. Details G4PSO. Normal meetings, 7.45pm. Church Hall, Sheffield, Bedfordshire.

Texas Instruments (ARC)—This is a new club recently affiliated to RSGB, welcome! Last Thursday or Friday in each month. Chairman G1JKF, and Sec G1IGX.

Not a lot of club news this month, August is a month when those clubs that meet in schools and colleges have to close, but keep the news coming in, see you all at Woburn. RR5.

REGION 6—RR F S G Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA.
Tel Penn (049481) 4240.

Maidenhead (M&DARC)—1 August (Evening out, family picnic and Ip operation), 20 August (Video show), 7.30pm. Red Cross Hall, The Crescent, Maidenhead. Sec G8RYW, tel Maidenhead 28463.

Newbury (NADARS)—10 September (Junk sale), Sec G3VOW, tel Newbury 43048.

Reading (R&DARC)—13 August (Club canal boat trip from IDR bridge to the Cuning Man ph, return cost only £2.50), 6 August (Discussion regarding our participation (or not) in the Sept 2m portable contest, and HF field day), 20 August ("Raynet", G4KWT), Sec G4CCC, tel Reading 471761.

Vale of the White Horse (ARS)—6 August (145MHz df hunt), 17 August (Bar-B-Que), 3 September (TBA), 17 September ("The weather and radio propagation", Jim Bacon, G3YLA), 8pm. Waterworth, Cockcroft Road, Didcot. Club nets on hf 28-750MHz vhf, 144-200MHz, ch-8, Thursday 7.30pm, Sundays 8pm. Sec G3SEK, tel Abingdon 31559.

REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Leatherhead, Surrey KT22 9AZ.
Tel 0372 372587

Ashford (Echelford ARS)—12 August ("Packet

radio", G4NNS), 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. New Sec G4VAZ, tel Sunbury 83823.

Croydon (SRCC)—5 August (Bar-B-Que at QTH G4CCY/G4DDY), 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.

Crystal Palace (CP & DRS)—17 August ("Cellular radio", G8GJO), 8pm. All Saints Parish Room, Upper Norwood, SE19. Sec G3FZL, tel 01-699 6940.

Redhill (RATS)—20 August (Members evening, short talks), 8pm. Constitutional and Conservative Club, Warwick Road, Redhill. Sec G8JXV.

Thames Ditton (TVARTS)—6 August (Open forum), 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec G3ENI.

REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE.
Tel 0795 70132.

Dartford (DDFC)—4 August (Salisbury hunt), 6 August (Pre-hunt meeting, after 9pm), 11 August (Club hunt), 18 August (Coventry hunt), 20 August (Pre-hunt meeting, after 9pm). Pre-hunt Tuesday evenings held at the Horse & Groom ph, Leyton Cross, Dartford Heath, Kent. Details G8DYF, tel Greenhithe 844467.

Eastbourne Electronics (ARC)—6, 13 and 20 August (Antenna construction). (Classes for the RAE Dec '85 exam, and morse classes to be held Sunday evenings at 7.30pm. Please enrol by 18 August). (Barbecue planned for August Bank Holiday weekend, at club contest site, Woods Corner, Dallington, 7.30pm. Archery Youth Centre, Seaside, Eastbourne. Details G1EJB, tel Eastbourne 27852 or Eastbourne 765701 (during club meeting times).

Eastbourne (Southdown ARS)—5 August (Fox hunt technology), 7.30pm. Chaseley Home, South-cliff, Eastbourne. Club has other activities at new clubrooms, Wealden DC Offices, Vicarage Fields, Hailsham, on Tuesdays and Fridays, 7.30pm. Sec G1BAB, tel Eastbourne 890234.

Gillingham (BRATS)—11 August (Visit to North Foreland Radio Station), 18 August (Club picnic), 22 August (Club open evening, intended for guests to be shown the varied aspects of the club), 31 August (Club bar-b-que), 8pm. Parkwood Community Centre, Parkwood Green, Wigmore, Gillingham, Kent. Details G4ZTF, tel Medway 374670.

Tunbridge Wells (West Kent ARS)—9 August (DF hunt No 1), 17, 31 August (DXpedition to Eire, to attempt first direct contact with North America on 144MHz, skeds available), 23 August (DF hunt 2, with prizes), 8pm. Adult Education Centre, Quarry Road, Tunbridge Wells, Details G4KIU, tel Tunbridge Wells 33586.

Worthing (W&DARC)—7 August (Ragchew), 14 August (DF hunt), 21 August ("Photography", G4AET), 28 August (Ragchew), 7.30pm. Lancing Parish Hall, South St, Lancing, West Sussex. Hon Sec G4SWH.

Many thanks for the warm welcome and courtesy extended to me during my recent visits to the Brighton (B&DRS), East Kent ARS, Maidstone, Bredhurst, (BRATS) Radio Club of Thanet, and Lewes clubs. RR8

REGION 9—RR A H Hammett, G3VWK, Rosehill, Ladoek, Truro, Cornwall TR2 4PQ.
Tel St Austell 0726 882 758.

Axe Vale (AVARC)—2 August (Natter night), 6 September (Demonstration, description and discussion of a pre-war transmitter, together with display of vintage gear, G3GC), 4 October (AGM), 6 December (Annual dinner), 3 January (Constructors contest). Sec G3VW.

Cornish (CRAC)—1 August ("Interference", G1AJB), 5 September ("RTTY", G4EIK and G4MSV), 12 August ("Disc drives", G3OCB), 9 September (TBA), 14 October ("Amor", G3VGO), 14 November (The Mackintosh), Henry Westlake).

REGION 10—RR E J Case, GW4HWR, 2 Abbey Close, Tyrlhiw, Taffswell, Med-Glam CF5 7RS.
Tel 0222 810368.

Abergavenny (A&NHARC)—3 August (Special event station at Pen-y-Fal Hospital fete callign GB2PYF), 7.30pm. Pen-y-Fal Hospital, above Male Ward 2, Abergavenny. Regular morse classes are held every week on club nights, newcomers are welcome. Sec GW4XQH, tel 0873 4655.

Cardiff (CRSGBG)—12 August (Films), 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec GW6ZHP, tel Cowbridge 3212.

Llanelli (LARS)—First and third Monday in each month (depending on availability of hall), 7pm. (Temporary HQ and meeting place), DDA Hall, Albert St, Llanelli. This is a newly formed club and is offering the following projects: for B licensees, absorption wave-metre; for general members RTTY terminal unit, also a 14-week course of tuition for the RAE commencing first week in September, fee £6.50. Sec GW1MGW, 1 Maestir, Felinfoel, Llanelli, Dyfed SA15 3NS.

Swansea (SARS)—15 August (Preparation for hf ssb field day), 8pm. Lecture Room N, Applied Sciences Building, Swansea University, 7.30pm. cw class (before main meeting). Sec 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)—No meetings during August. 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4VVW, tel 0492 636376.

Deeside (Alyn & Deeside ARS)—No meetings during August, except D&W if possible. 8pm. Shotton Social Club, Shotton Lane, Deeside. Sec GW4RXX, tel 0244 660066.

Holyhead (H&DARS)—Alternate Sundays starting 14 July. Foresters Arms, Kingsland, Holyhead. 7.30pm. Sec Mrs Barbara Anzian, 12 London Rd, Holyhead, tel 0407 50577.

Dolgellau (Melirion ARS)—1 August (Natter night), Dolserau Hall Hotel, Dolgellau. Sec GW4KEV, Tyddyn Mawr, Arthog, Gwynedd, LL39 1LJ.

Porthmadog (P&DARC)—August (Fox hunt, date and venue to be decided), 8pm. Cafe, Ffestiniog Railway, Porthmadog. Sec GW4WKQ, tel 0758 740445.

Rhyl (R&DARC, GW4ARC)—5 August (DF hunt No 2), 19 August (Activity night), 7.30pm. Mona Hotel, Market St, Rhyl. Sec GW1AKT, tel Nantglyn 469.

REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH.
Tel 0796 2140.

Forfar (F&DARC)—will continue to meet through the summer. Details of programme and new venue, GM4WMN, tel 0575 81222.

Inverness (ARC)—Thursdays 7.30pm. Cameron Youth Club, Planefield Road, Inverness. The club now boasts an operational shack on hf and vhf. Details GM1GFX, tel 0463 242463.

SARCON 85. 21 September. College of Education, Gardyne Road, Dundee. Doors open at 10.30am (RAIBC 10.15am). HQ staff will be in attendance to answer your queries, and there will be an RSGB forum/Zone G meeting. Lectures include packet radio, tv broadcasting in the future, and astronomical influences on amateur radio, morse tests will be available. All major traders will be in attendance. A dinner has been arranged for the evening, tickets in advance only, (ASAP please) from RR12.

Visitors to the region over the summer are asked to note that many clubs do not meet over the summer period. Full details of all clubs appeared in the July issue, and you are advised to contact

the appropriate club secretary before planning your visit.

RR12

REGION 13—RR A Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fife KY1 2LH.
Dunfermline (DARS, GM3IDS)—Thursdays, 7.30pm. Outh Wireless Station, Knockhill, by Dunfermline. Transport available from town centre by arrangement. Details GM4WYR, tel 736401.

Glenrothes, G&DARC)—18 August (Amateur tv GM8BVU), 15 September (AGM), 7.30pm. Provosts Land Centre, Leslie, Fife. Details GM4TNP, tel 755958.

May I remind all club secretaries of copy deadlines at the beginning of "Club News", so that information supplied is relevant.

RR13

REGION 16—RR A Owen, G4HMF, 102 Constable Road, Ipswich, Suffolk IP4 2XA.
Tel 0473 51319.

Bury St Edmunds (BSIERS)—20 August (RSGB films), 7.30pm. Guildhall, Guildhall Street, Bury St Edmunds. Sec G3GBB, 29 Angel Hill, Bury St Edmunds.

Ipswich (IRC)—7 August (Carnival planning), 24 August (Bar-B-Que at G4VSM, 28 August ("Slow scan tv", G4BAV), 8pm. Rose and Crown, Norwich Road, Ipswich. Sec G4IFF, tel Ipswich 44047.

Loughton (L&DARS)—2, 16 August (Informal meeting at the Wheatheaf), 8pm. Loughton Hall, Rectory Lane, Loughton. Details G6FWT, tel 01-508 7190.

Norwich (Norfolk ARC)—7 August (Visit to Radio Broadland), 14 August (Crossword competition), 21 August (Visit to Norwich Airport, 28 August (Technical topics), 7.45pm. Valley Drive Community Centre, Plumstead Road, Norwich. Details G3VNO, tel Norwich 37709.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL. Tel 0703 812435.

Amateur Radio and Computer Club (AMRAC)—13 September. The Crown, Bishop's Waltham, Hants. Sec Trevor Tugwell, tel (04895) 81032.

Basingstoke (BARC)—5 August (Natter night), 7.30pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G4WIZ, tel Tadley 5185.

Eastleigh (Itchen Valley ARS)—2 August (Homebrew evening (both sorts), 16 August (Portable dx evening), 30 August (Natter night), 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford, Hants. Sec G6DIA, tel (0703) 863039.

Fareham (F&DARS)—7, 14, 21 and 28 August (Portable operation), 7.30pm. Portchester Community Centre, Portchester. Sec G4ITG, tel Fareham 234904.

Farnborough (F&DARS)—14 August (Field day postmortem), 28 August ("VHF propagation", G3LTP). Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough PRO G4MBZ, tel Farnborough 837581.

Hordean (H&DARC)—5 August ("Salvage of SS Great Britain, part 2, G4BEQ). Merchiston Hall, London Road, Hordean, PRO G4BEQ, QTHR.

Liphook (Three Counties ARC)—7 August (Film night), 21 August ("2m dx", G3VXM), 8pm. The Railway Hotel, Liphook, Sec G3TBT, tel Passfield 368.

Poole (PARS)—11 August (Providing the QRP demonstration stand at the Flight Refuelling Hamfest 85). Sec G4YXX, QTHR.

Wimborne (FRARS)—4, 25 August (TBA), 11 August (Hamfest 85 an all day event), 18 August ("Russian travels", G1LHW), 7.30pm. Flight Refuelling Social Club, Merley, Wimborne. Sec G8LZH, tel (0202) 570894.

Winchester (WARC)—No meeting in August. Sec G4FPC, tel (0962) 64747.

REGION 18—RR Ian Gibbs, G4GWB, 61 The Gables, Widdington, Morpeth NE61 5QZ.
Tel 0670 790090.

Aycliffe & Shildon (ARC)—All meetings for August are informal, Thursdays 8pm. Scout HQ, Castle St, Shildon. Members and visitors are to note the new club venue. Sec G3LUC, tel 0388 774466.

Berwick (Borders ARS)—2 August ("Video evening", GM8TOR), 16 August ("Model making (radio section)", GM1JFF). Tweed View Hotel, Tweed St, Berwick. Sec G1IUK, tel 0289 305465.

Blyth (BARC)—Club running hf and vhf field

days in August from ZP73A/NZ38, look for G4VKY). Community Centre, Warwick St, Blyth. HF station operational on club nights. Club membership limited. Sec G1JFW, tel 0670 353069.

Hazlerigg (NER & CC)—5 August (Committee meeting), 12 August (Morse Class), 19 August ("RAE maths simplified", G1HDV), 26 August (No meeting) HF station operational. Hazlerigg, Village Hall, G1HDV, tel 0632 2742413.

Morpeth (Northumbria ARC)—18 August (Coffee morning G8TQL's (QTHR), all are welcome). Morse class in progress. The Old Telephone Exchange, Cresswell Rd., Ellington, Morpeth. Sec, G6IIA, tel 0670 513026.

Whitley Bay (Tyneside ARS)—28 August ("Homebrew for 2m and above", G8CYW). Community Centre, Earsdon, Whitley Bay, Tyne & Wear. Sec G4KOT, Tel 091 2340170.

Will all club secretaries note that it is their responsibility to pass on their clubs activities to the regional representative if they wish to have those details published in *Rad Com*. Please give serious thought to your autumn/winter programme and pass the information on as soon as it is available. Don't forget, repeaters cost money to run, support your local repeater group. Teesside repeater group (GB3TS), Sec G8MBK, 5, Belgrave Drive, Normanby, Middlesbrough, TS6 0SQ, Tel 0642 467095.

Tyne & Wear repeater group (GB3TW/GB3NT) Sec G6FGP, Braeheds, Mill Rd, Chopwell, Newcastle upon Tyne NE17 7JD, tel 0207 561212.

RR18

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Barking (BR&ES)—Details, Roy Woodberry, 162 Brentwood Road, Herongate Brentwood, Essex.

Cheshunt (CDARC)—7 August (Junk sale), 14 August (Natter night), 21 August (2m portable on Bass Hill Common, Broxbourne), 28 August (Natter night), 7.45 for 8pm. The Church Rooms, Church Lane, Wormley, Herts, all welcome. Sec G4OAA, details from G3JLI, tel Ware 4316.

Chiswick (ABCARC)—20 August (Some hints and thinks), 7.30pm. Chiswick Town Hall, High Road, Chiswick, London W4. Sec G3GEH, tel 01-992 3778.

Ealing (E&DRS)—Tuesdays. Community Centre, Northfields Road, London. W13. Details G4SCR, tel 01-997 1416.

Edgware (E&DRS)—8 August (No meeting), 22 August (Informal and SSB field day briefing), 8pm. 145 Grange Hill Rd, Burnt Oak, Edgware. Details G4SYI, 5 Dovercourt Gardens, Stanmore, tel 958 9868.

Harrow (RSH)—Roxeth Room, Harrow Arts Centre, High Road, Harrow Weald, Middlesex. Sec, tel Rickmansworth 779942.

Haslemere (H&DARC)—7 August (Informal), 14 August ("Directional couplers", G8ZKZ), 21 August (Informal), 28 August (Talk by G8IXC), 8pm. Fairkites Art Centre, Billet Lane, Horncchurch, Essex. Sec G1HTQ, tel Romford 23996.

Ilford (IRSGBG)—50 Mortlake Road, Ilford, Sec G3PCA. No info received in 12 months.

London (Civil Service ARS)—First and third Mondays in each month. 12.30pm. G3CSR operational from shack in Recreational Centre, Monck Street, London, SW1P 2BL. Nets Tuesdays, 7.30pm, on 144-575MHz, followed at 8pm, on 3-720MHz or 1-960MHz. Sec Bob Treacher, tel 01-212 8823, or G6IMM, 195 Conisborough Crescent, SE6, tel 01-698 4437.

London (New Scotland Yard ARS)—Not open to public. G4NSY and G8NSY active from time to time. Sec, Room 99, NSY Broadway SW1.

London (ARGBBC)—This BBC club is restricted to members of the BBC and their families. Details of membership, G8LRE. Ariel Radio Club, Bush House, Strand, London WC1.

St Albans (Verulam ARC)—13 August (Informal and workshop), 27 August (Bring and buy evening, commission on sales is 10 percent with an upper limit of £5 for all selling gear), 7.45pm for 8pm. RAFA HQ, New Kent Road, St Albans. Details G4JKS, tel St Albans 59318.

Southgate (SARC)—Meetings still held at St Thomas' Church Hall, Prince Georges Avenue, Oakwood, London, N14. 7.30pm for 8pm. Details G4OBE, 12 Borden Avenue, Enfield, EN1 2BZ.

Stevenage (S&DARS)—First and third Tuesdays in each month. Fairlands Hall Community Centre, Archer Road, Stevenage. Details G4BGP, 13 The Sycamores, Baldock, Herts, tel Baldock 893736.

Wanstead (ELGRSGB)—Details G4VIF, tel 01-594 0291.

Watford (WRC)—First and third Wednesdays in each month, 8pm. Tudor Arms, Bushey, Mill Lane, North Watford. Details G8XXV, tel 01-950 3611.
Welwyn (W&H Hatfield ARC)—First and third Mondays in each month, 8pm. Knightsfield Scout HQ, Welwyn Garden City. Nets on S15 at 8pm, on other Mondays, morse on Thursdays. Sec G0AII, 2 Sand-pit Road, Welwyn Garden City, tel (0707) 326138.

REGION 20—RR N F O'Brien, G3LP, 26 Southfield Road, Gloucester GL4 9UD. Tel 0452 34890.

Bath (B&DARC)—7, 21 August, 4 September, 8pm. Englishcombe Inn, Englishcombe Lane, Bath. Club station G4TMH regularly operating. Details G4UMN, tel Frome 93939.

Bridgwater (Sedgemoor ARC)—Third Wednesday in each month, 21 August, 7.30pm. New venue, Bridgwater Sea Cadets HQ, The Docks, Bridgwater. Details G4EHU, tel 0278 455923.

Bristol (BR5GBG)—19 August ("RTTY and Amtor", G4KUQ), 30 September (Microwave Society, G8MWR), 28 October, (Zonal rep and

John Nelson of RSGB HQ staff), 7.30pm. Small Lecture Theatre, Bristol University, Details G4SQQ, tel 0272 508451, or G4ROX, tel 0272 513573.

Bristol (North Bristol ARC)—2, 9, 16, 23, 30 August (Natter nights and RAE and cw instruction), 7pm. SHE, 7 Braemar Crescent, Northville, Bristol, Details G4EUV.

Bristol (South Bristol ARC)—7 August (Lecture—"Mendip Repeater Group"), 14 August ("Test and measurement for amateur radio", G4SDR), 21 August (Lecture—"Satellite communications"), 28 August, (TBA), 31 August (South Bristol Flower Show, club station), 4 September (AGM), 11 September (TBA), 7.30pm. Whitchurch Folk House East Dundry Road, Whitchurch, Bristol BS14 0LN. Details G4RZY, tel 0272 834282.

Cheltenham (CARA)—2 August ("Moonbounce operation", G4ASR), 16 August ("Natter night"), 21 August (Visit to Madley Satellite Communication Station 7.45pm), 7.30pm. Stanton Room, Charlton Kings Library Cheltenham. Details G4VXW, tel 0242 36723.

Cheltenham (Smiths Industries RS)—8, 22 August (Natter nights), 5 September (AGM), 8pm. Club House, Newlands, Bishops Cleeve. Details G8UJG, tel Bishops Cleeve 2175 or Bishops Cleeve 3333 ext 2511.

Gloucester (GARS)—7, 14 August (Natter nights), 21 August (DF hunt), 28 August (Natter night), 4 September (AGM), 7.30pm. St John Ambulance Headquarters, Heathville Road, Gloucester. Details G6AWT.

Portsmouth (Gordano ARG)—28 August ("Computers in amateur radio"), 8pm. The Ship, Redcliffe Bay, Portsmouth. Details G3LJD.

Weston-super-Mare (WsmARS)—12 August ("Visit HTV studios in Bristol"), Details G1DJW, tel Wsm 514429.

Yeovil (Y&DARC)—8 August ("Inductance", G3MYM), 15 August ("HF propagation at sunspot minimum" G3MYM), 22 August ("Cosmic radio noise", G3MYM), 29 August ("Natter night"), 5 September ("Great circle propagation paths", G3MYM), 7.30pm. Recreation Centre, Chilton Grove, Yeovil. Details G3GC, tel 0935 75533.

Members' Ads

CONDITIONS OF ACCEPTANCE

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Members' Ad form printed on the back of a recent address label carrier used to mail *Rad Com* to the advertiser: this will automatically provide proof of membership and should not be more than two months old. No acknowledgement of receipt will be sent, and advertisements not clearly worded or punctuated, or which do not comply with the conditions of acceptance, will be returned. No correspondence concerning this service will be entered into.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads" but should be submitted as classified or display advertisements in the usual way.

Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions, or for the quality of goods offered for sale. Advertisements for citizens band equipment will not be accepted.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not

subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £2.30 for 40 words or less: advertisements containing more than 40 words will cost an additional £2.30 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.

The closing date for the October 1985 issue is 20 August

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising officer.

FOR SALE

Trio 7010 144-100-144-195, 144-200-144-295, 144-300-144-335, £95. Xtals 8300, 8320, 8340, 8360, 8380, 8450, 8250, 8230kHz, £2.50 ea. MM 6 M conv 28MHz i.f., £22. G3WBN, QTHR. Tel 01-654 2761.

RX HQ170A Hammarlund 160 to 53 meg, £165, or would swap for FT707, or 435MHz module for FTV-901R. Spectrum analyser 2-40meg, £50. Buyers collect. G4HQD. Tel Billericay 58748.

30in microwave dish, £25. Abandoned projects: Qwerty keyboard, £8. New chips, 8088, 8284, 8272, 8251A, 8255, 8253, 2732, 2102, 8085, 74S387, 8212, 2708, MM5280, 2114, 74157, 6571 Texas low profile's 16 pin and 24 pin. All cheap. G8KHW, QTHR. Tel 0394 270649.

Yaesu 101E tx/rx nice cond, surplus to present equipment, £330. Buyer collects please. Hurst, G3JJU. Tel Fleet 5831.

Amtor rty cw Dragon 32 computer with all three programs in a cartridge by G4BMK as advertised in this magazine, stand-alone system, £100. Tel Southend-on-Sea (0702) 552729.

FT290R with nicads, charger, rubber flex, antenna, vgc, £250. MM linear 30W, 4 months old, as new £60 ono. Realistic 160DX, £50. GW4YJT. Tel Deeside 811687.

FT480R perfect cond, book, box etc, swap for hf linear. Tel Warrington 812586 anytime.

Master 40ft lattice telescopic, heavy duty wall mount, complete with 20ft extension pole, vgc, £175 ono. Dave. Tel Rotherham (0709) 67471.

Cossor double beam oscilloscope, model 1035 Mk3, with manual, £35. Wavemeter Class D No 2, 240V ac and 12V dc with manual, exc cond, £20. G3XFB, QTHR. Tel 0902 850033.

Kenwood TS930S fitted auto atu, superb performance, cond as new, only reason for sale delivery of 940S imminent, £900. No offers. G4ODG, QTHR. Tel 0778 422795.

RTTY system, TI99/4A computer, interface, software in rom, rty, Ascii, cw tx/rx message stores, split screen type ahead etc, TU (rx only), printer interface, basic programs incl morse, locator

programs etc, £80 ono. Data recorder also available. Dave, G8PQG. Tel Oxford 67165.

20m 3W cw/dsb xcvr from WPO DSB2 kit, £75. Trio VF0240, £50. 160m cw/a.m. tx, £20. 12V 5A psu, Furzehill VVM, Heath VF1U vfo, 813's, mains class D wavemeter, all £10 ea. MM 70mc conv, £20. Gd photocopy TR7 service manual, £5. Manuals for R4A T4XB 2B, £2.50 ea. Rty system based on ZX Spectrum 48k, £120. 2x printer and paper, £35. All plus carriage or post. Tel Mold (North Wales) 740101 evenings/weekends.

Trio TS430S, with mic, a.m. and cw filters, as new, £590. **Wanted** FC107, SP107. John. Tel Chelmsford 355331 evenings.

ICR70 in mint cond, in orig box with manual etc, £450 ono. Proceeds of sale to the RAIBC. Tel RAIBC HQ, 0844 51461 or G1GQJ, QTHR.

RTTY, Ascii, 1/1u with 5 month old as new and boxed Dragon 64 plus disk drive with full screen editor 51 x 24 upper and lower case screen gd small business computer, £300. G6KLD. Tel (Wroxham, Norfolk) 06053 3957.

Trio TR-7500 15W fm, exc performer, orig packing, £110 ono. GW4UZX, QTHR. Tel Swansea 792470. **Yaesu** FT757GX, FP757HD, FC757AT, 10 months boxed as new, super stn bargain, £900 vno. G4ZFK. Tel Clacton on Sea 86173. No time wasters please.

AR240 144-148 2m portable with 600kHz repeater shift, £100. MM30W linear (1-3W) input, the first version, £40. Jaybeam X/4 groundplane, £7. Tel Skelmersdale (0695) 32965.

FT101ZD mint 250Hz filter, spare pas and driver, manuals, packing, £150. FV1012 new unused, £100. FRG7 digital, £135. Rascal RA117E vgc spares and manual, £225 ono. **Wanted** Argonaut 509 or 515. G4PPG, QTHR. Tel 0257 421442.

TS820S immaculate, £485. Mizuho KX2 rx atu, £25. VFO820, £85. **Wanted** FT708R, FT208R or similar, DS2 for TS830S, also maybe FT730, W.H.Y.? Ian, G0BKN (G8SDN), QTHR. Tel 0525 714128.

RTTY almost new colour Genie Z80 based home computer complete with terminal unit, "Radsoft" rty/cw software contest log as per Lowe advt, a

gift at £80. Going Amtor on air QSOs demonstrated. G3CRH, QTHR. Tel 05436 6364.

Icom IC4E complete as new, rarely used, £175. Jaybeam 12XY 70cm beam with phasing harness, £45. Paul, G4XHA, QTHR. Tel 0252 878436 evenings.

Yaesu FT707 hf rig with smc fm board FP707 psu, FC707 atu with YD148 base mic, Datong rf speech processor and mobile mounting bracket, all boxed, gd cond, no splits, £520 the lot. G4SBK, QTHR. Tel 01-399 0624.

Portable oscilloscope solartron CD164Z 230V/12V, dual beam 15MHz y-amps, recalibrated June 1985, £99. G3TCU, QTHR. Tel Godalming (04868) 23272.

Icom 1050 suitable conversion 28MHz, £15. HF5, £35. Radial kit, £20. IC4E case, charger, spkr, mic, 12V adapter, £200. Swr £2. 12V PSN3A, £5. TVI filter, £2. World prefix map, £1. FM guide, £1. Late G3XOY 101E mint, £360. 101FV10B, £60. 7800, £170. Belcom 28MHz 65102L, £160. L520XE headset, boom mic, case, charger, external spkr mic, mint, £120. FC902, £85. MM28/100, £80. MMD050/500 frequency counter probe 15db 10W attenuator, £75. Rotator MS2000, £30. 5-ele 2m beam, £8. Tel 0709 814911.

KW2000B psu, needs some re-aligning, £120. Two pairs Ford H/lights, rectangular with halogen bulbs, £15 per pair. G6HYG, QTHR. Tel 0705 587929.

Linear amplifiers bnos LPM144 10-180 (see their advert), £175. Two Pye 50W vhf linears with service sheet, easily modified anywhere 68MHz to 174MHz (50MHz?), £45 pair. Buyer pays carriage or £210 job lot incl, all wkg. G4RNI. Tel 438 1441.

Sommerkamp 788dx full 10-11m coverage, all mode 100W output, vgc, £200. GM4RRP, QTHR. Tel 0463 870466 or 0997 21753.

JST100 tx/rx 10-160m by JRC matching psu NBD500, instruction manual, accessories, packing, present price new £1179, offers nearest £850. Europa B 2m transverter with matching psu, CPS10, £85. tel 0442 59970.

Yaesu FT209RH 2m tx/rx complete with NC15

quick charger and Yaesu YH2 boom mic/headset, all in mint cond, £250. **Wanted** Vibroplex Racer latic paddle. GW3YKZ, QTHR. Tel 0633 858314. **G4WPO** Omega, 95 per cent complete without case but incl front panel and de-luxe switches, rx wkg but some work required on pa, £200 for a kit currently costing over £600. **GW4EVJ**, QTHR. Tel 0792 843948.

Eddystone panoramic display unit with handbook in very clean cond, accepts 100kHz or 400-800kHz inputs and can be used as a wobulator for i.f.'s in the 90-550kHz range, £60. **Vince**, G8YPK, QTHR. Tel 0702 218443.

Tono 9000E terminal rtty/cw/ASCII, £500. **Tono** 1200G 12in monitor £100. **Eddystone** rx 990R 27-240MHz, £250. **Katsumi** EK150 el-key, £75. **Fairmate** synth rx 110-161MHz, 296-367MHz a.m./f.m., £100. The lot for £900. **G4CKF**. Tel 061-861 0683 after 6pm.

Yaesu 230R 2m fm tx/rx, YH-1 headset, SB2PTT RSL 150SS whip, gutter mount, £220 ono. **G0AZR**, not QTHR. Tel Matlaske (Norfolk) 496 after 6pm. **18AVT/WB** being dismantled, individual parts available send see for price list. **Heathkit** HM-102 rf power meter with manual, perfect cond, £25 incl carriage. **GM3WRN**, QTHR.

Sinclair frequency meter type PFM200 20Hz to 10MHz, 5MHz to 200MHz, plus mains unit, for quick sale, £40. **Pye** reflectometer type RFL1, 75W and 150W, vswr 68MHz to 174MHz, 50 Ω as new, £15. **G6NYQ**, QTHR. Tel Orpington 39386.

MR/TR1005 12V mobile, glider channel 130-1, small, manual, vgc, £55. New mag base antenna, £20. **GU3HKV**. Tel 0481 47278 between 6-7pm. Not September, away HP9!

Dressler D200C vhf linear 120W built in psu, £175 ono. **Pair** Elmac new boxed 4E27A/5-125B, offers. **G3AGT**, QTHR. Tel 082-347 6320.

Printer/typewriter (matrix), **Brother** EP22, internal interface, 2k buffer, £62 incl carbon ribbon, paper, postage or p/exch **TR2300**. **G8VGR**. Tel 0424 429757.

MM/T 432/144R transverter, attenuators for 10W and 3W input from 2m, 1-6MHz shift, £125. **Roy**, **G8NRR**, QTHR. Tel 084 421 2161.

757 with psu and mic, save £300 at £650. Telephone answering machine, £25. Car cassette, £5. Radiomobile push button, £9. Realistic portable cassette tape recorder, cost £35, sell £9. **Wanted** urgently, Atlas ssb filter, also Atlas spares. **W.H.Y.**? **G3MXO**. Tel 021-788 0518.

Exch IC211E (Mutek) plus ICRM3 remote controller and/or Yaesu FT707S with timestep fm boards (not fitted) for TW4000A, IC202S, IC402 or similar vhf/uhf equipment, or sell, any combination considered. **Keith**, **G6HHV**. Tel (Merseyside) 051-327 5804 anytime.

National HRO rx 0.5-30MHz gen cov, 160-10m bandspread coils, psu/spkr manual and spare valves, £60 ono. **Heathkit** HW17A 2m fm tx/rx (10W), £45 ono. **Creed** 75RP (plus 2m for spares), £15. **Creed** 656 auto tx, £5. **G4DFN**, QTHR. Tel Coventry 612431.

TW4000A Trio dual bander, the ideal mobile radio at a large saving on new price, complete in orig packing, £425. **G6JNS**, QTHR. Tel 0905 620041 evenings or weekends up to 11pm.

R2000 rx plus FRT7700 atu, both mint cond, £345. **G6WOH**, QTHR. Tel 029384 542 (W Sussex). **Vintage** Scott-Taggart 1923 book receive transmit 1-67, Grampian 150 spkr 9in, Grampian public address mic MCR. **Beomaster** Bang & Olufsen 900 radiogram 51in x 20in x 23in. **SAE** please, offers, information. **Cottrell**, 66 Gads Lane, West Bromwich.

Complete 2m stn standard fm C8600 12-ch 10W with 1/4 wave magmount spkr, mic, psu, £85. Transformers 10 amp continuous rated, 240V input, 17.5V output, £10 ea. **Nigel**, **G4NRR**. Tel 021-744 8672.

Trio TS-120V, £275. **Daiwa** DK210 keyer, £32. **Oscar** 2NE 2m whip plus guttermount, £17. **MCP** 40 4-colour printer/plotter (Centronics), £75. Hand made solid brass pounder, £30. **G3HSC** morse tutor, £6. **Pentax** MV1 auto SLR and case, £60. **G0AAV**, QTHR. Tel 0942 729202.

Icom 701 160m to 10m cw ssb, with psu, superb cond, £450. Noise blanker for Ten Tec Triton etc, £15, plus postage. **Wanted** Ten Tec Omni. TH2 or DX32 beam, rotator, turner. Tel 0622 39936 evenings.

Four valves type 833A (new) property of the late **G6BQ**, offers. **G2TN**. Tel Minster (0795) 875808.

Trio TS520 cw filter and matching vfo 520, £320. **Trio** TS120S cw filter, £350. **Yaesu** FT101ZD fm and cw filter fitted, £450. **FDK** multi 2000, £200. **GM3GBX**, QTHR. Tel 031-447 2611.

Toyo T-43SN rf watt meter 144-435MHz, 20W-120W, n-type sockets, vgc, £21 inc post. **Jon**

Jenkins, **G4LJW**, QTHR. Tel Bedford 781323. **Trio** JR310 ham bands rx, £75. **Admiralty** B40 rx, £30 ono. **Motorola** HT220 handheld, 2-ch vhf tcvr, ok for 144MHz, with manual, £65. **Collectors** item transmitting valve TYS 5-3000 in wooden case, £20 ono. **Chris**, **G4RBR**. Tel 01-398 8172 evening, 01-979 1798 day.

Drake separates, R4C rx, 250, 500, 1500Hz filters, noise blanker, many additional ranges, MS4 spkr, T4XC tx, AC4 psu, spare set new pa valves, £550. **Icom** IC251E, Mutek board, plus GAAsfet preamp, £450. **Doug** G4DZU, QTHR. Leeds (0532) 853564. **QRO** eht transformer, ideal for 2 x 4CX250B, 1700, 0, 1700V, 750mA, £25. Teletype ascii 110 baud, punch and reader, stand, RS232 exc wkg order, £30. **Choke**, 5H, 600mA, £3. **Buyers** must collect. **G8NEY**. Tel Yateley 872305.

G4MH mini beam vgc, used one year only, £40. **Buyer** collects. **G4GDD**, QTHR. Tel Chester (0244) 22461.

Corsair Ten-Tec optional 8 pole ssb cw filters, **Codur** AT5, T28, AC and DC psu, PR30, Q mult etc, may separate, AR88LF, genuine offers please. **Trio** YK88C, £22. **YK88CN**, £27, all carriage extra. **G3YRQ**, QTHR. Tel (0942) 679948.

FRDX400 basic good, £50. **KW204** complete not wkg, £30. **KP2026**-ch nicads tatty, £25. **D/B** scope, £15. **HF** vhf valves transformers. **Collect** or carriage extra. **G3NGT**, QTHR. Tel Gosport 584861.

Heathkit SB104A tx/rx, SB604 psu, SB644 remote vfo, all vgc tx/rx recently serviced, new pa transistors fitted, all with manuals, £260 ono. **Prefer** buyer inspects and collects. **G4XSE**, QTHR. Tel 04893 3511 evenings or weekend.

Yaesu FT707 plus FP707 psu in nice cond, **Yaesu** YM38 desk mic, **Adonis** MM/202HD headset and **Trio** at 130 atu, £495 ono. **G6PBG**, QTHR. Tel 0293 510491 after 4.30pm.

Linear amplifier **Yaesu** FL2100Z mint cond, orig packing, approx 6 months old, £500. **Microdot** mint cond, £250. **GW4RIX**, QTHR. Tel 093-884 477 evenings only.

FT220/FP200 gd cond all 10m, xtals, some spare valves incl 6J56's, £180. **G3SZS**, QTHR. Tel 0452 713761 evenings.

FT101ZD, fan, mic, mic stand, **Yaesu** extension spkr and manual, vgc, £450. **Buyer** inspect and collect. **G4VUR**, QTHR. Tel Wroxham 3240 evenings, or Wroxham 3041 day.

BASF discs DDDs, £2.25 ea. **DDSS**, £1.75 ea. **Pair** RCA813's, £40. **Pair** Zaerix 813's, £20. **All** new. Also tcvr, rx computer parts, much more, all must go, see for list. **Wanted** Wgk/non-wgk SA850 disc drive. **G8POO**, QTHR. Tel 0661 843449.

Heathkit HW8 tx/rx, no mods, exc cond with handbook, home built but factory checked, £85. **Tel** Seaford (0323) 890642.

Trio TR7730 25W fm mobile 144MHz hardly used, only £120. 2m collinear antenna, never erected or used, £20. **Tel** Tamworth (0827) 55113 day or 897913 evenings.

FDK multi 750XX not yet one year old, all orig packing, as new, £275. **G1HVC**, QTHR. **Letters** only.

FV707DM external vfo unmarked, hardly used, £100. **Carriage** paid. **Pete**, **G0BDF**. Tel Lutterworth (045 55) 57263 anytime.

DX33 western penetrator triband trapped 10, 15, 20m almost new due to change of QTHR, £150. **Buyer** collects. **G4PPU**. Tel 01-399 6746.

Westrex 2741 ASR33 teletype with plinth, £25. **Labgear** 7026 teletext adapter, plugs into antenna socket, decodes ceefax and oracle, £90. **Himound** Mk701 single paddle keyer, £16. 30ft telomast, £25. **Rad Com** 1960-1985 complete, offers? **G3OHC**, QTHR. Tel 021 352 0199.

Yaesu FT757GX super cond incl MH-1B8 scan mic, £600 ono. **Tel** Ruislip 30627.

Samson electronic keyer, vertical hf antenna for 10 to 80, 18aut/wb or Cushcraft AV5. **Tony** Lord, **G4KHT**, QTHR. Tel 0482 852216 (home) or 0482 223141 ext 3457 (work).

Fortop rx TVR1300 and TVD100 modulator, £100. **Two** Jaybeam CR23 antennas, £35. **Total** Toyo 2m/70cm wattmeter, £25. **All** new. 9in and 17in b/w monitors, £20 ea. **Carriage** extra. **G2JR**, QTHR. Tel Coventry (0203) 455021.

Yaesu FRG-7 communications rx with manual, mint cond, no modifications, orig packing, £125. **Can** be seen in London or Essex. **Tel** Maldon (0621) 892755.

IC290E 2m multimode vgc never used mobile, boxed, £285. **IC240** 2m fm mobile, £115. **Burndept** uhf 3-ch portable RBO, vgc, £65. **G6HSO**. **Tel** Thanet 297239.

AR88D, orig, manual, £65 ono. **Marconi** TF329G magnification meter, believed thermocouple u/s, manual, offers. **G8LYV**. Tel 03708 5369.

ICL 7181 terminal and printer, terminal in full wkg order, printer needs slight attention, £50 ono. **Buyer** collect. **G1GSX**, QTHR. Tel 0704 74284. **Trio** TR9130 2m multimode 25W virtually unused, orig packing, accessories and manual, as new, £350. **G5CW**, QTHR. **Tel** Bognor 0243 825566.

FT101 Mk2 fan, 250Hz cw filter, **G3LLL** double balance mixer, £250. **Mosley** V-4-8 40/80m vertical antenna, £50. **MMDO50/500** Microwave Modules digital frequency meter, £75. **KW** Electronics 750 dummy load, £15. **All** carriage extra. **G3LQI**, QTHR. **Tel** Worthing (0903) 754017.

FT101B, vgc with mic, fan cw filter and new valves, £310. **G4VPR**, QTHR. **Tel** Tunbridge Wells 28947. **ASR33** printer and keyboard (ASCII) complete with stand and full manuals. **All** in gd wkg order—offers invited. **G4LLQ**, QTHR. **Tel** 0608 811102.

Lab clearout, components, test gear, psu's etc. **EG** Memory 4164 150nS, new, £2. **IN5155A** varactors, x8=1W @ 4GHz, 3W @ 2GHz, £1.50. **Tek** 503 scope, TB or XY, £50. **HP175A** 50MHz DB and another for spares, £100. **Rockwell** AIM65 single board micro with keyboard, display and printer, £125. **Much** more, A4 see for list. **Wanted**, **Ham Radio** mag 1975 to date. **Chris**, 43 Collinwood Road, Headington, Oxford, OX3 8HH. **Tel** 0865 750681.

Yaesu FR101D rx with two and four metre internal converters, a.m., fm, cw and ssb filters. **All** 21 bands xtals plus two additional xtals. **Four** fixed channel xtals fitted in exc cond, bargain, £205 inc insured post. **Tel** 0224 643131.

VHF rx R216, 19-157MHz, £60. 4-86MHz panadapter, £15. **Early** national HRO collectors piece, 2-5V valves, LF coils only, vgc, £40. **Motorola** vhf tx, £5, matching psu, £5. **Switchmode** psu, 12V 10A, £20. **Solartron** LM1420 dvm for spares, £5. **Tektronix** 551 d/b scope mainframe only, crt ok, no psu, £10. **Mono** tv crt MW43/69, £1. **Colour** tv crt A56-120X, £5. **Buyers** collect. **G8LIU**, QTHR. **Tel** Uxbridge (0895) 30006 evenings.

TW4000A Kenwood Trio dual band 70/144 fm 5/25W, both bands, as new used few hours only, none mobile, reason for sale gone multi mode, £400. **Wanted** 70cms linear 1watt in 10 or more out. **G2ATK** QTHR. **Tel** Pershore 553735 anytime.

Icom IC-745 plus fm hf tx/rx, gen cov receive, matching PS-15 psu and SP-15 spkr, ten minutes use only, absolutely as new, £725. **IC02E** handheld with s/case, sp/mic, c/cord, virtually unused, mint, £159. **All** boxed and genuine. **Tel** 0582 606983.

Nems Clarke REU101 range extender, tunable converter covering 250MHz to 475MHz with 60MHz o/p, to match **Nems** Clarke 1301A or 1302A special purpose rx's. **Gd** cond, £60 ono. **Dave**. **Tel** Oxford (0865) 67165 after 6pm.

13cm single 2C39A brass pa cavity, beautifully made, £60. **Microwave** Modules 70cms 100W PA, £205. **Wanted** FT101 ZD Mk3, **Trio** 830 must be in mint cond. **Paul**, **G4XHF**. **Tel** 0293 515201.

Yaesu FT726R 2m and 70cm fitted six months old, as new, handbook and boxed, £850. **May** accept small 2m multimode in part exch. **Yaesu** FRG7 perfect, £120. **NML144/50S** linear pre-amp, £70. **Green** screen computer monitor new £35. **Clive**, **G1HUA**. **Tel** Bradford (0274) 881894.

Video recorder collection, **Philips** 1500, 1512, 1700, **Sony** SL8000UB tapes and manuals, offers. **Liner** 2, £55. **BBC** Micro model B + DNFS + software, £299. **Acorn** Z80 + software, £295. **Epson** FX80 printer, £265. **Centronics** P1 micro printer, £30. **G8VJR**. **Tel** Braintree (0376) 24682.

Communications rx realistic DX302, 0-01-30MHz ssb/a.m. digital readout, mains/battery 12VDC ideal base/portable, orig box, handbook, used little, as new, £150 ono. **G4RVM**, QTHR. **Tel** Lincoln 37751.

FT208R Handie, keyboard entry, 10 memories, scan, rubber helical ant, case etc, boxed with manual, used little, £145. **G4PHC**, QTHR. **Tel** Minehead 6936.

FT101Z Mk3 with fm, 600Hz cw filter, fan and FC902 atu, exc cond, used little, £575. **CPU2500R** **Yaesu** 2m fm keypad mic 3/25W, exc cond, used little, £160. **G4XKT**, not QTHR. **Tel** Locksheath 84340.

VHF sale, **Belcom** LS202E multimode handheld with case, nicads and charger, £160. **MMU144** 30LS linear, both mint cond. £50. **Sony** ICF2001 portable hf-rx, £55. **Creed** 444 teleprinter, £20. **Tet** SQY08 Quagi beam, £15. **Prefer** buyers collect. **G4FLY**, QTHR. **Tel** 0734 594495.

Yaesu FT757 mint cond, boxed, with manual, Complete with YM38 scanning base mic, £550. **Wanted** Trio base mic suitable for **Trio** 700G. **John**, **G4WLD**. **Tel** 01-857 8096.

FTV107R mainframe only, wired suitable for use with IC740, can be easily changed back to suit 107, (no reasonable offer), refused collect or plus

carriage. GM4HKW, QTHR. Tel Kirriemuir (0575) 73455 after 6pm.

Minimitter a.m./cw transmitter must be sold, £25 ono. G3LP, QTHR. Tel 0452 34890.

70cm station FT790R portable case, nicads, Alinco 30W linear, 48-40V beam, modular electronics pre-amp part home brew, cond as new with boxes/instructions, £350 ono. Kenwood MC55 mobile mic, £25. Lar omni-match, £20. G6XGB, QTHR. Tel Aylesbury 0296 21227.

FT480R c/w SMC psu, £250. AR40 rotator c/w control box, £40. 16-40V Yagi plus coaxial, £25. 2x5m alu poles and coupler, £20. The lot, £300. G8TEC, QTHR. Tel Southampton 766547.

Icom IC740 with fm and marker, also PS15 psu, SP3 spkr, SM5 desk mic, Welz SP15 swr/power meter, Welz AC38 atu, £650, or exch Yaesu FT726 Microwave Modules 432/28MHz transverter, 1.6MHz shift, £98. Tel 0923 44886.

Datong auto woodpecker blower, as new, £60 ono. Yaesu FV901 OM, digital vfo, £110 ono. Kenwood DFC230 digital vfo, £65 ono. Trio SM220 monitorscope, nice cond, £130 ono. **Wanted** Drake RV75 vfo (if nice condition top price paid). G4HSB, QTHR. Tel Peter 0642 816608.

FT1012D Mk3, fan, mic, manual, FC902 atu, handbook, £430. Teleguipment scope, S54A, s/beam, 10MHz, probe, £50. Datong, D70, morse tutor, £30. Solartron scope, CD1014-2, d/beam, £30. RA17, £120. Rascal case, £30. G4VMJ, QTHR. Tel Andover 53843.

Sommerkamp FLDX500 and FRDX500 gd cond original cartons. GW3BUT, QTHR. Tel 0222 628430 evenings.

8ft microwave dish antenna c/w launch unit, F/D ratio approx 2.7, this is a substantial commercial antenna with framework to ensure accurate profile, last used on 6GHz, buyer to collect, first sensible offer by end August secures. G3TZO. Tel 0829 270624.

Sommerkamp FT480R allmode tx/rx, as new, £330. FT290 with mobile mount, £210. Thandar TG102 function generator, £60. TM353 digital multi-meter, £50. TH301 digital thermometer, £40. TF040 frequency meter, £50. Roland, G6PNS, QTHR. Tel Hitchin 0462 811566.

Swop Commodore 64 computer and cassette deck, still 6 months guarantee, some radio programs, for hf linear 400W+ plus cash adjustment either way. Write Brian Hamilton, G4SDZ, 13 Moorside, Middlesbrough Moor, Spenny-moor, Co Durham DL16 7DY.

Trio Kenwood R1000, vgc boxed, 12V i/p. mod fitted, G4EAG buffer kit incl, £185. G6EZN, QTHR. Tel Falmouth 72051.

Codemaster Telereader cwr 610E rtty, cw, Ascii, cw practice, as new, £135. G0AVK. Tel Dover (0304) 821790.

IC260E 2m multimode, 10W as new, £240. FT790R 70cm multimode, portable with nicads and charger, used little, absolutely as new, £240. G4FDR. Tel Wendover 622225.

Yaesu FT757 GX, with FP757HD psu, FC757AT auto atu, and HF5 five band vertical, all immac, the lot £800. Will deliver south west or Securicor. Tel 0626 62765.

Pye Vanguard converted for 2m, fm, £20. Jaybeam D52m, £15. Two army 19 sets, £10 ea. Rotator R025 with cable, £30. Teletype KSR33 with stand, vgc, £35. All ono. **Wanted** Shimizu 105S. G4SXH. Tel 571223.

Datong D70 morse tutor, £46. G8YJG, QTHR. Tel 0452 414529.

Yaesu FR101 rx spares. **Wanted** Trio R820 rx workshop manual and information on mods and reviews for this equipment, xtals for fixed channel operation. J Wright, 12 Norn Hill, Basingstoke, Hants RG21 2HD. Tel 0256 468649.

Top Band Z-match per *Rad Com* Sept 61, £10. HF Roller Coaster, £5. Coaxial relay BNC, £4. London coaxial relay BELLG, £3. VHF var inductance, £5. 3in meter 5KV, £4. 10mA, £3. 200mA, £3. 2in meters RF 3A, 0.5A, 500mA, 100mA/DC, all £2 ea. 24V EXG Blower, £3. G3JNY, QTHR. Tel Leeds 863058.

RTTY Micro? You can't be serious! Most reliable cheapest way to start, based on real ex-GPO teleprinter, working daily, loads of extras, £65 for everything. May help with delivery Midlands. GM4AGS, QTHR. Tel 0382 543113.

Belcom LS102, all modes 28-30MHz, 10W o/p, ideal for mobile for ten, sensitive rx, offers around, £175. **Wanted** transverter for 70MHz with 28MHz i.f. and low-band Cambridge or Motophone a.m. or fm. G4SDZ, QTHR. Tel 0636 702076.

FR7 gen cov rx, exc cond, manual, orig packing, no mods, little used, £125. G6IUZ, QTHR. Tel Wroxham 3697.

Scope telequipment 554A with paperwork, £70.

RF gen, old, big, heavy, well screened but very stable, £15. Modern 444 teleprinter, with handbook, tape, read/punch and paper, £35. Vertical three band 14AVQ, with Giplane, £50. Computer printer ITT 3320 daisy wheel, RS232 parallel i/p handbook, plus all technical manuals, only total of 25hrs running on clock, £60. Collectors, Canadian Mk52 and Mk58 rx and tx/rx, both wkg but psu required, offers. Omega tx/rx for cw connoisseur, all bands, ssb/a.m. receive, digital readout, preamp, QRP/QRO, eight stage filter, notch filter, built in keyer with bench, swr, plus more, wooden case, spares including PA transistors, all paperwork, lovingly built, £520 ono. Odds and sods to clear. Tel Wellington 4109.

Morse tutor Datong D70, £40. G0AJM, QTHR. Tel Worcester (0905) 58442.

KW2000E, pristine cond, overhauled, with spare valves, psu and handbook, absolute bargain, £240. Trio R1000 hf rx, boxed, £175. LAR vhf omnimatch, as new, £20. Buyers collect. **Wanted** 144MHz valve linear. Mike, G3TSL. Tel Preston (0772) 635560.

Coscor commando 4m rig, cw, xtals, manual, £35. PFI rx's batt info, £70. One PFI tx batt info, £11. PFI mobile adapter, wkg, £8. Sentinel 2m conv preamp leads i.f. 2-4MHz, £15. Buyer collects pays postage. G4LQU. Tel Runcorn 714843 after 5pm.

Yaesu FT730, used little, gd cond, £190. MET 144/19T Yagi antenna, never used still in orig packing, £50. Chris, G0BHX. Tel Burntwood 75652.

FT290, FL2010 with mobile mount bracket, MMB, 11 nicads, mint cond, £300 ono. ICAT100, as new, £230 ono. GLA1000 linear, 1000W, (Detron) as new, £300 ono. G4VON. Tel 0780 720543, evngs.

Going QRT all items must go, Yaesu FT102, FV102DM, FC102, SP102, no split, £775. Yaesu FT221R, mint, plus Tono 2m 100W, £340. Drake TR4C, pwr supp, £300. All letters answered. G4OLC, QTHR.

Yaesu FT480R and Breml 13.8V, 5A stabilized psu, £300. Buyer collects. G1LXV. Tel Norwich 746464.

FT980, this superb rig has everything, (see review in *Radcom* Sept 1984), brand new this year with MH-1B mic, with Heil mod, listed £1,850, will accept, £1,185. 2.5kW Tokyo hy-power HC2000 atu, built like a tank. G4UJW. Tel 01-346 8597.

Hewlett-Packard oscilloscope 1707B, 75MHz dual beam, mains/batt, portable, complete with probes, £390. Teleguipment oscilloscope CD1011 dual beam, 10MHz, portable 10x8cm CRT, £150. BBC disc drive 3in and five discs of games, £70. Cannon camera A1 50mm, £200. lotec computer with micro vites 14in colour monitor, dual DSDD disc drives Z80 64k ram CPM OS, large qut software eg, Wordstar, Basic 80, Pascal assembler C Basic ADA Bascom BSTAM C, lots of utils, £700. May split. G8BXH. Tel 01-428 0974.

FT200 tx/rx, handbook, spare valves, clean, no mods, gd cond, buyer collects or carriage extra, £225. HQ1 minibeam 6/10/15/20m with balun, buyer collects, £75. Ray, G4ILQ. Tel Kidderminster (0562) 4930.

Icom IC251E with Mutek front end, used little ICR70 rx with fm tested but never used, both rigs in superb cond, £450 ea, both for £850. Ian, G6NKB, QTHR. Tel 0509 502989 after 6pm.

Yaesu FR101 rx 160, 80, 60, 40, 31, 25, 20, 19, 16, 15, 13, 11, 6, 2m bands, pwo, £195 ono. Michael, G1DND. Tel 01-958 8516.

FT707 gd cond, £375 ono. Good reason for sale. Tel 01-660 6075.

Shack clearance, Icom 271E, £495. Icom ICR70 plus fm, £395. Trio 7930 25W 2m, £195. Yaesu FTV901R 2x70, £350. Trio 7730 2m fm, £150. FRV7700, £45. Yaesu active antenna, £35. Eddy-stone 940, £95. Lowe SRX30D, £95. Dealers welcome. Tel 01-594 3495, 10am-4pm.

Gen radio sig gen and high speed scope, the lot, £20. L Hawkins, 17 Barkway Road, Royston, Herts. TR7500 fm 10W mobile, mic, handbook, mobile mount, £115 ono. SB104A SB604 solid state 100W cw/ssb, digital readout, mains psu in SB604, spkr, handbook, £135 ono. HROMX psu 9GC coils, offers. G3RZC, QTHR. Tel 0424 892504.

IC290A, 2m multimode tx/rx, mint cond, £275. IC502A 6m ssb/cw tx/rx, mint cond, £150. Unused KLM 27-40 432MHz Yagi, £25. Kokusai 455kHz mechanical filter with carrier xtal, £10. Spare Intel prompt 48 board, offers. Tel Dave, Cambridge (0223) 843604.

FT790R, nicads charger, carry case, £195 ono. FT290R same, £220. Sony C6UB beta video, n/heads fitted, complete with 10in b&w monitor, £190 ono, or exch, W.H.Y? FM HB/Dash Cambridge R1 fitted, £30. W.H.Y? G1EZJ, QTHR. Tel 0782 46570.

Creed 2300 teleprinter, with punch and reader

unmodified, 50 and 75 baud, £95 ono. G4ULD, QTHR. Tel 01-390 2766.

Collins KWM-2A, PM2-PS h/book spare valves matching i/s SM-2 desk mic, £400. Lattice tower 65' winch 3 sec, £250. Contact Peter, G4VUN, 0642 456327 10-5pm. Week days buyers to collect.

FT290R Mutek pre-amp, micro modules 25W linear, charger, Halbar foldi five portable beam, Halbar omi twin vert antenna, £270 the lot. Bencher BY1 squeeze key black base, as new, £35. G3BPE, tel 0373 862939, not QTHR.

FT480R 2m multimode in orig packing used little, £225. Microwave Modules 2m/70cm transverter used little, £100. they go well together so £300 the pair. Tel Huw 0222 590864 day or 0222 560424 evening.

Datong D70 morse tutor, £38. Hugh, G0AVU. Tel 06686 228.

FTV901R and 144MHz unit, £150. Alphacom 32 printer for ZX81/Spectrum, £45. Mobile mount FT77707, £13. 3N/4 wave antenna suit 10m, £30. 5Vx60A Farnell psu (damaged but works, cost £20), £15. Drae wavemeter, £17. Mic mixer, £5. All ono. Martin, G1GYC, QTHR. Tel 061 483 2330.

Trio 9000 2m multimode, vgc, £270. 10m transverter MMT28/144, £65. 2m switched preamp MMA144V, £15. Peter, G4OIM. Tel 01-464 4927.

HyGain Thunderbird junior TH3 JR 3-4ele triband beam antenna, needs cleaning, used by swl only, £75 ono. G4TXV. Tel Kidderminster 515305.

FRT7700 ATU new unused, £35. Drae morse tutor used little, £35. SMC T3 170L twin meter 3.5-170MHz, £12. BR53624. Tel 0709 816554.

Open University microprocessor and product design course for engineers, includes course manuals, experiment books, complete micro computer system with full qwerty keyboard plus experiment board, £299 ono. Tel Kildsgrave (07816) 71264 after 6pm.

PET/CBM sale by tender, available December, with vdu, tape drive, gwo. Several of 2000/8k, blue, green/DOS screens, 2000/32k, green/DOS, disc drives, newish 1541 (64VIC) 2031 (Pet/CBM). Printer 3022. Offers with sae. M M Fry, 4 Deansway, Warwick CV34 5DG by middle October.

Superb standard C110E 2m handheld tx/rx, antenna, case, in mint cond, but without batteries, £125. Laurence Mendes, The Portrait Studio, 38-40 Port Street, Evesham, Worcestershire, WR11 6AW. Tel Evesham (0386) 49760.

TS520 cw filter fitted VFO520, manuals etc, £300. BK100 bug key, £10. All first class cond. G3BII QTHR. Tel 04946 5528, after 6pm.

QTH, Superb 4/5 bedroom QTH, with purpose built shack, 17ft by 9ft, attached to rear, ideal flat take-off, secluded garden, three miles to M5 m/way, good local dx interest, handy to shops, schools etc, but very quiet, £65,000. G4XOS. Tel 0384 371108.

Emoto SO2CXX rotator, almost mint cond, £90. Western Electronics DX33, 3-4ele antenna, damaged so only £30. G4GBR, QTHR. Tel 0228 61120.

Icom 720A hf tx/rx, ICSP3 spkr, ICPS15 psu, ICSM5 desk mic, matching Welz SP15M swr/pwr meter, AC38M atu, CH20 coaxial switch, boxed as new, £750 ono. High Mound HK808 morse key, new, Telescopic steel box section mast 21ft 6in down, 36ft 6in up, mount for rotator, two winches, all fittings, as new, £400 ono. 10m converted new DNT, £40. Unopened G5RV, £10. G6XFB not QTHR. Tel 0702 72164.

IC720 hf nine band tx, 160m-10m, gen cov rx, mic, int spkr, PS15 psu, hardly used, also five band vertical AE with radial kit, moving going QRT, must sell, offers/inspection invited. G3NWM. Tel Felixstowe (0394) 283769 evenings/weekends.

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13cm cavity, 40W o/p, new, £60 inc post. QTY of PTFE sheet, £3 per sq ft. New 4CX250K, coaxial (cost £76), £25. 4CX250B/432MHz stripline amplifier, 300W o/p, incl blower, relays, new tube/ socket, bargain, £250. Will exchange any of the above for a Bird 43 and/or elements. G4J4CD, QTHR. Tel 0534 77067, office hrs.

Datong FL2 filter, £60. M/M 10m preamp, £12. Drae three-way antenna switch, £10. Vhf N-plug two-way switch, £8. Satellite experimental handbook, £6. Vhf handbook for radio amateurs, £4. ARRL

operating manual, £2 ono. G6LPT, QTHR. Tel 01-959 4849.

FT707 with FP700 psu, exc cond with orig packing, £450. Carriage extra. G4TJG, QTHR. Tel Reading 0734 866770.

70cm 24-elt lightweight Yagi, brand new, orig packing, £25. Buyer collect. New 'record a call' telephone answering machine, remote 80A, £90. Polaroid 350 with portrait attachment, as new, £50. G3AAG. Tel Hants (0730) 892143/893534.

Yaesu FT707, plus psu, and Trio atu, Adonis headset with scan, and Yaesu desk mic with scan, £495 ono. G6PBG, QTHR. Tel 0293 510491.

FT290R, Mutek front end, used little, boxed, vgc, 5/8 whip boot mount, the lot, £240. G8GGG not QTHR. Tel Oxford 773979.

Sale/exch, Digital storage scope, Gould OS4000, s/h value £650, exch for TL922, FT757GX, TS430S, TS770, FL2100Z, IC740, QRO 2m linear, sstv, tx/rx equipment. W.H.Y? G4NVD, QTHR. Tel 0472 71999.

Yaesu FT208, April 85, perfect, £160. Matching HL30V, 30W linear, perfect cond, £40. Yaesu FT708, as new, £145. Yaesu PA3, £7. Matching spkr/mic for use with above. G3KLF. Tel Fareham 236906 evenings/weekends.

Realistic DX301 digital hf rx, as new, £100. Full size students microscope, three objectives, three eyepieces, many accessories incl camera adapter (Pentax), wooden case, £45. Minolta autocord 2.25 sq reflex camera, mint, £50. G1CRB, QTHR. Tel Coventry (0203) 413350.

IC251E, 144/100S linear, swr meter, rig, £375. Linear, £85. Together, £450. IC251 fitted Mutek board, complete with handbook and service manual. G3CBW, QTHR. Tel 0228 39291.

Icom IC271E with preamp fitted, no mods, £495. Will deliver reasonable distance. Mike, G4CJJ, QTHR. Tel Sheffield 748319, after 6pm.

Separates from Heathkit, SB301 rx, SB401 tx, in wkg cond and used regularly, £200 ono. G4DXI, QTHR. Tel Sittingbourne 25364, 6-10pm.

TR9130, B09 system base, Arrow 12/15A psu, Welz SP15M meter, coaxial switch, rotator, Q6 beam, colinear, all coaxial feeders, 7/8 mobile antenna, including gutter mount, complete stn, £550. John Tyerman, G6TVE. Tel 061-236 3838, daytime until 5.30pm.

144MHz G2BCX 16-elt beam, £15. Transformers, 15V plus 15V 1-6A, £4. 20V plus 20V 3A, £6. Wanted Memory unit for FT225RD. Will buy complete rig if necessary. Also Sept 84 Radcom, backnumbers QST, 73, VHF Communications. G4NVA, QTHR. Tel Knutsford 33011.

Zycomm 2m fm handheld tx/rx, 144-148MHz spare nicad, charger case, mic, £95. G4RNR. Tel 0533 867855.

Trio R600 rx, 150kHz-30MHz, £235. Yaesu FRT7700 atu, £35. Both perfect cond, only seven months old. Tel Troon (0292) 316807.

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FT277ZD, FT1012D, mic, fan, dc to dc converter, narrow cw filter, a.m. and fm, FC902 tuner, SP901 spkr, headphones, balun traps, colour Genie c/w Radsoft rtty software, and tv, AU handbooks and workshop manual for rig, £70. Tel 01-697 3445.

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Icom 260E, 10W, fm/ssb, complete with mobile mount scanning mic, and manual, boxed, £180 ono. G6ZPS. Tel 01-394 1465.

Yaesu YC355D frequency counter, 5Hz-200MHz eight digit readout, £70, or exch for Trio PS30 psu or similar 20A unit. Bob, G0ARF not QTHR. Tel 054-47 350.

Trio TS520, remote VFO, both as new with orig packing, £300. May consider part exch with FRG7, or similar. Several RSGB publications, home kit built GDO, going QRT. Peter, G4NRS. Tel Hartlepool (0429) 870058.

World wide countries check list, keep an easy

check of countries worked or heard on hf, vhf/uhf, and satellites, includes full countries, prefix, and continent index, £2.50 plus 50p p/p. A Goodier, 35 Rose Lane, Marple, Stockport, Cheshire, SK66DS.

WANTED

Wide spaced variables 200 to 350 PF (two). For sale RF noise bridge, £12 (incl postage). J Van Walwyk, G3YRW, 11 Valette Court, St James Lane, London, N10 3RA.

Band pass filter 144-146MHz. G18OLV, QTHR. Tel 0265 823278.

Trio 120S or 130S and Trio 530S, also Eddystone 830 rx. G3XFB, QTHR. Tel 0902 850033.

KW2000B with psu, xtals, mic in wo, or similar tx/rx. Geoff, G4VWH. Tel 0908 665100.

To buy or photocopy handbook for FL1000 linear. Frank G0AKX. Tel 061-928 6828.

Weston electric model 507 2.5in thermocouple ammeter to measure 0-2A rf, or similar instrument, original plug-in coils, earphones, biscuit tin for MCR1 clandestine wireless set, BBC approved xtal wireless set for exhibition. Stan, G3XON, QTHR. Tel Guildford (0483) 36953.

FM board for FT1012D. Gd cond essential, fair price paid. Jim, G4VMD, QTHR. Tel 021-706 3570.

Sharp PC 1500 inside information esp opcodes, undocumented keywords etc. G8APX, QTHR.

Drake SP-75 speech processor, must be in pristine cond. Stuart, G4OOK, QTHR. Tel 0642 211685.

HD rotator, Ham IV or similar, also tri-band 3-elt beam such as TB3, perfect cond. G4LIH, QTHR. Tel 0642 781818.

Drake TR7 or 7A. GW3NNF, QTHR. Tel (Amlwch) 0407 830282.

Heath OS-2 scope, non-wkr considered. Stratfull, 55 Craigwell Lane, Aldwick, Bognor Regis, West Sussex, PO21 5AN. Tel 0243 861578.

Valves, 6N6G, PA20, PX4, SV4B, AC/VP1, HL13C etc. Early radio receivers up to late 30s, especially sets with fretwork books on radio and wholesalers catalogues of radios. G4OOW, QTHR. Tel Hincley (0455) 612091 after 7pm.

Schlumberger 4900 rf-af measuring unit, buy or borrow service manual, circuit or any info on above. G8EVG, QTHR. Tel Nottingham (0602) 820517.

Heathkit HW8 and/or ex WD A128 set with accessories will accept HN8 with mods but prefer A128 as issued, premium prices paid for exceptional examples. Nicholson, Koschatgasse 32/1, Vienna 1190, Austria. Tel Vienna 454470 evenings.

Heath OS-2 oscilloscope, clean non-wkr considered. Stratfull, 55 Craigwell Lane, Aldwick, Bognor Regis, West Sussex, PO21 4XN. Tel 0243 861578.

FT290R in gd cond, also small portable transistor radio with gd shortwave performance. Tel Blackpool (0253) 404566.

DC-DC mobile psu, 4 transistor type as used in KW2000B series tx/rx, three required, going rate of £25 paid. G3ROZ, QTHR. Tel 0767 80828 Saturdays only.

Meter movement for AVO valve characteristic meter, Mk3 (VCM 3), can anyone help please? G4CWB. Tel Harrogate (0423) 504373.

VFO700 for VFO7010 for use with TR7010. G4EHU, QTHR. Tel Bridgwater 455923.

Can anyone provide present address of WA1ARF Swan Islands 1971 and G3OGI New Guinea (VK9MH) 1973, your postage or expenses refunded. GM3AWW, 16 Broom Road, Newton Mearns, Glasgow. Tel 041-639 2370.

Eddystone short wave manual no 1 required and short wave (Lissen Ltd) no 5, borrow or purchase, all costs refunded, also to complete long standing project, black UX6 moulded valve holder, max diameter 1 1/2in. G4IMT, QTHR. Tel Bath 891254.

HF linear, KW1000, KW600, FL1200B or Heathkit equivalent must be in gd wkg cond. John, G4VJK, QTHR. Tel 0273 783556.

Yaesu FC107 antenna tuning unit for FT107M in fair/gd cond and gwo, can you help? Ian G6ZNT, QTHR. Tel (0993) 2900 day, 75337 night.

HW8 in gd unmodified cond, good price paid plus

post and insurance if necessary. Write Niewiadomski, 29 Mackinley Avenue, Stapleford, Notts. MML 144/30LS linear, must be in mint cond. G3HEE, QTHR. Tel 0778 424500 (work), 0780 55001 (home).

Trio PS30 psu, or similar unit with 20A rating for exch or sale. Yaesu YC355D frequency counter, 5Hz-200MHz, eight digit readout. Bob, G0ARF not QTHR. Tel 054 47 350.

CV1596 cathode ray tube, as fitted to Hartley 13A oscilloscope. G3RVH, QTHR. Tel 0983 293323.

KW 2000B ac power supply any cond, if mains transformer is ok or transformer only. G3AIU, 17 Brook Meadow, Wroughton, Swindon, tel Swindon (0793) 814280.

A Codar PR30 9v operated pre-selector, battery only, to use with JR310 rx by Trio, must be in gd cond. RS86238. Sylvania Enzie, Buckle, Banffshire, Scotland AB5 2BN. Tel Wood Cloven 378.

KW600 linear amplifier. G3REO, QTHR. Tel 0966 41329.

RTTY program for CBM 2001 8k pet, must have 45 and 50 bds facility, don't want the macrotronics program, would also like to contact anyone else with 2001 pet who runs rtty. Write/phone G4JXI, QTHR. Tel Leigh (0942) 605839.

Any make hf tx/rx, six band preferably, age and cond immaterial, will take faulty rig if complete, must be cheap. John, GM4LGM, not QTHR. Tel 0389 58840 evenings after 6.30pm.

Radio shack realistic xtal and synth scanners, prefer synth, other makes considered, also gen cov rx, FRG7, DX302, etc. Cash or goods offered in exch. G6SSG not QTHR. Tel Peterborough (0733) 46770, daytime.

Realistic scanners, pref synth. DX302 FRG7 airband rx. Exch for goods or cash. Can supply Tandy realistic spares and diagrams. G6SSG. Tel Peterborough (0733) 45731.

DH391 or ICP1 CRT, HRO coils, 50-100MHz, 430-960kHz. For sale FRG7000, exc cond, £150. Icom 1050 (B), all mods completed, £35. Bremi mains 10m 200W linear, £50. Tel Peter, Purfleet (Essex) 866531.

Ten inch HD monitor, mono for Osborne 1, seller deliver, unmodded prop pitch motor, lengths 1-625in fibreglass tubing, anchor winch 12V, copy of electronic designers handbook, McGraw Hill 1957. 4000 non-inductive resistors. G3AAG, Tel Hants (0730) 892143/893534.

Manual and circuit for RCA AR77E, GM3KMF, QTHR. Tel 0592 742249.

Heathkit phasing type ssb adapter unit SB10, as used during the 60s, with Apache and DX100 txs. Postcard please stating cond and price. N Harwood, 12 Rollason Rd, Edginton, Birmingham.

HF linear, must be in gwo. FL2100, TL922, SB201, KW1000 or anything over 500W. G4MBT, QTHR. Tel 0642 485355.

KW1000, best price paid, cond not important. G3LZN, QTHR. Tel 021-356 7144 office hours.

WS38, WS18, WS68P, SCR536, required for WW2 displays, U/S but complete in appearance—price and cond. G3KPT, QTHR. 021-358 1573.

Exch AVO Mk8 IV leather cased as new, for Trio R5995 rx, consider cash adjustment if cond warrants, other similar model considered. G6DCM, QTHR.

Swan psu type 230-XC for 350 tx/rx, Swan model 410C frequency control unit. John, G8HHI. 43 Bartsons Drive, Yateley, Camberley, Surrey GU17 7DW. Tel 0252 871555 after 7pm.

Ex-WD R109 rx, ac power plug for class D wave meter No 2, headphones for R209/class D wave meter, R209 Mk2, any man packs or spy sets B2, etc. Keith, G4MSF, QTHR. Tel 091-4693955.

Benchner paddle or any quality unit, old quality morse keys, xtal sets—homemade or commercial, printer suitable for Spectrum computer plus interface, old heavy duty rotator CDE, etc. 17-elt Tonna. W.H.Y? Harry, G4PDT. Tel 01-952 9548.

IC402 70cm ssb portable in gd cond, gd price paid, 23cm receive converter. For sale 10-elt 2m Jaybeam Yagi, as new, £15 ono. Please write. Steve, G1JJA, QTHR.

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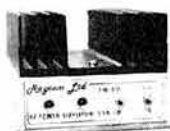
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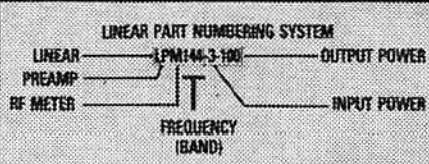
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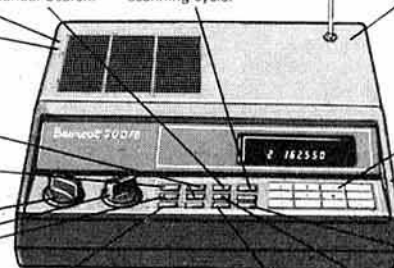
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432/19T	19 ELE	2.2M	14.2 dBd	£35.50	A
432/17X	17 ELE Crossed	2.2M	13.4 dBd	£49.17	A
432/17T	17 ELE Long	2.9M	15dBd	£39.20	A
432/5B	5 ELE Back Mount	7M	9.2dBd	£16.95	B
2M					
144/5	5 ELE	1.5M	9.2dBd	£19.55	A
144/7T	7 ELE	1.8M	10dBd	£24.15	A
144/8T	8 ELE Long	2.45M	11dBd	£31.26	A
144/14T	14 ELE	4.5M	13dBd	£46.71	A
144/19T	19 ELE	6.57M	14.2dBd	£55.88	A
144/5X	5 ELE Crossed	2.5M	10.2dBd	£39.75	A
144/5P	2M Ground Plane			£14.41	B
4M					
70/3	3 ELE	1.7M	7.1dBd	£30.12	C
70/5	5 ELE	3.45M	9.2dBd	£45.74	C
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RPM 1.5M (2" dia)				£19.50	D
RPM 3M (1 1/2" dia)				£34.50	D
RPM 3M (2" dia)				£39.00	A
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8. 2M Linear/Pre-amp 25W	(144PA4/S + 144LIN25B)		48.00
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18. 24cms FMTV Transmitter (Ass)	(UFM01, 70LIN3/LT, 70FM10, WDV400/1200 Boxed)		140.00
			170.00

70cms Transceiver Kits and Accessories

	CODE	ASSEMBLED	KIT
FM Transmitter (0.5W)	70FM05T4	52.25	33.05
FM Receiver (with PIN RF c/o)	70FM05R5	68.75	48.10
Transmitter & Channel Adaptor	70MC06T	21.75	14.95
Receiver & Channel Adaptor	70MC06R	25.95	18.80
Synthesiser (2 PCB's)	70SY25B	91.60	65.35
Synthesiser Transmitter Amp	A-X3U-06F	36.40	24.30
Synthesiser Modulator	MOD 1	9.10	5.75
Bandpass Filter	BPF 433	6.95	3.65
PIN RF Switch	PSI 433	7.90	5.60
Converter (2M or 10M i.f.)	70RX2/2	28.40	21.10

70cms Power Amplifiers (FM/CW Use)

500mW to 500mW	70FM1	24.60	15.75
500mW to 3W	70FM3	28.75	20.50
500mW to 10W	70FM10	48.10	38.50
3W to 10W	70FM3/10	27.05	21.05
10W to 40W	70FM40	78.60	60.20
Combined Power Amp/Pre-Amp (Auto Changeover)	70PA/FM10	63.50	46.10
500mW to 3W (Auto Changeover)	70FM3B	T.B.C.	T.B.C.

70cms Linears

500mW to 3W (Straight amp, no changeover)	70LIN3/LT	31.40	23.10
3W to 10W (Auto Changeover)	70LIN3/10E	47.20	35.70
1W to 7W (Auto Changeover)	70LIN10	50.15	37.40

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FM Receiver (with PIN RF Changeover)	144FM2R5	68.25	49.50
Synthesiser (2 PCB's)	144SY25B	84.10	63.00
Synthesiser Multi-Amp (1.5W O/P)	SY2T	30.95	23.75
Bandpass Filter	BPF 144	6.85	3.65
PIN RF Switch	PSI 144	7.90	5.60

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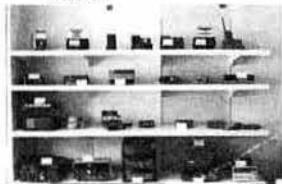
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Please write clearly. No responsibility accepted for errors.
 Latest date for acceptance—7 weeks before 1st of issue month.
 All classified and semi-display advertisements MUST be prepaid.

Copy and remittance to: M. J. HAWKINS G3ZNI, RSGB Advertisements,
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 (Cheques should be made payable to RSGB.)

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NEW PRODUCT NEWS



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Demodulates: CW-SSB (USB & LSB), FM (narrow and broadcast including stereo MPX output), AM also TV and panadaptor possibilities. This is complemented by an all mode (communications) squelch plus a wideband F.M. adjustable mute.

SELECTIVITY

Four IF bandwidths provide the optimum selectivity for telephonic modes usually encountered.

SYNTHESISER STEPS

Seven step sizes offer world wide compatibility whilst the inclusion of auto selected bandwidths coupled with mode and steps allows for simple, rapid, search and scanning.

CLOCK/TIMER

24 hour clock shares readout with display. Programmable as on/off timer with contacts to control a tape recorder etc for which a line output is provided.

SCANNING

Manual scan, using convenient up/down keys (momentarily press for 1 step change -500mS depression for scan), memory scan plus limited band scan (defined by two adjacent memory channels). Scan halts on a carrier or on modulated signal only, with auto resume of scan and time to scan start indication.

DISPLAY

Bright pleasant green fluorescent display providing; 7 digit frequency readout (or time), two colour graphic signal strength, indicator mode, step size, memory channel number, control status (dial-priority etc) at a glance.

MEMORIES

100 channel (10 x 10 groups) containing frequency and mode with '5 year' Lithium back up. Priority channel, checkable every 3 seconds, is available during both scanning (normal or limited) and dial modes.

COMPUTER CONTROL

Optional interface (FIF series—RS232C or specific models) provides frequency and mode selection for 'infinite' memory capability with most home machines. Intercept role using interactive control from AGC output and scan stop information provided.

SPECIFICATIONS

Frequency Coverage
60-905 MHz
(60-460 MHz for SSB)

Frequency Resolution
100 Hz (Digital Readout)

Modes of Reception
AM, CW/SSB (LSB/USB), NBFM, WBFM, TV*, A3E, A1A, G3E, J3E, C3F*.
(*NTSC Demodulator Option)

Selectivity (@-3dB)
AM (A3E H3E),
2.4 KHz (N), 6.0 KHz (W).
CW/SSB (A1A J3E);
2.4 KHz
NBFM (G3E) Narrow;
15 KHz
WBFM (G3E) Wideband;
180 KHz.

Tuning Steps
AM-N; 100 Hz/1KHz.
SSB; 100 Hz/1 KHz.
NBFM; 5/10/12.5/25 KHz.
WBFM; 5/10/12.5/25 KHz.

Image Rejection (Typical)
-50 dB (60-460 MHz).
-40 dB (460-905 MHz).

IF Frequencies
45.754, 10.7, 0.455 MHz.

Conversions
Triple: AM, SSB/CW, NBFM.
Double: WBFM.
Single: T.V.

Audio Output
1W into 8 ohms @ 10% T.H.D.

Power Requirements
Operating: 550mA (Max Volume).
Standby: 100mA (Clock etc).
Off: 3µA (Memories).

Sizes (Ex/Inc Projections)
218/245 D, 79/91 H, 18W mm.
Weight 2.19Kg (W/O NTSC Unit).



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